M01 Maximizing the Cost Effectiveness of IT

Course Duration: 12 hours

Course Content

- Basic idea of ERP
- About ITSM
- How IT is measured on an enterprise’s value drivers
- Apply ROI and TCO to measure cost effectiveness throughout the project
- Apply appropriate s/w tools

Enterprise Systems

1. **Evolution of ERP Systems**
2. **Components of Enterprise Systems**
3. **Dell: Pioneer of Virtual Integration**
4. **Cisco Did ERP Project Right !**
5. **Fox-Meyer Drugs Went Bankrupt!**
6. **Hershey: “Candy Everywhere But Not In The Stores”**
7. **Hidden Costs of ERP Implementation**

What are Enterprise Systems?

An ***integrated*** suite of information systems that form the backbone of the enterprise for ***running*** and ***managing*** its operations

Back To Back:
Enterprise Systems Encompass

- **Front-end systems** like Customer Relationship Management

AND

- **Back-end systems** like Enterprise Resource Planning and Supply Chain Management

Objective:
Seamless and Transparent
Flow of Data
Across the Entire Value Chain

The Big Problem with Information Systems Today…

…“ **Islands of Automation**”

- ✓ ***Stand-alone systems*** designed for specific processes
- ✓ ***Cannot “talk”*** to each other within the organization
- ✓ Much less, ***externally*** with the systems of customers or suppliers

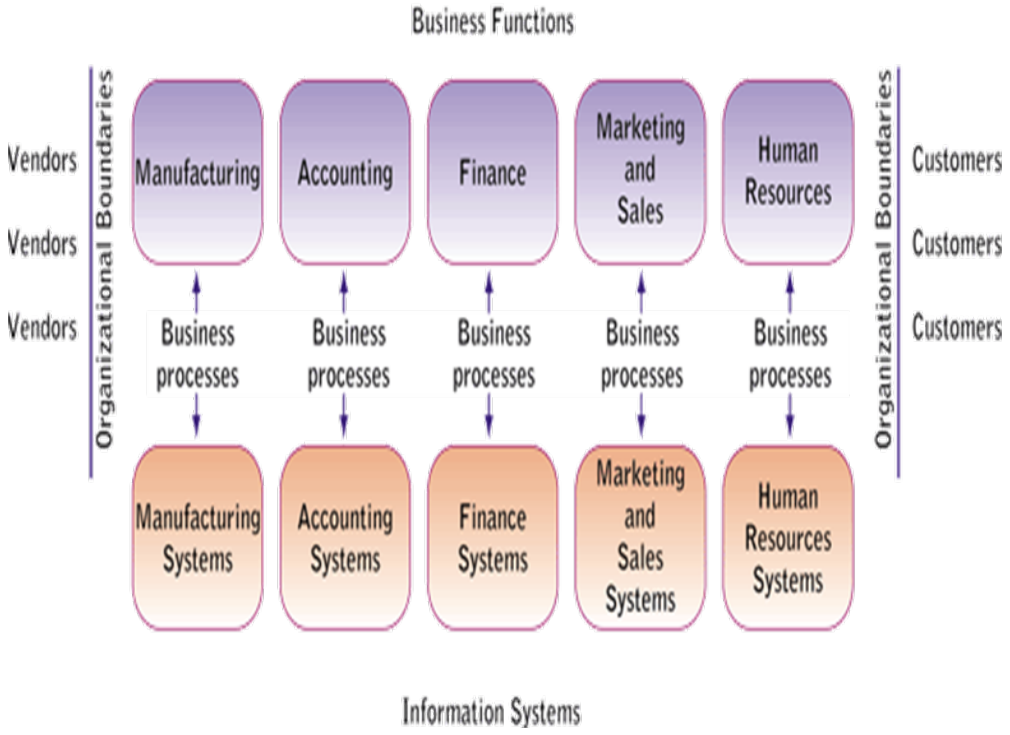
Drivers of Enterprise Systems

- ✓ Inefficient operations
- ✓ Higher internal costs
- ✓ Lack of coordination with suppliers
- ✓ Poor customer service
- ✓ Missed opportunities for revenue

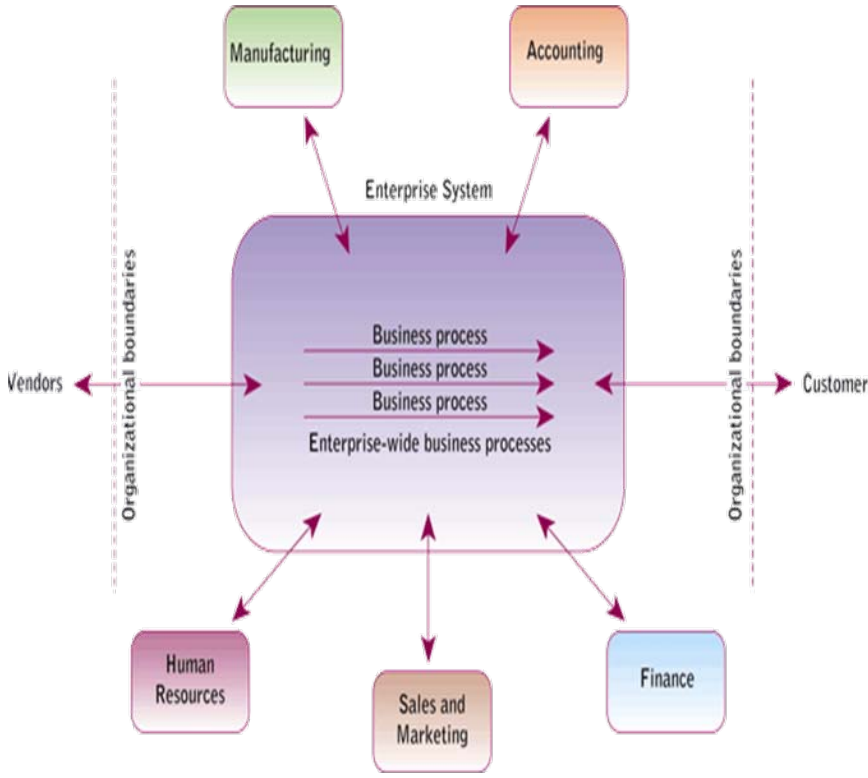
Most Important: Emergence of the Internet
A cost-effective means to connect
the back-office and front-end systems

IT Architecture Should Integrate Information, Processes and Functions

Traditional View



Enterprise View



Evolution of ERP Systems

- ✓ **Material Requirements Planning (MRP) System**
  - **For each SKU**
    - **… Estimate Material Requirements for Next Month/Quarter/Year**
    - **… Using Bill of Materials (BOM) for the SKU**
    - **… And Sales Forecast in Units for that SKU**
  - **Aggregate Material Requirements for all the SKUs**
- ✓ **Manufacturing Resource Planning (MRP II) System**
  - **A natural expansion of the MRP system to all the resources required for manufacturing the SKUs**
  - **Machines, Men, Energy, …**
  - **IBM's MRP II system – a popular software package riding on the back of IBM's 70+ % share of the mainframe market**

The Customer's Pain Point - Not Addressed by IBM

- ✓ **The Familiar Islands of Automation Problem**

  - **ICI (Europe) requested IBM to develop an electronic link for the data transfer**
  - **IBM's focus: Hardware at that time – ignored software needs**
- ✓ **SAP: Launched by Hasso Plattner**
  - **IBM's Account Executive for ICI (Europe)**
  - **An Integrated Software for Manufacturing & Financial Systems**
- ✓ **PeopleSoft: Launched by David Duffield**
  - **An Integrated Software for Human Resources & Financial Systems**
- ✓ **Enterprise Resource Planning (ERP) Systems**
  - **An Integrated System for Manufacturing, Human Resources & Financial Systems**

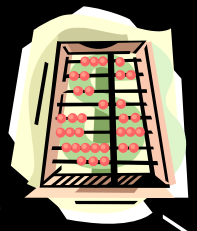
Why ERP Systems Took Off ?

- ✓ **Looming Y2K Problem**
  - **Repairing Legacy Systems Not Cost-Effective**
    - … **Poor documentation of programs**
    - … **COBOL language – a relic of the Sixties**
    - … **High Costs**
    - … **Problem of Silos will persist**
- ✓ **Promise of ERP Systems**
  - **Y2K Complaint**
  - **AND, Integrated System**

Finance:

Modules for bookkeeping and making sure the bills are paid on time.

General Ledger
Accounts Receivable
Fixed Assets
Treasury Management
Cost Control



Human Resources

Software for handling personnel-related tasks for corporate managers and individual employees.

HR Administration
Payroll
Self-Service HR

Manufacturing & Logistics

A group of applications for planning production, taking orders and delivering products to the customer.

Production Planning
Materials Management
Order Entry & Processing
Warehouse Management
Transportation Management
Project Management
Plant Maintenance
Customer Service

Transaction Engine:

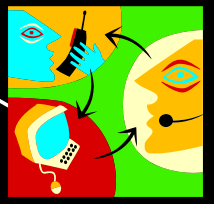
Core software that manages the flow of transactions among applications.and handles tasks such as security and data integrity

Data Analysis:

Decision-support software that lets senior executives and other users analyze transaction data to track business performance.

Supply Chain Management:

Advanced planning applications that take into account production constraints, demand forecasting and order delivery promises.



Front-Office Applications:

Sales force automation, telemarketing and call center support software for use in dealing directly with customers

Four Major Components of Enterprise Systems

1. **ERP**
   - Enterprise Resource Planning systems evolved from Manufacturing Resource Planning (MRP) systems
   - Integrate all the ***internal*** processes and data flowing through the organization: the **"back-end" systems**

2. **CRM**
   - Customer Relationship Management systems evolved from Sales Force Automation (SFA) for contact and lead management
   - A full suite of applications for telemarketing, call center (today, contact center), ... for supporting marketing, sales and services: the **"front-end" systems dealing with the customer**

Four Major Components of Enterprise Systems *(...contd)*

3. SCM

- Supply Chain Management systems address the problem of fulfilling, and responding to changes in, demand at a minimum cost.
- Advanced planning applications that take into account demand forecasts, production constraints, ...**front-end systems connecting to suppliers, logistics providers,** ...to get the right product to the right place at the right time at the right cost.

4. BI

- Business Intelligence systems, the new label for Decision Support Systems (DSS) and Executive Information Systems (EIS), including Data Warehousing and Data Mining
- **Systems for analyzing the vast amount of internal transaction data and external data** about customers and competitors to track performance and manage the business more effectively

The Internet Changed The Rules of the Game

It is all about:

- **Communicating**
- **Co-ordinating**
- **Collaborating**

with the OUTSIDE world

…Not just speeding up and automating a company's internal processes

…Spread the efficiency gains to the business systems of its suppliers and customers

…Collaboration is the competitive advantage

Dell Virtually Integrated the Value Chain with its Customers and Suppliers

The dominant model in the personal computer industry – a value chain with arms-length transactions from one layer to the next:

Dell's direct model eliminates the time and cost of third-party distribution:

Virtual integration works even faster by blurring the traditional boundaries and roles in the value chain:

Benefits of Virtual Integration

- **Dell's Suppliers**
  - … Connected to Dell's customer data through the corporate extranet
  - … Have real-time access to Dell's customer orders
  - … Can schedule production and delivery to ensure Dell's production line moves smoothly
- **Dell's Customers**
  - … Connected to Dell's supply chain via website
  - … Can track the progress of their order from Dell's factory to their doorstep
  - … Save time and cost on telephone or fax inquires
- **Dell: Big Savings**
  - … Low Inventory: 13 days in 1998 vs. 40+ for Compaq – Now counting inventory in "hours"
  - … Customer Self-Service: Frees up Dell personnel

A Big Splash In Wall Street in March 2001...

Nike Says Profit Woes Due To IT

Philip Knight, Nike's Chairman and CEO, blamed the "complications arising from the impact of implementing our new demand-and-supply planning systems and processes" for the shortages of some products and excess amounts of others as well as late deliveries.

Result: Profits Fell Short of Estimate by 33%

I guess my immediate reaction is:

This is what we get for $400 million?

Source: Computerworld, March 5, 2001

Nike's IT Disaster is Not An Exception...

- ✓ **ERP Projects**
  - **A mere 5% of projects were a major success. (McKinsey)**
- ✓ **CRM Projects**
  - **55% - 75% of projects do not meet their stated objectives. (Meta Group, 2001)**
  - **70% of "big" CRM projects (Cost > $50 M; Time > 1 year) fail. (Gartner Group, 2001)**

CRM – Hot Area for IT Spending But… A Big Challenge to Implement

- **CRM involves a radical cultural shift that reshapes a company's sales, marketing, and customer service**
- **Unfortunately, it doesn't occur magically once the software is booted up**
- **Too often, companies see CRM as software, when it is merely an enabler, a tool in their tool kit**

The Big Hurdle: Change Management

- **87% of respondents in a recent survey conducted by online resource center, CRM Forum, pinned the failure of their CRM programs on the lack of adequate change management**

Case Study

- Cisco’s ERP Implementation

Cisco's Dilemma in Late 1993

1. **Legacy system could not handle 80% annual growth rate of Cisco.**

   Constant band-aids to meet business needs resulted in the application becoming "too much spaghetti."

   Systems outages became routine exacerbated by the difficulties of recovering from outages.

2. **CIO's Viewpoint**

   - Each functional area had to make its own decision regarding changing the legacy system and fund it.

   - Not in favor of ERP solution because it could become a "mega-project"

Problem: ***None of us was going to throw out the legacies and do something big.***

The Defining Moment

January 1994:

- **The legacy system crashed because a workaround due to the system's inability to perform malfunctioned, corrupting the central database.**
- **Shut down the company for two days**

↓

Autonomous approach to replacing legacy systems in Order Entry, Finance and Manufacturing will not work.

↓

SVP of Manufacturing took the lead - put together a team in February to investigate the replacement

Process for Selecting ERP Vendor

1. **Could not be an IT-only initiative**
   - **Must have the very best business people on the project**

2. **Need a strong integration partner to assist in both selection and implementation of the ERP solution**

3. **Selected KPMG because they brought experienced people to the engagement, not "greenies"**

4. **Team of 20 people tapped the actual experience of large corporations and knowledge of sources such as Gartner Group**
   - **Narrowed the field to 5 candidates within 2 days**

5. **After a week of evaluating the packages at a high level, two prime candidates were selected - Oracle was one.**
   - **Size of the vendor was an issue in the selection**

Process for Selecting ERP Vendor

6. **Team Spent 10 days on the Request for Proposals**
   - **Vendors given 2 weeks to respond**
7. **Visited reference clients of each vendor as part of "due diligence"**
8. **Vendors invited for a 3-day software demo**
   - **To show how software could meet Cisco's needs using sample data from Cisco**
9. **Oracle selected because**
   - **Better manufacturing capability**
   - **Made number of promises about long-term development of functionality - Oracle wanted to win badly**
   - **Same location as Cisco**

Total Time:	**75 days**
Time clock:	**May 1, 1994**
Next step:	**Board Approval**

Estimating Project Time

1. **Cisco's Financial Year: August 1 - July 31**
2. **Constraint: Cannot implement in Quarter 4**
3. **One option: July/August 1995**
4. **Rejected it - too late**
5. **Worked backwards:**
   - **Qtr 3 - System should go live**
   - **So it would be completely stable for Qtr 4**

Target Date: February 1995

Project Time: 9 months

Rationale for ERP Investment

- **Cisco had NO CHOICE but to move**
- **Three Options**
  1. **Upgrade legacy system**
  2. **Replace it in parts**
  3. **Big bang implementation**
     - **One ERP solution for all systems in 9 months time**
- **ERP Project Cost: $15 Million**
  - **Single largest capital project at the time**
- **Justification:**
  - **No Cost-Benefit Analysis**
  - **“We are going to do business this way.”**

ERP System became one of Cisco’s top 7 goals for the year

The Implementation Team

- **Executive Steering Committee**
  - **VPs of Manufacturing & Customer Advocacy**
  - **Corporate Controller & CIO**
  - **Oracle's Senior VP of Applications**
  - **KPMG's Partner-in-charge of West-Coast Consulting**
- **Project Management Office**
  - **Cisco's Business Project Manager**
  - **KPMG's Project Manager**
- **Team of 100 members placed onto one of 5 "tracks" (process areas)**
  - **Order Entry, Manufacturing, Finance, Sales/Reporting and Technology**
- **Function Area Tracks had**
  - **Business Leader, IT Leader**
  - **Business and IT Consultants (KPMG and Oracle)**
  - **Users**

Selecting Team Members

- **Hand-picked the best and brightest**
- **Rules of engagement**
  - **short-term**
  - **no career change**
  - **it was a challenge**
- **To each person:**
  - **the project was THE opportunity**

Implementation Approach

Version 0

- **Training the team on Oracle**
  - **compressed 5-day class into 2 16-hour days**
  - **completed the "immersion training" in 2 weeks**
- **Small parallel "tiger team" set up the system**
- **Configuration of Oracle package**
  - **went off-site, 2 days, 40 people**
  - **homework assignment to everybody:**

    "come in with an 80 -20 recommendation on how to configure the system."
  - **"the 1% effort that gave us an 80% accuracy on how the application would run as opposed to a typical ERP approach, where you go off for 6 months and overanalyze it to death."**
- **Demonstrated the Quote-to Cash capability**
- **Realized that modifications were required despite compelling reasons not to.**

Implementation Approach

Version 1

- **Goal: Make the system work in each track**
- **Modeled the business process in detail and documented the issues**
- **Weekly 3-hour meetings with track leaders to resolve issues**
- **Found that software could not support huge number of business processes**
- **Classified required modifications as "Red," "Yellow" or Green"**
- **Steering Committee had to approve a Red**
- **30 developers needed for 3 months**
- **After-sales support needed *another package* since Oracle could not handle it**

Implementation Approach

Versions 2 & 3

- **October 1994: Most difficult part of the project**
- **Project scope had expanded**
  - **major modifications to Oracle**
  - **new after-sales support**
  - **a data warehouse was necessary**
- **Did not convert any history**
  - **the data warehouse became the bridging system for reporting history and future in an integrated data conversion.**
- **Final test with full complement of users**
  - **captured a full day's business data**
  - **re-ran it on a Saturday in January 1995**
  - **Team members gave "go" signal after watching each track executing the simulated day.**

Post-Implementation Blues

- **Major day-to day challenges**
  - **a new system for users**
  - **system was disturbingly unstable - went down nearly once a day**
- **Primary problem:**
  - **Hardware architecture and sizing**
  - **Fixing hardware at vendor's cost**
  - **Cisco's contract based on promised capability**
- **Software unable to handle transaction volume**
  - **"Our mistake was that we did not test our system with a big enough database"**
  - **Tested individual processes *sequentially* rather than *at the same time***

Fixing the System

- **February - March 1995:**
  - **ERP project status became number one agenda item for weekly executive staff meetings**
- **"It was tough, really stressful…we always knew we would make it. It was always a "when," not an "if." This was a big thing, one of the top company initiatives."**
- **SWAT-team mode to fix the problems**
- **Strong commitment from Oracle, KPMG, and hardware vendor**
- **Stabilized the system by Quarter 3 end.**

Reward for the ERP Team - Over $200,000 cash bonus

Cisco's ERP Implementation Lessons

- **Well Communicated Top Management Commitment**
- **Put "Best People" on Team**
- **"Can Do" Team Attitude**
- **High Priority in Company**
- **Project End Date Defined by Business Factors**

Cisco's ERP Implementation Lessons

- **Select Hungry Vendors**
- **Financially Strong Vendors**
- **High-Level Vendor Personnel on Steering Committee**
- **Structure of Hardware Contract (Capability-Based)**
- **"Seasoned," Experienced Consulting Support**
- **Rapid, Iterative Prototyping**

ERP Implementation Costs

Software:	**16%**
Hardware:	**32%**
System Integration:	**38%**
Headcount:	**14%**
Total Cost	**$15 Million**

Note: Cost of Cisco personnel time not included beyond some members of the core team

Key Steps taken by Cisco Management

1. **Oversight by Top Management**

- CEO made the project one of the company's top 7 goals for the year and tracked its progress in executive staff meetings, company-wide meetings and board meetings

2. **Project was NOT An IT-only Initiative**

- Hand-picked the best business people to work with IT personnel on the project
- Team of 100 members placed onto one of 5 tracks (process areas)

Key Steps taken by Cisco Management

3. Implementation Responsibility at Two Levels

- **Executive Steering Committee composed of VPs of Manufacturing and Customer Advocacy, CIO, Corporate Controller and Senior VPs of Vendors**
- **Project Management Office headed by business manager overseeing the 5 tracks, each of which had a business leader and an IT leader jointly overseeing the work of the team**

The Promise of ERP

Promise:	**Change the way companies work by integrating the back-office processes into one smoothly functioning whole.**
Problem:	**Years to implement** **Hundreds of millions of $**
AND	**Inward-looking**
Focus:	**Efficiency of the Enterprise in isolation**

Case Study

- Fox-Meyer’s ERP Project

The Reality :
Fox-Meyer Case Example

- **Once a $5 billion drug distributor - 4th largest in the US**
- **Tight Margin Business**
- **CIO Magazine praised them in 1995 for new client/server initiatives in 1993**

Fox-Meyer's ERP Project

- **Launched ERP Project in 1993, a hot new idea at the time**
- **SAP's R/3 had a track record only in the manufacturing industry**
- **Goal: First mover advantage in distribution industry**
- **"We are betting our company on this" - CIO Robert Brown**

Fox-Meyer - The System

- **Cost – $100 million**
- **Implemented SAP's ERP and Pinnacle's Computerized Warehouse Systems at the same time**
- **Big problems surfaced in late 1994**

  e.g.: R/3 miscounted inventory, which in turn screwed up customer orders
  - Outright crashes were routine

Fox-Meyer – What Happened?

- **R/3 could not handle the volume**
  - **Could process just 10,000 invoice lines per night compared to 420,000 in the old Unisys system**
  - **Software usable only in 6 of 23 warehouses**
  - **Had to revert to old Unisys system**
- **Data conversion bungled by implementation consultants**
  - **Used incorrect product codes**
  - **Faulty interfaces between old and new systems**
- **State of the art warehouse opened late**
  - **Incorrect orders cost millions in excess shipments**

Fox-Meyer – The Blame Game

- **Fox Meyer Management:**
  - **Claimed vendors oversold capabilities**
  - **Consultants were neophytes**
  - **“Installation guinea pig – far worse than original system”**
- **Pinnacle COO – “not a failure of automation – It was a management failure”**
- **SAP – “users who install R/3 are usually changing basic business processes at the same time – this is where most of the pains and challenges of implementation come from”**
- **Vendors claim project was completed according to their agreement**

Fox-Meyer - Aftermath

- **Filed for bankruptcy in 1996**
- **Purchased by a major competitor for $80M**
- **August 1998 - Bankruptcy trustee for Fox-Meyer sues Vendors for $500 million each.**

And Others...

- **Allied Waste Industries**
  - **Pulled the plug on a $130 million SAP R/3 system**

- **Waste Management Inc.**
  - **Cancelled SAP installation after spending $45 million of a $250 million project.**

Case Study

- **Hershey Foods' New Computer System**

A Notorious Disaster
Hershey Foods – October 1999

- **IBM-led installation and integration of software from 3 vendors:**
  SAP, Manugistics (planning applications) and Siebel (pricing promotions)
- **Embarked on the project in 1996**
  . . . Partly to satisfy retailers who were demanding fine-tuning of deliveries to keep their inventories and costs down
  . . . Also faced Y2K problems in old system
- **Investment : $ 112 M, 5000 PCs.**
- **"To be used by 1200-person salesforce and other departments to handle every step from order placement to final delivery . . . Touches nearly every operation; tracking raw ingredients, scheduling production, measuring the effectiveness of promotional campaigns, setting prices, and even deciding how products ought to be stacked inside trucks"**
  - Wall Street Journal, October 29, 1999

Why "Hershey's Biggest Dud Is Its New Computer System"

1. "Scope – Creep" in Defining Objectives of the Project
   - Had to select 3 different vendors to meet project objectives

2. Big-Bang Implementation Approach
   - Replaced all legacy systems at once despite complexity of integrating 3 packages; Not a phased approach – one module or unit at a time
   - Successful Implementation in Canada; but, it is a tiny fraction of the size of the U.S. business

3. Initial Time Estimate - 4 years
   - Squeezed into 30 months

Why "Hershey's Biggest Dud Is Its New Computer System"

4. Expected to go live in April '99 - a slow period
   - Date pushed to July, when Halloween orders begin to come in
   - 40% of candy sales between Oct. & Dec; Halloween is the single biggest sales day, followed by Christmas

5. No Contingency Plan
   - Could not backpedal to old logistics systems – they had been demolished to make way for new system
   - Built up 8 days of inventory as a cushion against computer glitches - by early August, 15 days behind in meeting orders

The Implementation Failure

- Candy “everywhere” but NOT in the stores for Halloween
- Problem : Getting customer orders into the system and transmitting the details to warehouses for fulfillment
- Rivals, Mars and Nestle, benefiting without much effort because :
  “If you don’t have my toothpaste, I’m walking out (of the store). But for a chocolate bar (and that too for Halloween), I’ll pick another brand.” - Shelf-space is hard to win back.
- Hershey sales rep calling Dallas-based 7-Eleven chain candy-category manager weekly to ask what 7-Eleven has received because Hershey itself can’t tell what it was
- “They’ve missed Halloween; problems could persist through Christmas and may be even Valentine’s Day & Easter”.
- Bottom-Line : $ 150 M loss in sales in quarter after system went live, 29% higher product inventories, compared to year before

Post-Mortem of Hershey Failure

#1 Trying To Do Too Much At Once

#2 Unentered Data in SAP

#3 No Leadership

Source: *Baseline,* December 2002

Integrating SAP With Manugistics - More Complex Than Anticipated

- Hershey had used Manugistics supply chain planning software for years – but it was the mainframe version
- The software had to be changed to a client-server version that had to be configured as a bolt-on to SAP
- Not enough time for testing, with the rush to implement by the Y2K deadline

The Data Problem
- How Could Hershey Lose Track of Inventory

- ✓ **Hershey's management process**
  - **Very good at crisis management**
  - **Devised informal mechanisms for dealing with tremendous buildup of inventory to meet peak holiday sales**
  - **"They would put candy everywhere they could to store it… they were not used to having to tell the computer about that."**

- ✓ **"Surge storage" capacity created in warehouse space rented on a temporary basis – even spare rooms within factory buildings**
  - **These locations were not recorded as storage points in SAP**

The Data Problem
- How Could Hershey Lose Track of Inventory

- ✓ **SAP requires a lot of discipline**
  - **Found that significant amount of inventory was not where the system said it was**
  - **To fulfill a customer order, SAP checks data of available inventory in the system**

- ✓ **Breakdown between Logistics Group and IT Group to identify this data in advance**

Poor Management Oversight

- ✓ **No CIO**
  - **Head of IT only a VP, a couple of levels down**

- ✓ **Different parts of the business pulling in different directions**
  - **No one at the top to pull these demands together to guide the creation of a system that will work for the whole system**
  - **"You get 100 little committees with no oversight"**

- ✓ **No high-powered steering committee for project oversight**

Lessons Learned AND Applied by Hershey - The IT System for a New Distribution Center

Lesson #1: Go Slowly

Hershey took the time and resources to thoroughly test the computer system.

"Testing included putting bar codes on empty pallets and going through the motions of loading them onto trucks so that any kinks would be worked out before the distribution center opened for business".

Lesson #2: Data is King

Fixing data problems became a top priority for the top management of distribution centers

Lesson #3: Management Oversight Matters

Top management was determined that nothing go wrong

"Wound up with a very high-powered steering committee… we had the CEO himself involved."

No End In Sight . . .
Goodyear – November 2003

Hits $ 100M Bump in the ERP System

What caused a major accounting blowout ?

- **SAP installed in 1999 to run core accounting functions**

  Had to be linked to existing systems for intercompany billing which handled internal transactions on the purchases of raw materials made centrally for use in global operations
- **Consulting help from PwC and J. D. Power**
- **Discovered "financial errors"**

  Need to identify whether "the errors were in the ERP or in the internal billing systems so that fixes can be made and accounting procedures improved"
- **System Fallout**

  Had to restate financial results from 1998 to first half of 2003 - > $ 100M in profits wiped out !

ERP Implementation: A Real Pain

- **More ways to fail than to succeed**
- **Very expensive**
- **Slow to install**
- **Medium size projects in tens of millions and require years of tweaking**
- **Support Industry surrounding ERP:**
  - **costly services and consultants**
  - **can be 10 times the cost of software**
  - **Consultant's "Full Employment Act" !**

Hidden Costs

ERP implementation costs fall in the range of $3 to $10 per dollar spent on the software itself

- Meta Group

1. **Training**
2. **Integration**
3. **Testing**
4. **Data Conversion**
5. **Data Analysis**
6. **Getting rid of your consultants**

Training
- Consistently Underestimated

Because….

Workers have to learn new processes

Not just a new software interface

e.g., A receiving clerk at the plant's loading dock now becomes an accountant. Because the clerk is keying new inventory directly into a live system, mistakes have an immediate impact on the books. And the plant's number crunchers can no longer simply look at their data in batches, now they need to be able to pinpoint the origin of each data entry to verify its accuracy.

ERP is NOT
Just About Technology Implementation

- **It requires significant change management**
  - **the most elusive budget item**

- **Training costs: 10% - 15% of total budget**
  - **do not skimp on training;**
    otherwise, pay more later

- **One approach to control price tag**
  - **train the trainers**

Integration
-- Is NOT Easy

Links have to be built between ERP and other corporate software on a case-by-case basis

Monsanto has add-on applications for logistics, tax, production planning and bar coding. Integrating them with SAP has consumed more time and money than estimated

AND…

If the ERP's core code has to be modified to fit the business process, costs will skyrocket.

Testing
Must be Process-Oriented

DO NOT…
… Use DUMMY DATA
… And move it from one application to another

Run a real purchase-order through the system, from order entry to shipping and receipt of the payment -- the whole "order-to-cash" cycle - preferably with the employees that will eventually do the jobs.

Fox-Meyer's Mistake

Company received about 500,000 orders daily from thousands of pharmacies, each of which ordered hundreds of items.

SAP could only handle a few thousand items a day

No way to test in advance…ran some simulations, but not with the level of data we have in an operating environment.

Data Conversion Is NOT 1-2-3

Because….

- **Most companies in denial about quality of legacy data. Hence, underestimate cost of moving data to new ERP home.**
- **Even clean data may need some overhaul to match process modifications necessitated by the ERP implementation**
- **One alternative: outsource data conversion**
  - **claim to reduce costs by 75%**

Elf Atochem Case

- **Cleaned up inconsistencies in data**

  e.g. El du Pont Nemours might also appear as Du Pont, DuPont and so on, giving the illusion of several customers - in reality, only one.

- **Added new data fields** to make system more effective
  e.g. To tell customers when shipments will arrive, not just when shipped, added “route determination record” that gives point-to-point delivery times to customers.

- **Data clean-up was done by company’s cross-functional teams.**

Data Analysis
- An Additional Cost

Reports in ERP package will NOT meet management information needs because …

… ERP data has to be combined with external and soft data such as goals, budgets, etc.

… Management reports should be customized to the organization needs and culture

Cost of data analysis is often overlooked in project budget because of misconception that ERP package provides all the analysis users need

Consulting Fees Can Run Wild

IF…

Users fail to plan for disengagement

Hence…

- **Identify objectives for consulting partners when training internal staff**
- **Include metrics in contract**

e.g. A specific number of staff should be able to pass a project management leadership test - similar to what Big 5 consultants have to pass to lead an ERP engagement

How to Uncover Hidden Costs Upfront

- **Assemble cross-functional teams.**
- **Include both senior managers.**

  AND lower-level end users who will have daily contact with the ERP systems and provide level of detail.
- **Systematically question and challenge each other's assumptions and estimates**
- **Examine in depth the six components of hidden costs.**
- **Cost of ERP software is only a SMALL SLICE of the total project outlay.**

Questions

IT Service Management (ITSM) & IT Standards

Agenda

- Strategy of IT Service Management
- Current Project Status
- Service Support Processes
- Change, Test, Release & Configuration
- Technical Service Taxonomy
- IT Standards
- Questions

ITSM Objectives

- Alignment of IT services with current and future business needs
- Excellence Today (Quality)
- Best Practice & Standardisation
- Reduction of long-term service provision costs (Lean Thinking approach - Identify levels of waste, refine, automate process where possible)

The Challenges

- Understanding and Acceptance of IT Service Management
  - Understanding and Acceptance of ITIL Best Practice Framework
  - Managing Change
- How do we meet these challenges?
  - Through promotion events, training and by agreement

IT Service Management and the ITIL Framework

What is ITSM

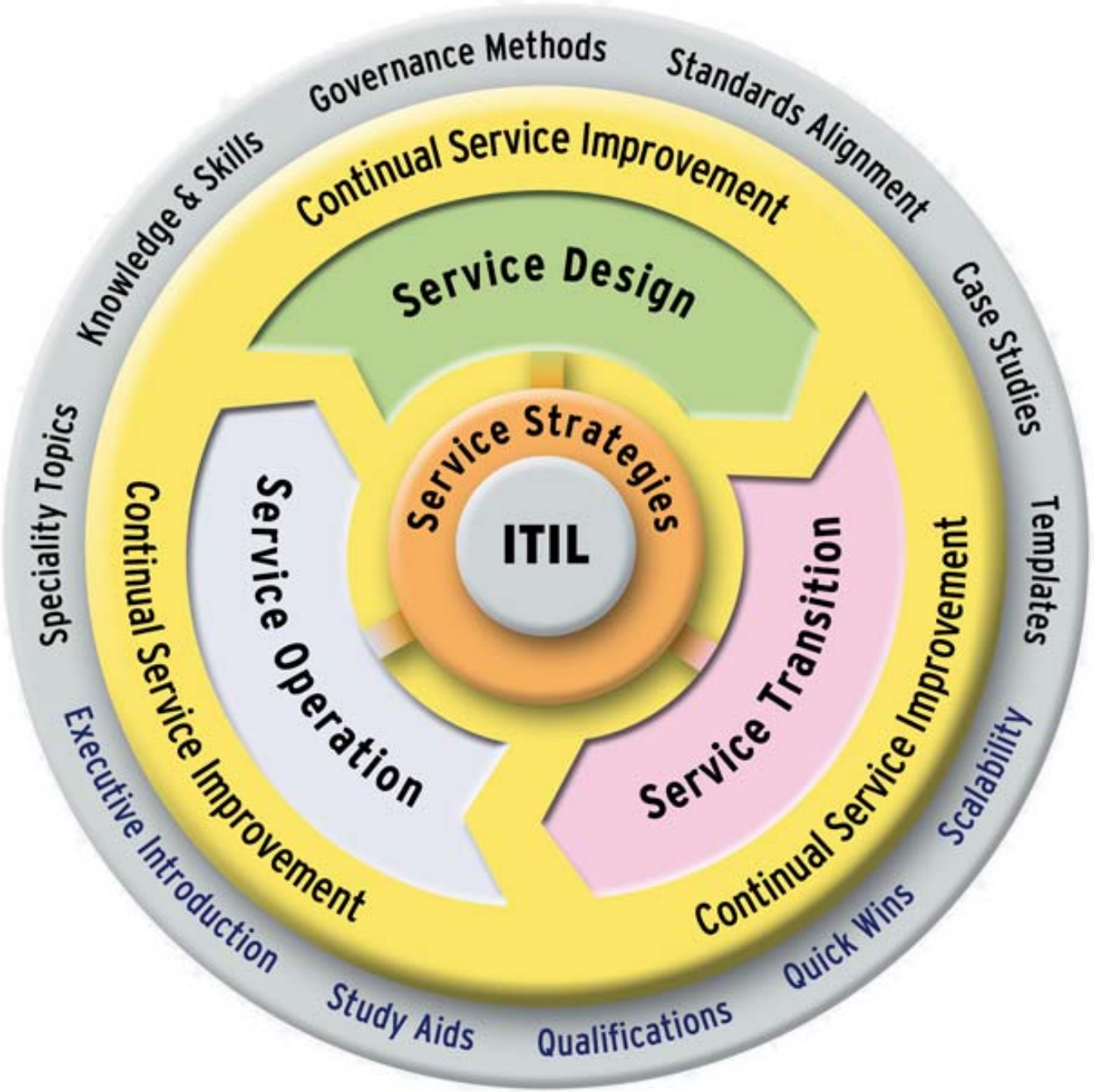
- **IT Service Management** (ITSM) is an International Standard focused on providing a framework to structure IT related activities and the interactions of IT technical personnel with business and customers

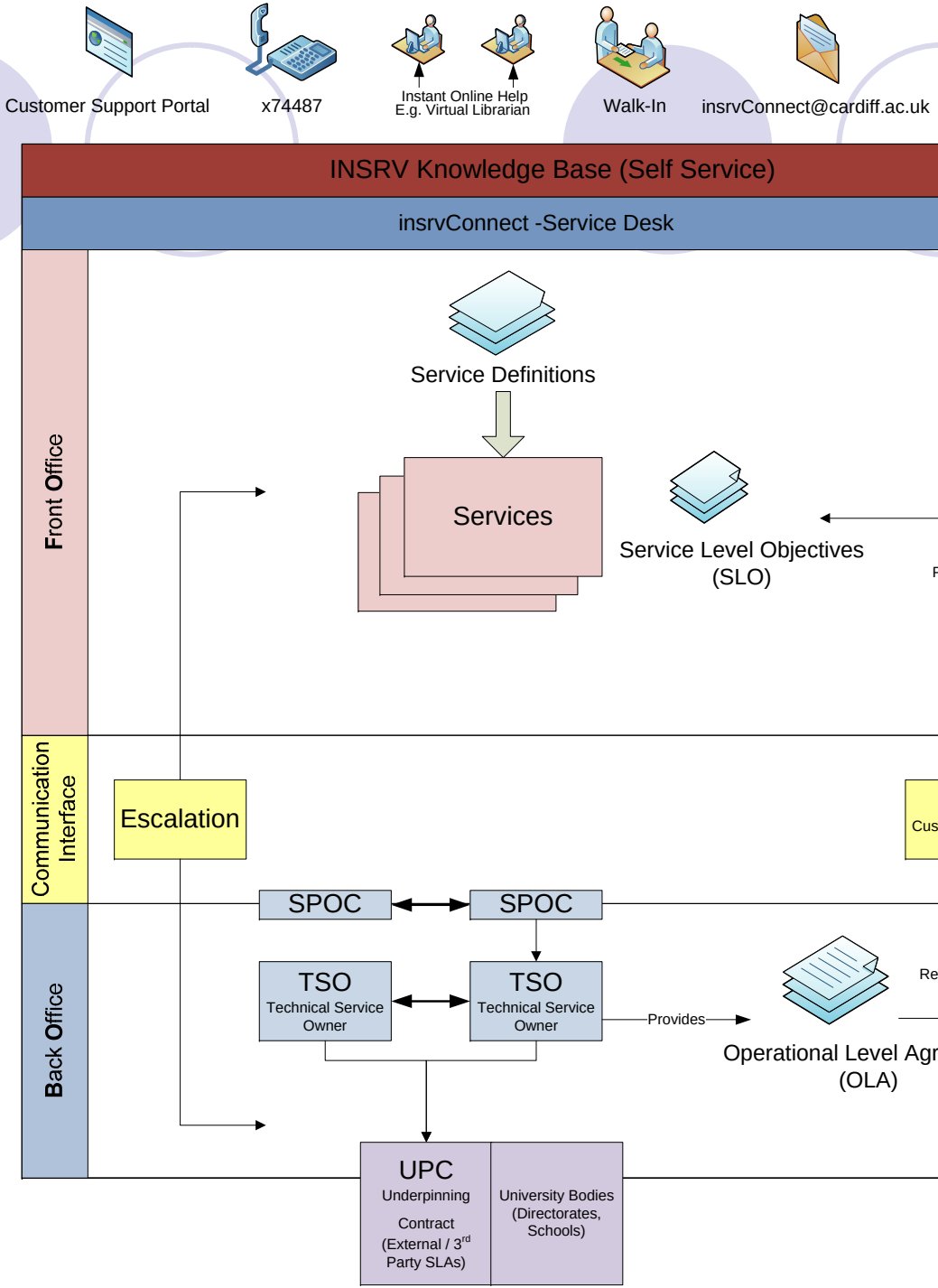
- The following represents a characteristic statement from the ITSM literature:
  - *Providers of IT services can no longer afford to focus on technology and their internal organisation, they now have to consider the quality of the services they provide and* ***focus on the relationship with customers.***

ITIL Definition

Information Technology Infrastructure Library

- A best practice customisable framework for the implementation of IT Service Management. Originated from the UK Government in the 1980's but is now the defacto international standard and is widely used worldwide.
- It promotes quality services in the information technology sector and addresses the organisational structure and skill requirements for an organisation by presenting a comprehensive set of management procedures with which an organisation can manage its operations.


Governance Methods
Standards Alignment
Knowledge & Skills
Continual Service Improvement
Service Design
Case Studies
Speciality Topics
Service Strategies
ITIL
Templates
Service Operation
Service Transition
Continual Service Improvement
Continual Service Improvement
Executive Introduction
Scalability
Study Aids
Qualifications
Quick Wins


Customer Support Portal
x74487
Instant Online Help
E.g. Virtual Librarian
Walk-In
insrvConnect@cardiff.ac.uk
INSRV Knowledge Base (Self Service)
insrvConnect -Service Desk
Front Office
Service Definitions
Services
Service Level Objectives
(SLO)
Provision of
Communication Interface
Escalation
CSO
Customer Service Owner
SPOC
SPOC
Back Office
TSO
Technical Service Owner
TSO
Technical Service Owner
Provides
Responsible To
Operational Level Agreement
(OLA)
UPC
Underpinning
Contract
(External / 3rd Party SLAs)
University Bodies
(Directorates, Schools)

Some Useful ITIL links:

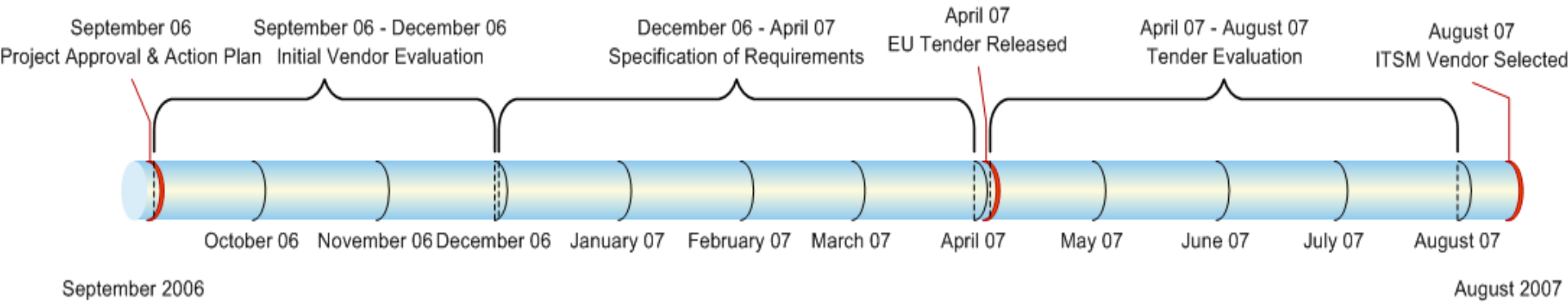
- **Links**
  - Official site from the OGC - http://www.itil.co.uk
  - BECTA Framework for ICT Technical Support - http://becta.org.uk/fits/
  - ITIL Foundation Training – ILX Online Learning
    - Contact Lorraine Forster forsterl@cardiff.ac.uk or x70275

IT Service Management Project Example - INSRV

Project Progress

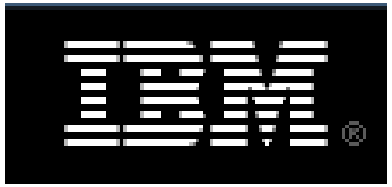
- ITSM and Virtual Librarian Project Integration
- Promotion and Agreement that ITSM and ITIL is key to delivering Quality Service Support
- Documentation of the Services INSRV provide
- Service Level Objectives and Operational Level Agreement - Drafted
- Configuration, Change and Release Management Handbooks - Drafted
- ITSM Software – Vendor Review & Selection

Vendor Selection Timeline




HORNBILL


FrontRange
SOLUTIONS


IBM


infra

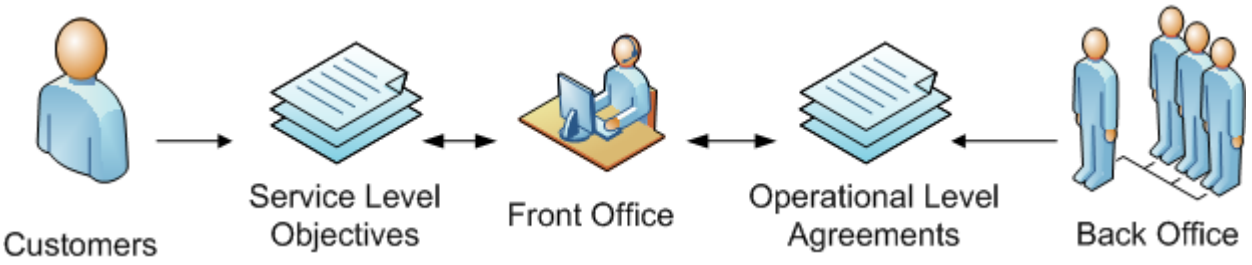

Remedy


Touchpaper

Service Support Processes

Priority	ITSM Enablers & Service Support Process	Current - RMS	ITSM Project Deliverables
1	Incident Management	✓	✓
1	Problem Management	✓	✓
1	Service Level Management	✓	✓
1	Self Service Portal		✓
1	Knowledgebase		✓
2	Change Management	✓	✓
2	Release Management		✓
2	Configuration Management		✓
3	Reporting - Management Information	✓	✓
3	KPIs and Dashboar**ds**		✓

Service Level Management

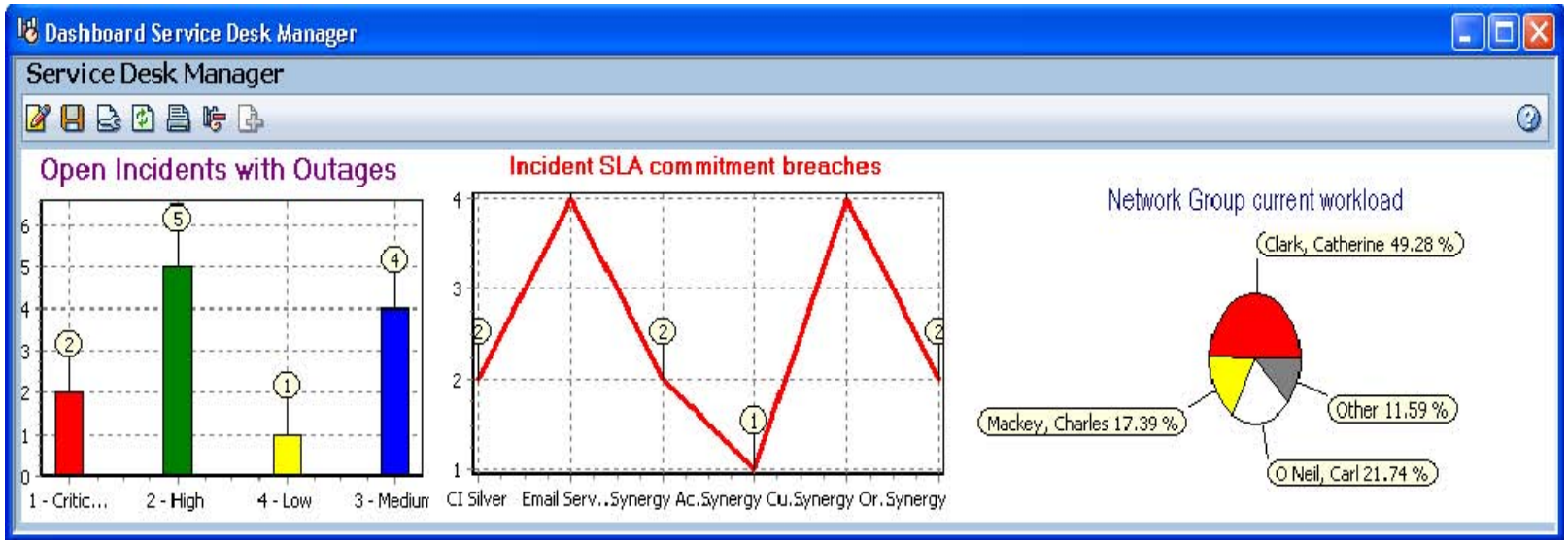


Enabling Services

- Self Service Portal
  - Create/View/Update Support Calls
  - Online Chats/ Desktop Sharing
    - E.g. Virtual Librarian
- Knowledge Base
  - FAQ’s
  - Support Forums
  - Quicktime Clips
  - Template Answers

Reporting Services

- Management Reporting
- Dashboards
- KPIs and Metrics



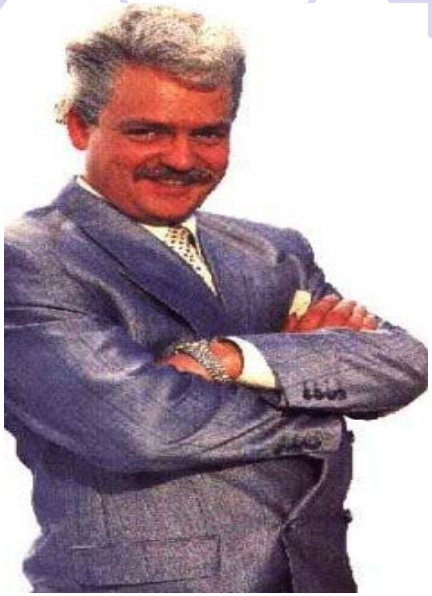
- Leads to Continuous Improvement Program

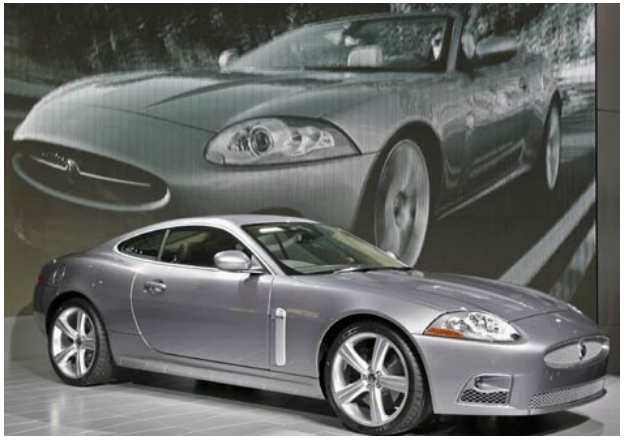
Service Delivery

- Availability Management
  - Planning 9 months in advance
- Capacity Management
  - Planning 2 years in advance
- Continuity Management
  - Service Design, Planning, Implementation

Configuration, Change and Release Management

Release Management

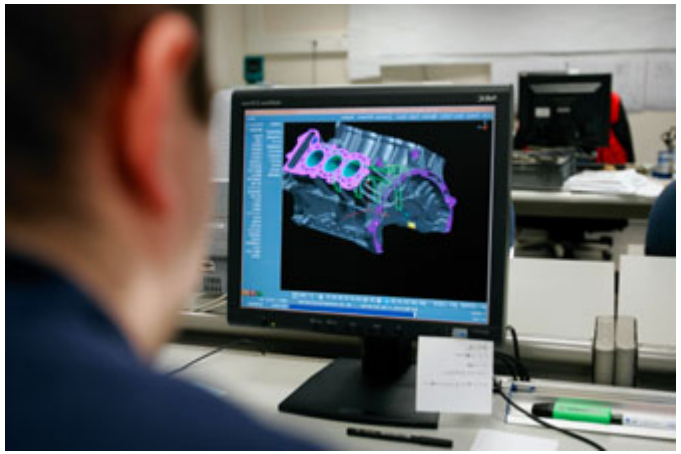




Release Management

- Ensure that we deliver ‘Quality’ Services to our customers
- Plan the Rollout
- Communicate and Manage Expectations
- Protect the Live Environment

Change Management - Proactive

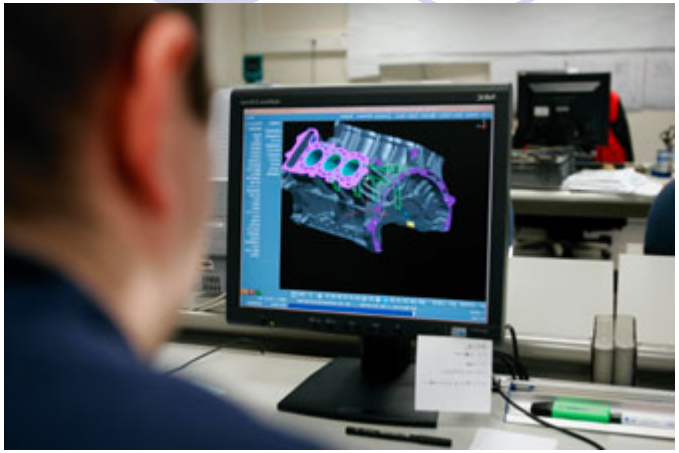


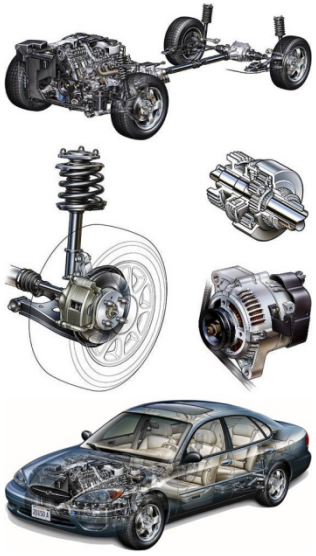
Change Management - Reactive

Change Management

- Control Changes to Configuration Items
- Standardised Methods and Procedures
- Minimise Change-related Incidents
- Improve Day-to-Day Operations
- Improve Communication
- Reactive and Proactive

Configuration Management





Configuration Management

- Cornerstone of ITIL and ITSM
- Tracks Configuration Items (CI's)
- CI (Hardware / Software / Service)
  - Technical
  - Ownership
  - Relationships

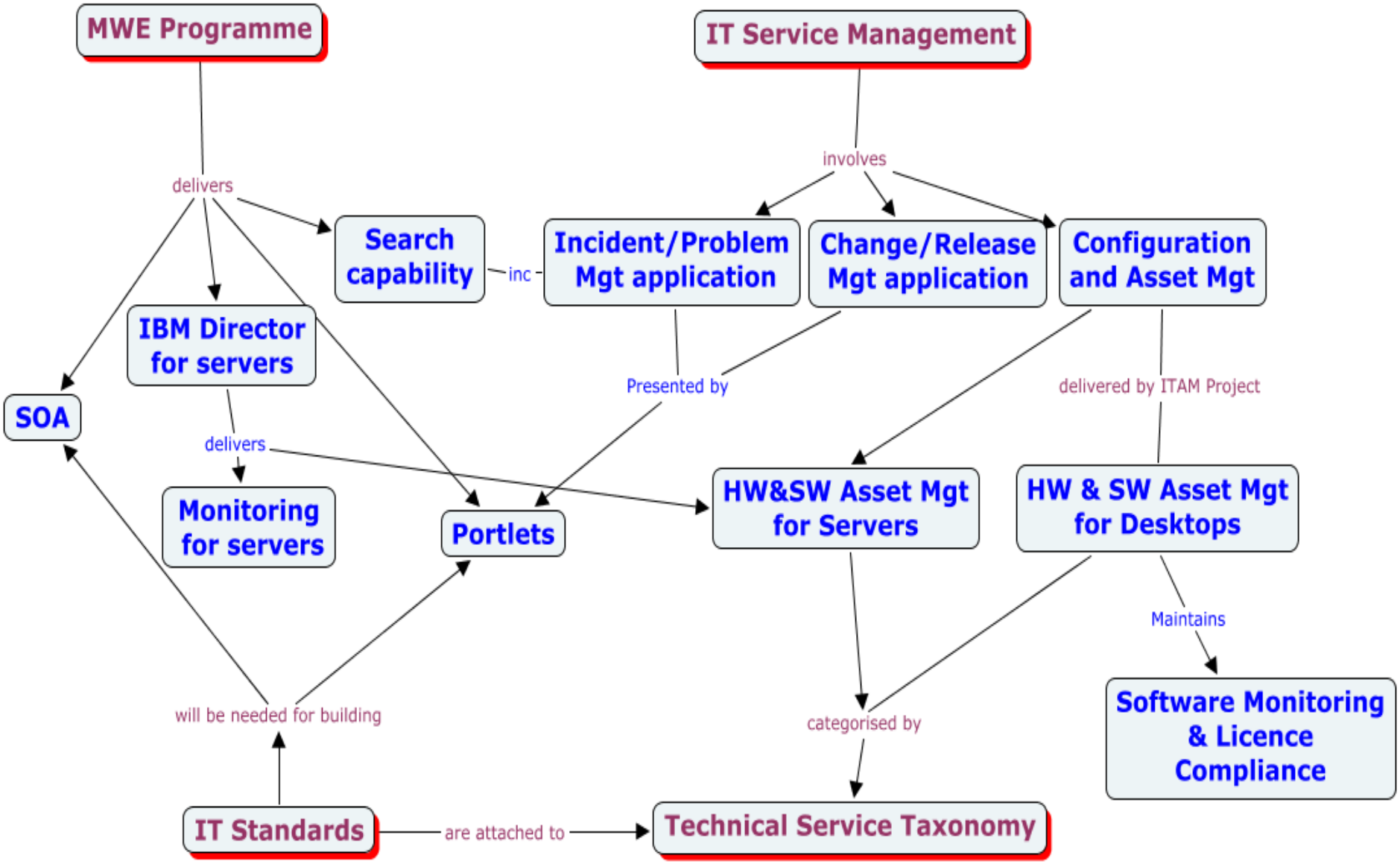
- Know what you have got
- Manage Changes/Releases

IT Standards

Relationships

- Modern IT Working Environment (MWE) Programme
- IT Service Management
- IT Standards
- Technical Services Taxonomy

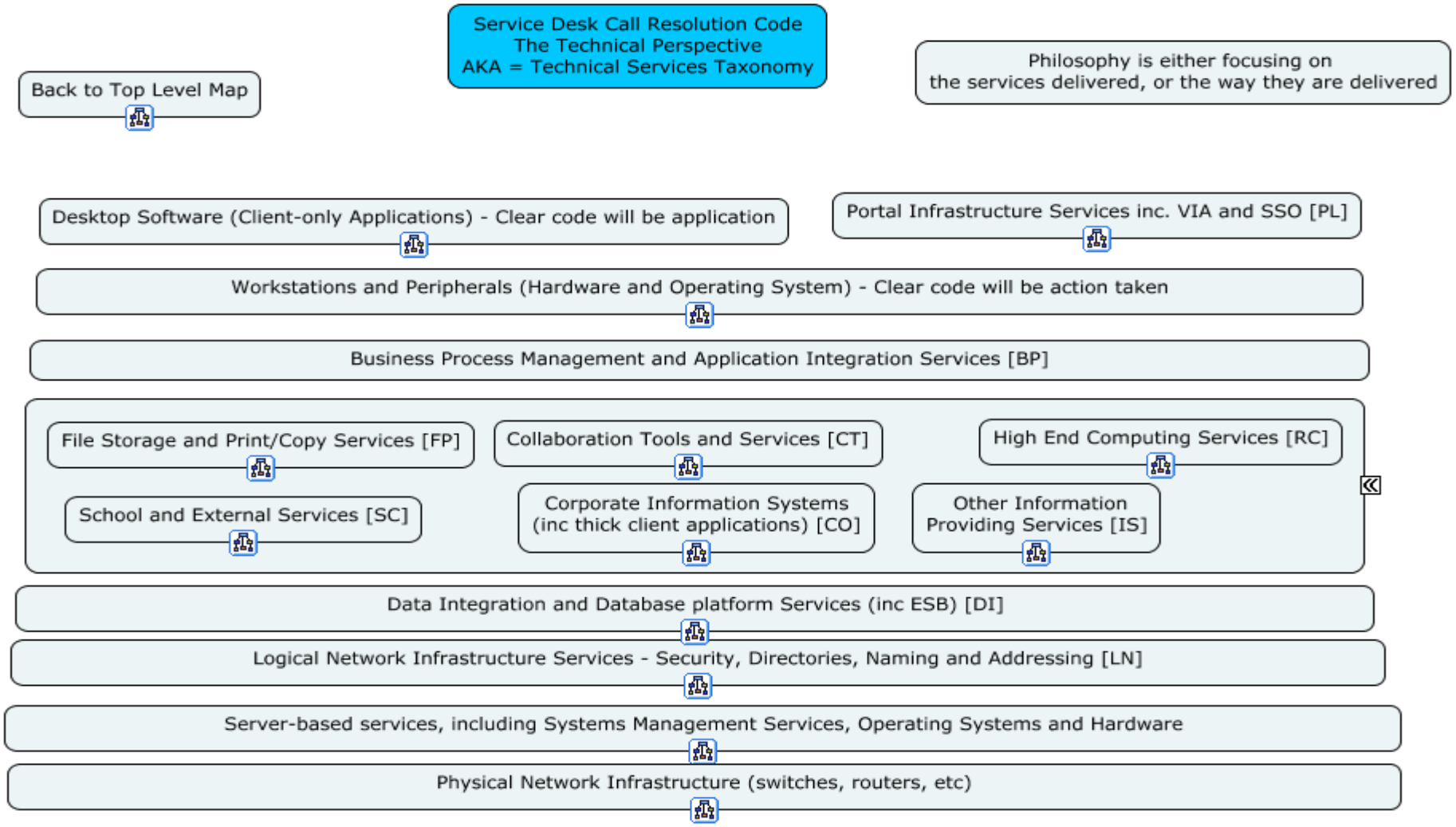
How they Relate to each other?



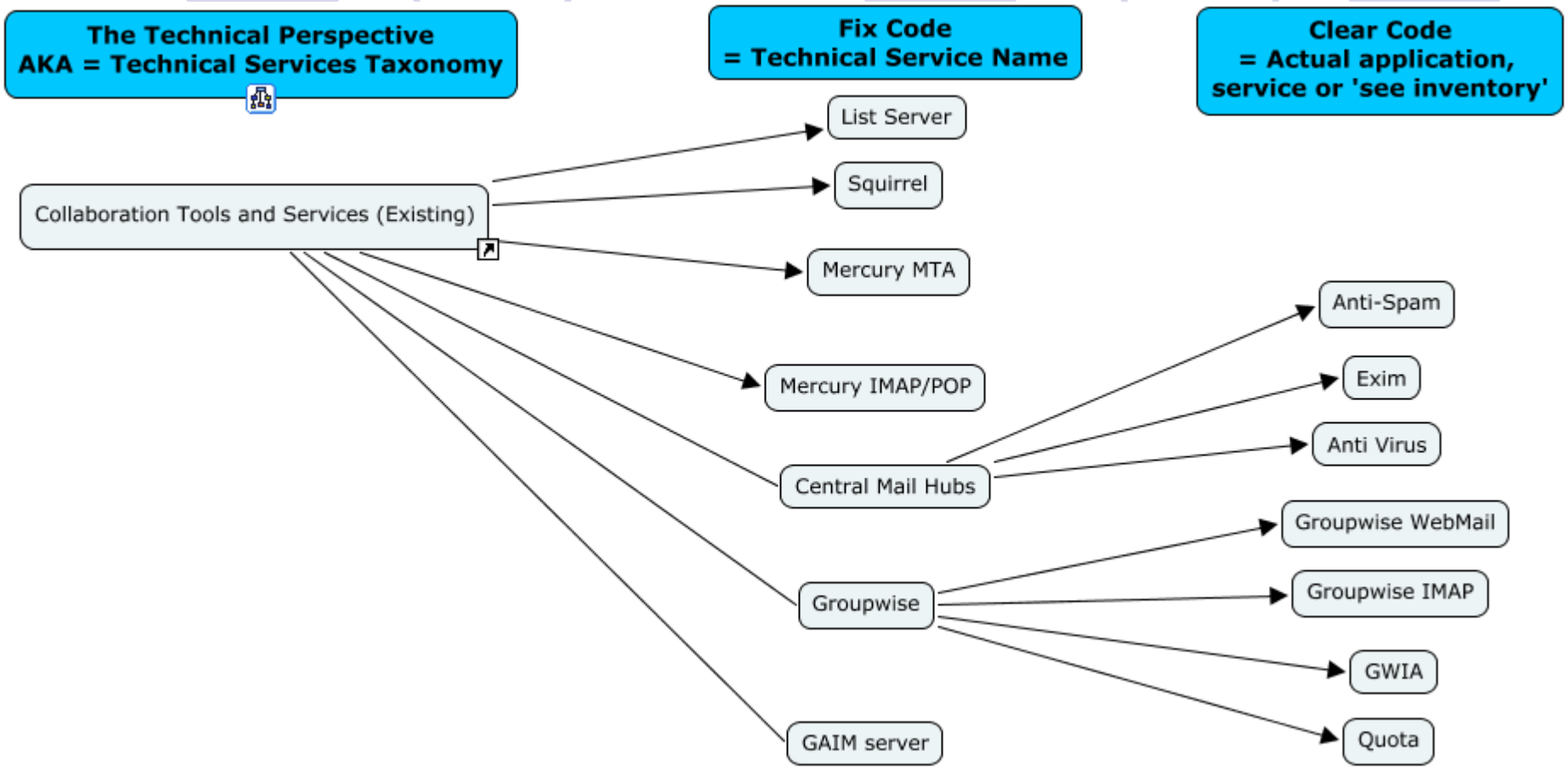
IT Standards

- Overview of IT Standards Group
  - Documentation & Process
  - Membership
- Approved Standards
  - Technical Services Taxonomy
  - General Server Monitoring
- Draft Standards
  - Server Naming Convention
  - Operating Systems
  - Database Standards

Technical Services Taxonomy



TST – Second Level Map



Questions

Project methodology – *How IT is measured on enterprise's value*

Case study of TER

Objective

- identify project's prioritization / categorization,
  - support elaboration of a medium and long-term investment strategy in the region concerned
  - encourage the realization of projects that have good chances of implementation and fall within the TER Master Plans objectives.

Phases of Methodology

- **PHASE A – Identification**
- **PHASE B – Forecasting**
- **PHASE C – Evaluation**
- **PHASE D – Prioritisation**

Identification Phase

- **Identification** of the projects that worth further analysis and evaluation according to their..
  - Relevance
  - Readiness
  - Viability

...countries complete TEMPLATES 1 and 2

TEMPLATE 1 – Identified Projects

Project ID*	Rail and related infrastructure	Project Name	Project cost (€ MIO)	Overall Budget (€ MIO)
	Sections	*e.g. Rehabilitation of Sofia-Varna rail line*	*Please indicate the currency*	*per year of the years covered by the national plans*

TEMPLATE 2B – Rail and related infrastructure Project Fiche

Project Name:	
Nature of Project:	☐ New ☐ Rehabilitation ☐ Upgrade ☐ Other
Location:	*(Preferably in a map else complete geographical description including length and area covered)*
Status of Project:	☐ Identification ☐ Planning ☐ Study ☐ Design ☐ Tendering ☐ Under Construction
Project Objectives: *	

Project Description: *Describe the new project, as it differs from the existing situation (Technical Characteristics of existing situation will be provided in section V of the template, and the new project characteristics in section VI of the template)*

I. Current traffic**	
a) All traffic (trains/day)	
b) International traffic	
b1) passenger trains/day, passenger trains/year b2) freight/trains/day, tons/year b3) mixed trains/day	
c) Domestic traffic	
c1) passenger trains/day, passenger trains/year c2) freight trains/day, tons/year c3) mixed trains/day	

II. Projected traffic (2010)**	
a) All traffic (trains/day)	
b) International traffic	
b1) passenger trains/day, passengers/year b2) freight trains/day, tons/year b3) mixed trains/day	
c) Domestic traffic	
c1) passenger trains/day, passenger trains/year c2) freight trains/day, freight/year c3) mixed trains/day	
III. Travel costs per passenger/ton per km for the section considered (existing, and if project is implemented)***	
IV. Travel time for passengers and for freight for the section considered (existing, and if project is implemented)***	
V. Technical Design characteristics for the existing situation	
a) Part of an international agreement (as AGC) b) Type of rail lines (electrified, non electrified, max. speed etc)	

c) No of tracks d) Length (in km) e) Type of special structures (length of tunnels, length of bridges, etc)	
VI. Technical Design characteristics for the project	
a) Part of an international agreement (as AGC) b) Type of rail lines (electrified, non electrified, max. speed etc) c) No of tracks d) Length (in km) e) Type of special structures (length of tunnels, length of bridges, etc)	
VII. Special al Infrastructure (freight village, terminal for road and or maritime/inland waterways transhipment)	
a) Type of special infrastructure b) Location of special infrastructure c) Area (km2) for special infrastructure	

Estimated Investment Cost (€ or $, 2003 prices):	
IRR	*From the feasibility study or expected one*
Expected benefits:	
Existing Reports:	
Implementation Programme (years):	**Preparation:….. Expropriation:….. Construction:….** **Total:……**
Implementation Authority:	
Funding Sources: (Total number per source or in % of total budget per source)**	National funds:…… Bank loan:…… Grants (e.g. from EU, USA, Japan etc.):…… Private sector:……

TEMPLATE 2C – Maritime/ Port Fiche

Port Name:	
Location:	*(Geographical Description including main cities, ports, etc and preferably a map)*
Port and intermodal connections description:	
Project Description: *Provide information if there are plans for the port infrastructure/installations investments*	
I. Current average annual traffic (AAT)**	
a) Passengers (international, domestic) b) Trains international c) Trains domestic d) General cargo in tons (international, domestic) e) Containers (number of TEUs, tons)--domestic f) Containers (number of TEUs, tons)—imports/exports g) Containers (number of TEUs, tons)—transhipment	
II. Projected average annual traffic (AAT) (2010)**	
a) Passengers (international, domestic) b) Trains international c) Trains domestic d) General cargo in tons (international, domestic) e) Containers (number of TEUs, tons)--domestic f) Containers (number of TEUs, tons)—imports/exports g) Containers (number of TEUs, tons)—	

III. Port annual throughput (in tons for general cargo, in TEUs for containers)	
IV. Travel costs in ports (handling, port charges etc) ***	
a) Per container b) Per ton of general cargo c) Per ship (average)	
V. Handling/processing time in ports***	
a) Per container b) Per ton of general cargo	
VI. Travel costs in ports (handling, port charges etc) ***	
a) Per container b) Per ton of general cargo c) Per ship average	
VII. Characteristics of port connections with the other ports in the TEM or TER countries	
a) Container ships: connections per month, cost of sea voyage, travel time of sea voyage, number of TEUs per year b) General cargo ships: connections per month, cost of sea voyage, travel time of sea voyage, number of tons per year	

Forecasting Phase

- Any official forecasts or official estimations could serve in verifying and finalize consultants' forecasts.
- Alternative demand scenarios are to be produced in the framework of WP3, in a qualitative macro-scale based on the expected economic development of the countries concerned as well as other characteristics.
- If forecasted data are not collected, then WP3 results will be used. For any forecasted data provided, consistency with the macro-level forecasts (elaborated in WP3) will be investigated.

Evaluation Phase

- Selection of Criteria – *3 hyper-criteria*
- Quantification of Criteria - *Scores*
- Weighting/ Hierarchy of Criteria – *Delphi/Paired Comparison*
- Total Performance of Project

(=> to assist Prioritization on the next Phase)

Selection of Criteria -1

- **CLUSTER A**

  Socio-economic return on investment **(C_A):**

  - Degree of urgency (C_{A1}),
  - Cost effectiveness (C_{A2}),
  - Relative investment cost (C_{A3}),
  - Level of transport demand (C_{A4}),
  - Financing feasibility (C_{A5}).

Selection of Criteria -2

- **CLUSTER B**

  Functionality and coherency of the network **(C_B):**

  - Relative importance of international demand of traffic/ passengers (C_{B1}),
  - Relative importance of international demand of traffic/ goods (C_{B2}),
  - Alleviation of bottlenecks (C_{B3}),
  - Interconnection of existing networks (international level) (C_{B4}),
  - Interoperability of networks (C_{B5}).

Selection of Criteria -3

- **CLUSTER C**

  Strategic / Political concerns regarding the network **(C_C):**

  - Border effects (C_{C1}),
  - Political commitment (C_{C2}),
  - Regional and international cooperation (C_{C3}),
  - Historical/ heritage issues (C_{C4}),
  - Economic impact (C_{C5}).

Quantification of Criteria -1

1. Degree of urgency

A: Immediate requirement (in the next 2 years-until 2005),
B: Very urgent (between 2005 and 2010),
C: Urgent (between 2010 and 2015),
D: May be postponed for some years (between 2015 and 2020),
E: To be reconsidered later (after 2020)

2. Cost effectiveness

A: Excellent (IRR more than 15%),
B: Very good (13-15%),
C: Good (10-13%),
D: Acceptable (4,5-10%),
E: Low (less than 4,5%)

Quantification of Criteria -2

3. Relative investment costs (costs/return)

- Rehabilitation/upgrading of railways:
  - A: less than (min cost of this project type/return)%;
  - *...(intermediate values to be calculated assuming linearity, see next figure)...*
  - E: more than (max cost of this project type/return)%
- New Railway Line:
  - A: less than (min cost of this project type/return)%;
  - *...(intermediate values to be calculated assuming linearity , see next figure)*...
  - E: more than (max cost of this project type/return)%

X_1: the min cost of the project type observed in the country.

X_2: the max cost of the project type observed in the country.

X_3: the considered project cost

country's GDP given in million €

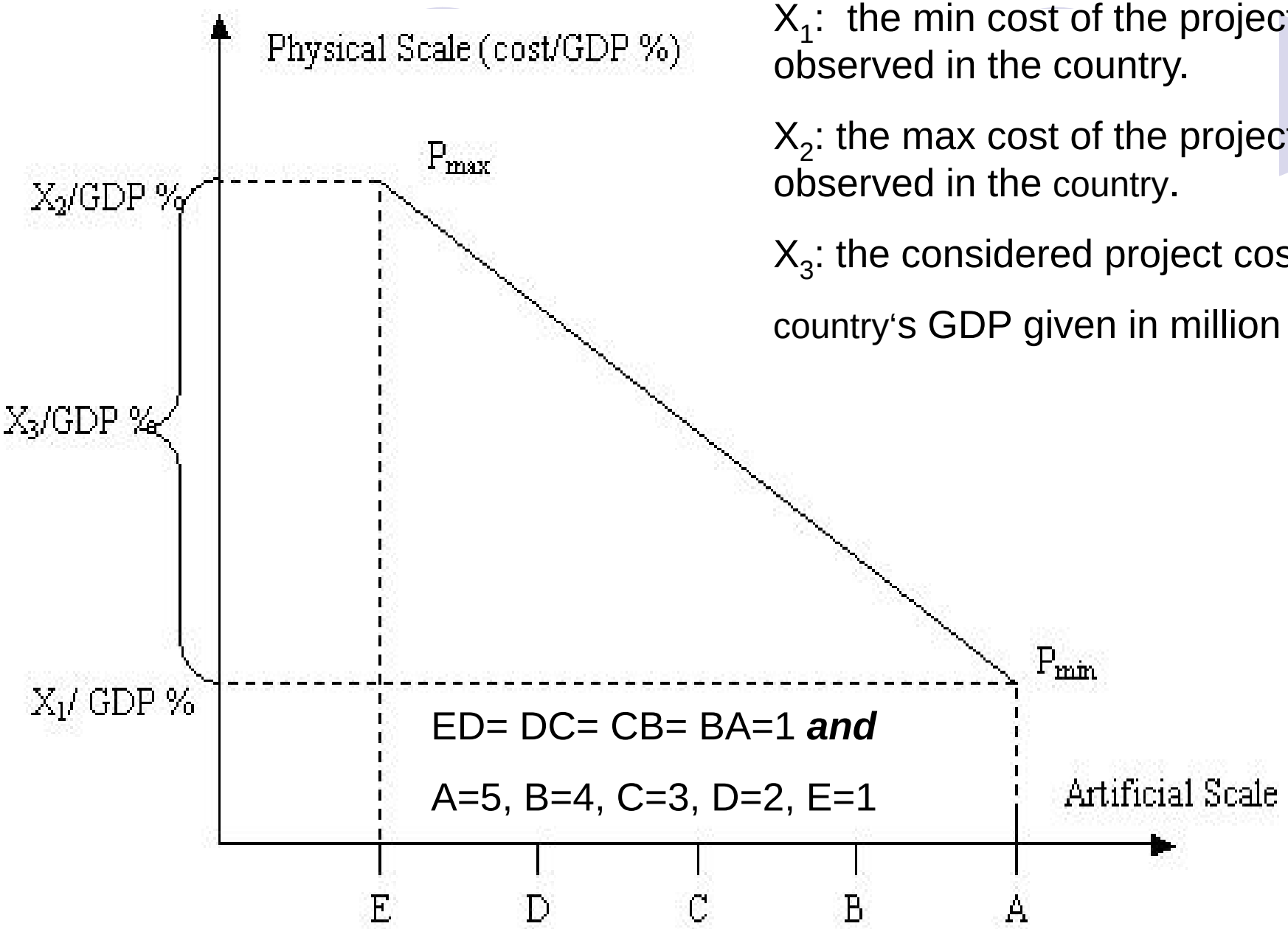


Figure 1

Quantification of Criteria -3

4. Level of transport demand

Railways:

A: present traffic more than 140 trains a day;

B: present traffic from 100 to 140 trains a day;

C: from 60 to 100 trains a day;

D: from 25 to 60 trains a day;

E: less than 25 trains a day

5. Financing feasibility

A: Excellent, B: Very Good, C: Good, D: Medium, E: Low

Quantification of Criteria -4

6. Relative importance of international demand of traffic (passengers)

A: more than 30 % of total traffic;

B: from 25 to 30 % of total traffic;

C: from 15 to 25 % of total traffic;

D: from 7 to 15 % of total traffic;

E: less than 7 % of total traffic

7. Relative importance of international demand of traffic (goods)

The same as 6.

8. Alleviation of bottlenecks

A: Satisfactory, B: Adequate, C: Medium, D: Inadequate,

E: Unsatisfactory

Quantification of Criteria -5

9. Interconnection of existing networks

A: Missing Link,
B: Natural Barrier,
C: Improve the connection,
D: No influence,
E: Averse effects on rest of network

10.Technical interoperability of network

A: No interoperability problems,
B: Minimal interoperability problems,
C: Tolerable Interoperability problems,
D: Serious interoperability problems,
E: Unsolvable interoperability problems

Quantification of Criteria -6

11.Border effects

A: No border problems,
B: Minimal border problems,
C: Tolerable border problems,
D: Serious border problems,
E: Unsolvable border problems

12.Political commitment

A: Strong, B: High, C: Medium, D: Adequate, E: Low

13. Regional and international cooperation

A: Satisfactory,
B: Adequate,
C: Medium,
D: Inadequate,
E: Unsatisfactory

Quantification of Criteria -7

14. Historical/ heritage issues

A: No effects,

B: Minimal effects,

C: Tolerable/ Reversible effects,

D: Serious effects,

E: Irreversible effects

15. Economic impact

A: Strong impact,

B: High impact,

C: Medium impact,

D: Low impact,

E: No impact

Criteria Scores

- A value is 5 (the highest) in terms of score. Respectively for value E, is 1 (the lowest).

- Therefore:

$$C_{Ji} \in [1,5]$$

where:

J = A, B or C and

i = 1,....,5

The template for criterions scores is TEMPLATE 3.

TEMPLATE 3 Project Criteria Scores

Criteria	Default Set of Scores by consultants*	Scores per Country - involved in the project **																		
		AT	BG	B-H	BL	CZ	CR	FYROM	GE	GR	HU	IT	LT	MD	PL	RO	RU	SK	SL	S-M	TU	UKR
C_A																						
C_{A1}																						
C_{A2}																						
C_{A3}																						
C_{A4}																						
C_{A5}																						
C_B																						
C_{B1}																						
C_{B2}																						
C_{B3}																						
C_{B4}																						
C_{B5}																						
C_C																						
C_{C1}																						
C_{C2}																						
C_{C3}																						
C_{C4}																						
C_{C5}																						

Criterion Scores from Country Experts

- *Good communication between the externals and the country experts is necessary.*
- *For instance, war effects (in Bosnia-Herzegovina) destroyed sections of transport infrastructure. If the externals for some reason will not identify them as "missing links" in criterion C_{B4}, then country experts must do it, when reviewing the criterion scores.*

Weighting/ Hierarchy of Criteria

- Country experts will receive TEMPLATE 4 with proposed default set of weights, derived by the consultants, using Paired Comparison Matrix.
- *The sum of criteria weights should be 1.*

- Therefore:

$$W_{Ji} \in [0,1] \quad \text{and} \quad \sum_{J=A}^{C} \sum_{i=1}^{5} W_{Ji} = 1$$

where:

J= A, B or C and

i = 1,....,5

Paired Comparison

- Paired comparison approach is a scaling approach.
- Only one question to be answered is “is this criterion more important than the other?”.
- This means that the paired comparison matrix (see Table I next) can be filled with zeros and ones, where one represents “is more important”.
- By adding these values over the column, a measure is obtained for the degree to which a criterion is important compared to all other criteria, if finally these measures are standardised (see Formula I next), a set of criteria weights is created.

Table I An example of Paired Comparison matrix

	W_1	W_2	...	W_N
W_1				
W_2				
...				
W_N				

Standardised score $w_i = \dfrac{\text{'raw' score}.w_i}{\sum \text{'raw' scores}}$ (I)

TEMPLATE 4 Project Criteria Weights

Weights	Default Set of Weight by consultants*	Weights per Country - involved in the project **																			
		AT	BG	B-H	BL	CZ	CR	FYROM	GE	GR	HU	IT	LT	MD	PL	RO	RU	SK	SL	S-M	TU	UKR
W_A																						
W_{A1}	12%																					
W_{A2}	4%																					
W_{A3}	8%																					
W_{A4}	12%																					
W_{A5}	4%																					
W_B																						
W_{B1}	10%																					
W_{B2}	10%																					
W_{B3}	13%																					
W_{B4}	10%																					
W_{B5}	8%																					
W_W																						
W_{W1}	4%																					
W_{W2}	1%																					
W_{W3}	3%																					
W_{W4}	1%																					
W_{W5}	2%																					
SUM	*100%*																					

Criteria Weights from the Country Experts

- *As an example, Bosnia-Herzegovina wishes to put high priority for sections of the network destroyed by the war. Then, they have to be classified as missing links, and in the weighting it has to put high values in the criterion C_{B4}, as well as criterion C_{C2} .*
- *Another example is when a country wishes to promote a link that it considers important as a domestic link: in such a case it has to put a very low weight to criteria* ***(C_{B1}), (C_{B2}), (C_{C1}).***
- *Furthermore, if country experts provide their own weights, with the proper justification of course, we might avoid putting a project into the wrong/unwanted priority category.*

Projects Total Score/ Performance -1

- To derive the project's **total score in each country** we use the following relationship:

$T.S._{Project/Country} = \sum_{J=A}^{C} \sum_{i=1}^{5} C_{Ji} * W_{Ji}$

where:

$C_{Ji} \in [1,5]$

$W_{Ji} \in [0,1]$

J = A, B or C and

i = 1,....,5

$TS_{Project/Country} \in [1,5]$

Projects Total Score/ Performance -2

- For **Total Score per Project**, we use **Country/ Spatial Weights (SW)**.

$SW_{Country}$ = % of projects length in the country/ total project's length.

- So the Total Score per project will be:

$T.S._{Project} = T.S._{Project/Country} * SW_{Country}$

Prioritization Phase

- The combination of the criterions scores and priorities puts each project in one of the four priority categories.
  - If the project scores between 4-5 then it belongs to priority category **I**.
  - If the project scores 3 then it belongs to priority category **II**.
  - If the project scores 2 then it belongs to priority category **III**.
  - If the project scores 1 then it belongs to priority category **IV**.

Priority Categories

- **I**: projects, which may be funded and implemented rapidly, including on-going projects up to 2010.
- **II**: projects requiring some additional investigations for final definition before likely financing, or planned for implementation up to 2015
- **III**: projects requiring further investigations for final definition and scheduling before possible financing, or planned for implementation up to 2020.
- **IV**: projects to be implemented in the long run, including the projects where insufficient data existed.

Prioritization Results

- If a project results i.e. to be in priority category II according to TER Methodology but according to Van Miert prioritization belongs in another Priority Class (i.e. A, B or C) then Van Miert's prioritization will be followed, at least for the EU member states (current and the ones to be members in 1/5/2004).
- On the other hand, in the unlikely case that the priority of a project differs with the national priority, a more thorough analysis on the underlying assumptions will take place.

Application of Evaluation Methodology for TER

Greek Project:

Electrification of Railway Line: Piraeus – Athens – Thessalonica

Example steps

- Complete Project Fiche – *see next*
- Derive Criteria Scores
- *Use default set of Criteria Weights*
- Derive Project Total Score
- Prioritize Project

TEMPLATE 2B – Rail and related infrastructure Project Fiche

Project Name:	
Nature of Project:	☐ New ■ Rehabilitation ☐ Upgrade ☐ Other
Location:	517,84km, All in Greek territory and covering the distance between Piraeus-Thessalonica
Status of Project:	☐ Identification ☐ Planning ☐ Study ☐ Design ☐ Tendering ■ Under Construction
Project Objectives*:	To improve the quality of environment, improve the quality of transport services and achieve higher speeds

Project Description:

I. Current traffic**	
a) All traffic (trains/day)	70 trains/day
b) International traffic	10 trains/day
b1) passenger trains/day, passenger trains/year	-
b2) freight/trains/day, tons/year	-
b3) mixed trains/day	10 trains/day
c) domestic traffic	60 trains/day
c1) passenger trains/day, passenger trains/year	40 trains/day
c2) freight trains/day, tons/year	10 trains/day
c3) mixed trains/day	10 trains/day

II. Projected traffic (2010)**	
a) All traffic (trains/day)	80 trains/day
b) international traffic	12 trains/day
b1) passenfer trains/day, passengers/year	-
b2) freight trains/day, tons/year	-
b3) mixed trains/day	12 trains/day
c) domestic traffic	68 trains/day
c1) passenger trains/day, passenger trains/year	42 trains/day
c2) freight trains/day, freight/year	16 trains/day
c3) mixed trains/day	10 trains/day
III. Travel costs per passenger and per ton***	3€/passenger, 2 €/tonne
IV. Travel time for passengers and for freight***	3hours (passengers), 5 hours (freight)

V. Technical Design characteristics	
a) Part of an international agreement (as AGC) b) type of rail lines (electrified, non electrified, max. speed etc) c) No of tracks d) Length (in km) e) Type of special structures (length of tunnels, length of bridges, etc)	Yes, part of the line (Athens-Thessalonica) belongs to E85. Electrified line, max speed: >200 km/h Double track 517,84 km (length of tunnels unknown, no bridges)
VI. Special Infrastructure (freight village, truck / coach terminal, lorry and coach parking, fuel station)	
a) Type of special infrastructure b) Location of special infrastructure c) Area (km2) for special infrastructure	- - -
Estimated Investment Cost (€, 2003 prices):	0,129 billion €
IRR	24%

Expected benefits:	Environmental Quality, Quality of services (higher speed, less travel time etc.)
Existing Reports:	Technical Studies, Feasibility Study, Study of Environmental Impacts
Implementation Programme (years):	**Preparation:** 4 **Expropriation:** 2 **Construction:** 4 **Total:** 10
Implementation Authority:	Hellenic Railways Organization
Funding Sources: (Total number per source or in % of total budget per source)	National funds: 35% Bank loan: 5% Grants (from EU): 60% Private sector: 0%

Criteria Scores-1

1. Degree of urgency

In the socio-economic evaluation of the project, as included in the feasibility study, and according to governmental priorities, the project's implementation is characterized as **A: immediate requirement**.

$C_{A1}=5$

2. Cost effectiveness

Based on the data of TEMPLATE 2A, the project's cost effectiveness is characterized as **A: Excellent (IRR higher than 20 %).**

$C_{A2}=5$

Criteria Scores-2

3. Relative investment costs (costs/GDP)

Based on the data of TEMPLATE 2B, country's GDP and Figure 1 the project's relative investment cost is characterized as **A**.

C_{A3}=5 (or taken directly from Figure 1 -see example next)

4. Level of Transport Demand

Based on the data of section 1, the level of transport demand 60 trains a day, therefore the project's level of transport demand is characterized as **C: from 60 to 100 trains a day.**

C_{A4}=3

X_1: 110 million €

X_2: 200 million €

X_3: 159 million €

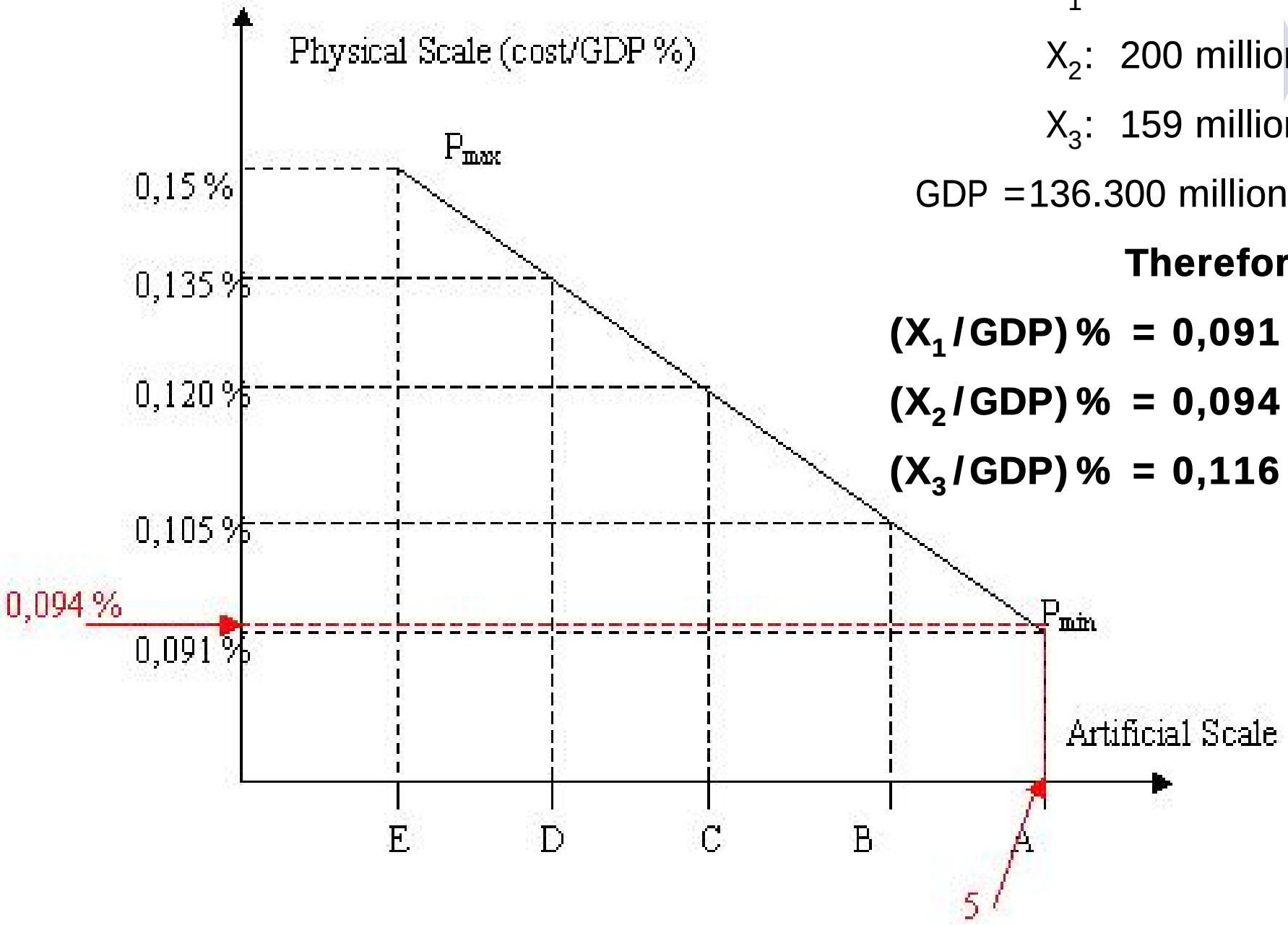
GDP =136.300 millions €

Therefore:

$(X_1/GDP)\,\% = 0{,}091\ \%$

$(X_2/GDP)\,\% = 0{,}094\ \%$

$(X_3/GDP)\,\% = 0{,}116\ \%$



Criteria Scores-3

5. Financing Feasibility

In the viability study of the project, and according to expert's opinion, the project's financing feasibility is characterized as **B: Very Good.**

$C_{A5}=4$

6. Relative importance of international demand of traffic (passengers)

Based on the data of TEMPLATE 2B, the relative importance of international demand of traffic is 16,67% (=10/60) therefore the project's relative importance of international demand of traffic is characterized as **C: from 15 to 25 % of total traffic.**

$C_{B1}=3$

Criteria Scores-4

7. Relative importance of international demand of traffic (goods)

Based on the data of TEMPLATE 2B, the relative importance of international demand of traffic is 16,67% (=10/60) therefore the project's relative importance of international demand of traffic is characterized as **C: from 15 to 25 % of total traffic.**

C_{B2}= *3*

8. Alleviation of Bottlenecks

Based on expert's opinion the project's alleviation of bottlenecks is characterized as **A: Satisfactory**.

C_{B3}=*5*

Criteria Scores-5

9. Interconnection of existing networks

Based on expert's opinion the project's interconnection of existing networks (in this case existing lines) is characterized as **C: Improve the connection**.

$C_{B4} = 3$

10. Technical interoperability of network

Based on expert's opinion the project's technical interoperability in the network is characterized as **B: Minimal interoperability problems.**

$C_{B5} = 4$

Criteria Scores-6

11. Border effects

The project is a one-country one, therefore regarding the border effects is characterized as **A: No border problems.**

$C_{C1} = 5$

12. Political Commitment

The political commitment is characterized as **A: Strong.**

$C_{C2} = 5$

13. Regional and International Cooperation

The regional cooperation (since there is no international cooperation) is characterized as **A: Satisfactory.**

$C_{C3} = 5$

Criteria Scores-7

14. Historical/ heritage Issues

According to the Environmental Impacts Study of the project, there are no effects on historical heritage, therefore the project scores **A: No effects.**

$C_{C4} = 5$

15. Economic Impact

According to the socio-economic study of the project, it is expected to have a **C: Medium Impact.**

$C_{C2} = 3$

See TEMPLATE 3 completed next..

TEMPLATE 3 Criteria Scores

Criteria	Scores per Country - involved in the project **																			
	AT	BG	B-H	BL	CZ	CR	FYROM	GE	GR	HU	IT	LT	MD	PL	RO	RU	SK	SL	S-M	TU	UKR
C_A																					
C_{A1}									5												
C_{A2}									5												
C_{A3}									5												
C_{A4}									3												
C_{A5}									4												
C_B																					
C_{B1}									3												
C_{B2}									3												
C_{B3}									5												
C_{B4}									3												
C_{B5}									4												
C_C																					
C_{C1}									5												
C_{C2}									5												
C_{C3}									5												
C_{C4}									5												
C_{C5}									3												

TEMPLATE 4 Criteria Weights

Weights	Default Set of Weight by consultants*	Weights per Country - involved in the project**																			
		AT	BG	B-H	BL	CZ	CR	FYROM	GE	GR	HU	IT	LT	MD	PL	RO	RU	SK	SL	S-M	TU	UKR
W_A																						
W_{A1}	12%									12%												
W_{A2}	4%									4%												
W_{A3}	8%									8%												
W_{A4}	12%									12%												
W_{A5}	4%									4%												
W_B																						
W_{B1}	10%									10%												
W_{B2}	10%									10%												
W_{B3}	13%									13%												
W_{B4}	10%									10%												
W_{B5}	8%									8%												
W_{00}																						
W_{001}	4%									4%												
W_{002}	1%									1%												
W_{003}	3%									3%												
W_{004}	1%									1%												
W_{005}	2%									2%												
SUM	**100%**																					

Project's Total Score

- In our case is only one country so spatial weighting was unnecessary
- Based on methodology described earlier the calculation of Total Score is presented in TEMPLATE 5. *(It is the weighted sum of criteria scores or else TEMPLATE 5 is the result of multiplying TEMPLATES 3 and 4)*

TEMPLATE 5 Project Total Score

Weights	Scores per Project – from countries involved in the project																			
	AT	BG	B-H	BL	CZ	CR	FYROM	GE	GR	HU	IT	LT	MD	PL	RO	RU	SK	SL	S-M	TU	UKR
TS_A																					
TS_{A1}									0,6												
TS_{A2}									0,2												
TS_{A3}									0,4												
TS_{A4}									0,36												
TS_{A5}									0,16												
TS_B									0												
TS_{B1}									0,3												
TS_{B2}									0,3												
TS_{B3}									0,65												
TS_{B4}									0,3												
TS_{B5}									0,32												
TS_{TS}									0												
TS_{TS1}									0,2												
TS_{TS2}									0,05												
TS_{TS3}									0,15												
TS_{TS4}									0,05												
TS_{TS5}									0,06												
$TS_{Country}$									4.1												
$SW_{Country}$									1												
TS	***4.1***																				

Prioritization of Project

- The Projects Total Score is:

  T.S. = 4,1

- Therefore the project belongs in Priority category:

  I: projects, which may be funded and implemented rapidly, including on-going projects up to 2010.

Feasibility Analysis and the System Proposal

- Apply ROI & TCO to measure the cost / effectiveness of project

Objectives

- Identify feasibility checkpoints in the systems life cycle.
- Identify alternative system solutions.
- Define and describe six types of feasibility and their respective criteria.
- Perform various cost-benefit analyses using time-adjusted costs and benefits.
- Write suitable system proposal reports for different audiences.
- Plan for a formal presentation to system owners and users.

Feasibility Analysis

Feasibility – the measure of how beneficial or practical an information system will be to an organization.

Feasibility analysis – the process by which feasibility is measured.

Creeping Commitment – an approach to feasibility that proposes that feasibility should be measured throughout the life cycle.

Six Tests For Feasibility

Operational feasibility – a measure of how well a solution meets the system requirements.

Cultural (or political) feasibility - a measure of how well a solution will be accepted in an organizational climate.

Technical feasibility – a measure of the practicality of a technical solution and the availability of technical resources and expertise.

Schedule feasibility – a measure of how reasonable the project timetable is.

Economic feasibility - a measure of the cost-effectiveness of a project or solution.

Legal feasibility - a measure of how well a solution can be implemented within existing legal/contractual obligations.

Operational Feasibility

- How well proposed system solves the problems and takes advantage of opportunities identified during the scope definition and problem analysis phases
- How well proposed system satisfies system requirements identified in the requirements analysis phase
- Is the problem still worth solving?

Cultural (or political) feasibility

- Does management support the system?
- How do end users feel about their role in the system?
- What end users may resist or not use the system? How can this be overcome?
- How will the working environment change? Can users and management adapt to the change?

Technical feasibility

- Is the proposed technology or solution practical?
- Do we currently possess the necessary technology?
- Do we possess the necessary technical expertise?

Schedule feasibility

- Are specified deadlines mandatory or desirable?
- Are mandatory deadlines realistic for proposed solution?

Economic feasibility

- During Scope Definition
  - Do the problems or opportunities warrant the cost of a detailed study and analysis of the current system?
- During Problem Analysis
  - After a detailed study of the current system
  - Better estimates of development costs and benefits
- During Decision Analysis
  - Requirements now defined
  - Development costs can be better estimated

Legal feasibility

- Copyrights
- Union contracts
- Legal requirements for financial reporting
- Antitrust laws
- National data and work laws

Information System Costs

- Development costs - one time costs that will not recur after the project has been completed.
  - Personnel
  - Computer usage
  - Training
  - Supply, duplication, and equipment
  - Computer equipment and software
- Operating costs - costs that recur throughout the lifetime of the system.
  - Fixed costs — occur at regular intervals but at relatively fixed rates.
  - Variable costs — occur in proportion to usage.

Information System Benefits

- Tangible benefits are those that can be easily quantified.
- Intangible benefits are those benefits believed to be difficult or impossible to quantify.
  - Fewer processing errors
  - Increased throughput
  - Decreased response time
  - Elimination of job steps
  - Increased sales
  - Reduced credit losses
  - Reduced expenses

Three Popular Techniques to Assess Economic Feasibility

- Payback Analysis
- Return On Investment
- Net Present Value

Time Value of Money

- Used with all three cost-effectiveness techniques.
- Concept that recognizes that a dollar today is worth more than a dollar one year from now.
  - Invest $100 at 2% for one year yields $102.
  - So $100 today and $102 one year from today represent the same value.
  - Given $20,000 benefit from information system two years from now and 10% return from other investments, means that benefit is worth $16,528 today.

Payback Analysis

Payback analysis – a technique for determining if and when an investment will pay for itself.

Payback period – the period of time that will lapse before accrued benefits overtake accrued and continuing costs.

Present Value Formula

Present value – the current value of a dollar at any time in the future.

$$PV_n = 1/(1 + i)^n$$

Where ***n*** is the number of years and **i** is discount rate

Discount rate – a percentage similar to interest rates that you earn on your savings.

- In most cases the discount rate for a business is the **opportunity cost** of being able to invest money in other projects or investments

ROI

- ROI measures the contribution of a program/solution designed to improve or retain intellectual capital
- ROI = $\frac{\text{Value of Benefits} - \text{Cost of Project}}{\text{Cost of Project}}$

180

Return-on-Investment Analysis (ROI)

Return-on-Investment (ROA) analysis – a technique that compares the lifetime profitability of alternative solutions.

> The ROI for a solution or project is a percentage rate that measures the relationship between the amount the business gets back from an investment and the amount invested.

Lifetime ROI =
(estimated lifetime benefits – estimated lifetime costs) / estimated lifetime costs

Annual ROI = lifetime ROI / lifetime of the system

(ROI Workshop + Case Study)

Net Present Value (NPV) Analysis

Net present value – analysis technique that compares annual discounted costs and benefits of alternative solutions.

	A	B	C	D	E	F	G	H	I	J
1	Net Present Value Analysis for Client-Server System Alternative									
2	(Numbers rounded to nearest $1)									
3										
4	Cash flow description	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total	
5	Development cost:	($418,040)								
6	Operation & maintenance cost:		($15,045)	($16,000)	($17,000)	($18,000)	($19,000)	($20,000)		
7	Discount factors for 12%:	1.000	0.893	0.797	0.712	0.636	0.567	0.507		
8	Present value of annual costs:	($418,040)	($13,435)	($12,752)	($12,104)	($11,448)	($10,773)	($10,140)		
9	Total present value of lifetime costs:								($488,692)	
10										
11	Benefits derived from operation of new	$0	$150,000	$170,000	$190,000	$210,000	$230,000	$250,000		
12	Discount factors for 12%:	1.000	$0.893	$0.797	$0.712	$0.636	$0.567	$0.507		
13	Present value of annual benefits:	$0	$133,950	$135,490	$135,280	$133,560	$130,410	$126,750		
14	Total present value of lifetime benefits:								$795,440	
15										
16	NET PRESENT VALUE OF THIS ALTERNATIVE:								$306,748	
17										

Candidate Systems Matrix

	Candidate 1 Name	Candidate 2 Name	Candidate 3 Name
Stakeholders			
Knowledge			
Processes			
Communications			

Candidate Systems Matrix – a tool used to document similarities and differences between candidate systems.

- **Stakeholders** - how system will interact with people and other systems.
- **Knowledge** - how data will be implemented, how inputs will be captured, how outputs will be generated.
- **Processes** - how processes will be built and implemented.
- **Communications** - how processes and data will be distributed.

Sample Candidate Systems Matrix

Characteristics	Candidate 1	Candidate 2	Candidate 3
Portion of System Computerized Brief description of that portion of the system that would be computerized in this candidate.	COTS package Platinum Plus from Entertainment Software Solutions would be purchased and customized to satisfy Member Services required functionality.	Member Services and warehouse operations in relation to order fulfillment.	Same as candidate 2.
Benefits Brief description of the business benefits that would be realized for this candidate.	This solution can be implemented quickly because it's a purchased solution.	Fully supports user required business processes for SoundStage Inc. Plus more efficient interaction with member accounts.	Same as candidate 2.
Servers and Workstations A description of the servers and workstations needed to support this candidate.	Technically architecture dictates Pentium III, MS Windows 2000 class servers and workstations (clients).	Same as candidate 1.	Same as candidate 1.
Software Tools Needed Software tools needed to design and build the candidate (e.g., database management system, emulators, operating systems, languages, etc.). Not generally applicable if applications software packages are to be purchased.	MS Visual C++ and MS Access for customization of package to provide report writing and integration.	MS Visual Basic 5.0 System Architect 2001 Internet Explorer	MS Visual Basic 5.0 System Architect 2001 Internet Explorer

Sample Candidate Systems Matrix (cont.)

Characteristics	Candidate 1	Candidate 2	Candidate 3
Application Software A description of the software to be purchased, built, accessed, or some combination of these techniques.	Package solution	Custom Solution	Same as candidate 2.
Method of Data Processing Generally some combination of: on-line, batch, deferred batch, remote batch, and real-time.	Client/Server	Same as candidate 1.	Same as candidate 1.
Output Devices and Implications A description of output devices that would be used, special output requirements, (e.g., network, preprinted forms, etc.), and output considerations (e.g., timing constratints)	(2) HP4MV department laser printers (2) HP5SI LAN laser printers	(2) HP4MV department laser printers. (2) HP5SI LAN laser printers (1) PRINTRONIX bar-code printer (includes software & drivers) Web pages must be designed to VGA resolution. All internal screens will be designed for SVGA resolution.	Same as candidate 2.

Sample Candidate Systems Matrix (cont.)

Characteristics	Candidate 1	Candidate 2	Candidate 3
Input devices and Implications A description of input methods to be used, input devices (e.g., keyboard, mouse, etc.), special input requirements (e.g., new or revised forms from which data would be input), and input considerations (e.g., timing of actual inputs).	Keyboard & mouse.	Apple "Quick Take" digital camera and software (15) PSC Quickscan laser bar-code scanners (1) HP Scanjet 4C Flatbed Scanner Keyboard and mouse	Same as candidate 2.
Storage Devices and Implications Brief description of what data would be stored, what data would be accessed from existing stores, what storage media would be used, how much storage capacity would be needed, and how data would be organized.	MS SQL Server DBMS with 1000GB arrayed capability.	Same as candidate 1.	Same as candidate 1.

Feasibility Analysis Matrix

Feasibility Analysis Matrix – a tool used to rank candidate systems.

	Weighting	Candidate 1	Candidate 2	Candidate 3
Description				
Operational Feasibility				
Cultural Feasibility				
Technical Feasibility				
Schedule Feasibility				
Economic Feasibility				
Legal Feasibility				
Ranking				

Sample Feasibility Analysis Matrix

	Wt	Candidate 1	Candidate 2	Candidate 3
Description		Purchase commercial off-the-shelf package for member services.	Write new application in-house using new company standard VB.NET and SQL Server database	Rewrite current in-house application using Powerbuilder.
Operational feasibility	15%	Supports only Member Services requirements. Current business process would have to be modified to take advantage of software functionality. Also there is concern about security in the system. Score: 60	Fully supports user-required functionality. Score: 100	Fully supports user-required functionality. Score: 100
Cultural Feasibility	15%	Possible user resistance to non-standard user interface of proposed purchased package. Score: 70	No foreseeable problems. Score: 100	No foreseeable problems. Score: 100

Sample Feasibility Analysis Matrix (cont.)

	Wt	Candidate 1	Candidate 2	Candidate 3
Technical feasibility	20%	Current production release of Platinum Plus package is version 1.0 and has been on the market for only 6 weeks. Maturity of product is a risk, and company charges and additional monthly fee for technical support. Required to hire or train Java J2EE expertise to perform modifications for integration requirements. Score: 50	Solution requires writing application in VB .NET. Although current technical staff has only Powerbuilder experience, it should be relatively easy to find programmers with VB .NET experience. Score: 95	Although current technical staff is comfortable with Powerbuilder, management is concerned about acquisition of Powerbuilder by Sybase Inc. MS SQL Server is the current company standard for database, which competes with Sybase DBMS. We have no guarantee that future versions of Powerbuilder will "play well" with our current version of SQL Server. Score: 60

Sample Feasibility Analysis Matrix (cont.)

	Wt	Candidate 1	Candidate 2	Candidate 3
Economic feasibility	30%			
Cost to develop:		Approx. $350.000	Approx. $418.000	Approx. $400.000
Payback (discounted):		Approx. 4.5 years	Approx. 3.5 years	Approx. 3.3 years
Net present value:		Approx. $210,000	Approx. $307,000	Approx. $325,000
Detailed calculations:		See Attachment A	See Attachment A	See Attachment A
		Score: 60	Score: 85	Score: 90

Sample Feasibility Analysis Matrix (cont.)

	Wt	Candidate 1	Candidate 2	Candidate 3
Schedule feasibility	10%	Less than 3 months Score: 95	9-12 months Score: 80	9 months Score: 85
Legal feasibility	10%	No foreseeable problems Score: 100	No foreseeable problems Score: 100	No foreseeable problems Score: 100
Weighted score	100%	67	92.5	87.5

The System Proposal

System proposal – a report or presentation of a recommended solution.

- Usually formal written report or oral presentation
- Intended for system owners and users

System Proposal – formal presentations

Formal presentation – a special meeting used to sell new ideas and gain approval for new systems. They may also be used for any of these purposes:

- Sell new system
- Sell new ideas
- Head off criticism
- Address concerns
- Verify conclusions
- Clarify facts
- Report progress

Typical Outline and Time Allocation for an Oral Presentation

I. Introduction (one-sixth of total time available)

- A. Problem statement
- B. Work completed to date

II. Part of the presentation (two-thirds of total time available)

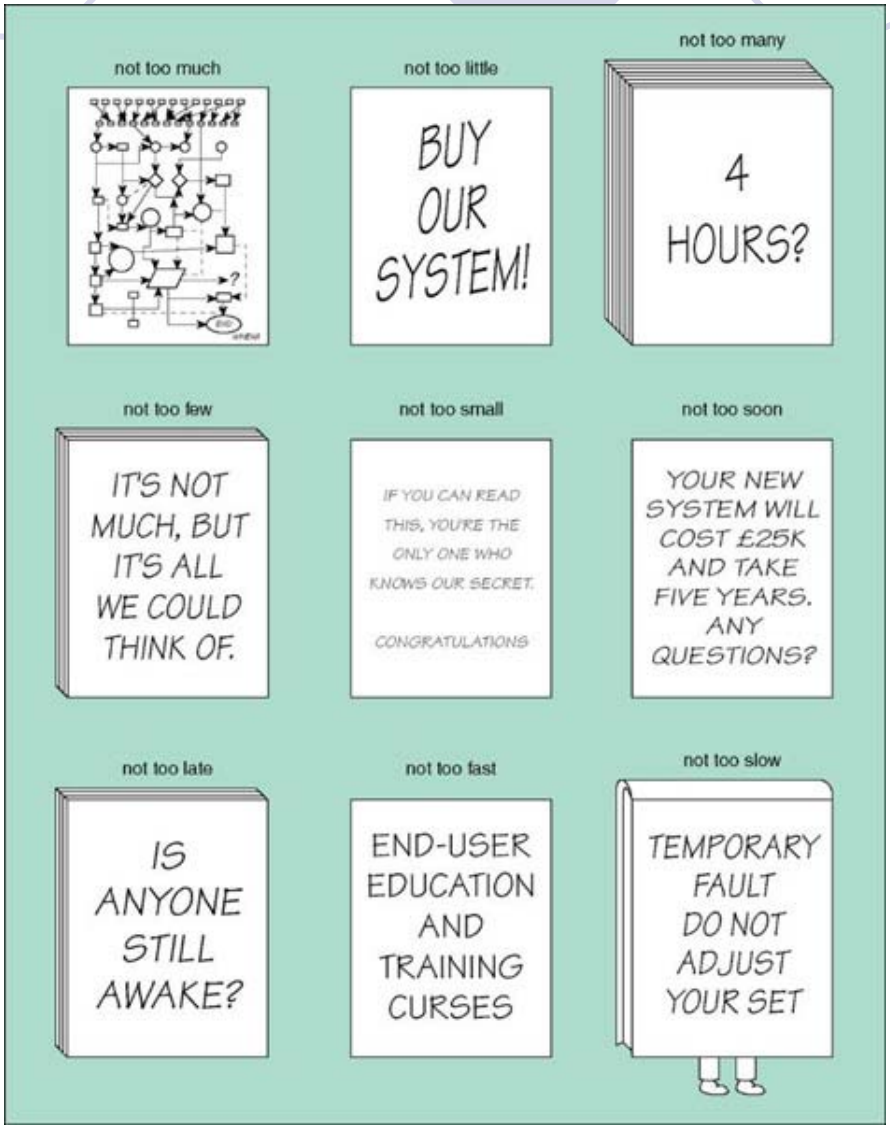
- A. Summary of existing problems and limitations
- B. Summary description of the proposed system
- C. Feasibility analysis
- D. Proposed schedule to complete project

III. Questions and concerns from the audience (time here is not to be included in the time allotted for presentation and conclusion; it is determined by those asking the questions and voicing their concerns)

IV. Conclusion (one-sixth of total time available)

- A. Summary of proposal
- B. Call to action (request for whatever authority you require to continue systems development)

Guidelines for Visual Aids



Conducting the Formal Presentation

- Dress professionally.
- Avoid using the "I" word when making the presentation.
- Maintain eye contact with the group and keep an air of confidence.
- Be aware of your own mannerisms.

When Answering Questions

- Always answer a question seriously, even if you think it is a silly question.
- Answer both the individual who asked the question and the entire audience.
- Summarize your answers.
- Limit the amount of time you spend answering any one question.
- Be honest.

Questions