Starting Over
Planning For A New Child Support Enforcement System

Feasibility Studies, Analysis of Alternatives, and Cost/Benefit Analyses
Feasibility, Alternatives and Cost Benefit Analysis

A Description and Discussion
Overview

Feasibility Studies
Alternatives Analysis
Cost Benefit Analysis
Review Criteria for Cost Benefit
Typical Review Process
Feasibility Study Review Examples
Feasibility Studies

In Complex, Large Scale Application Development Projects
Feasibility Studies: Purpose

- The Preliminary Study That Determines Whether a Proposed Systems Project is Technically, Financially, and Operationally Viable
- The Foundation for Approval of the Project’s IAPD
Feasibility Studies

- Include an Alternatives Analysis, Identifying Viable Options for System Design and Development. Together, They Provide:
  - Analysis of the System Objectives, Functional Requirements, and System Design Concepts
  - Feasibility of Applying Automation To Economically Improve Program Operations
  - Evaluation of Each of the Alternatives and Selection of an Optimal Solution
Feasibility Study Process

- Describe the Status Quo
- Define the Problem
- Define System Objectives
- Identify System Constraints and Assumptions
- Develop Initial Requirements
- Assess Project Feasibility
Describe the Status Quo

• Understanding of How the Current System Works
  • Work Flow Analysis
  • Technical Architecture of Hardware
  • Software Components
  • Manual Components
  • Interfaces
Define the Problem

- What Functionality is Missing or in Need of Automation From the Current System
- What Functionality is in Need of Improvement or Modification in the Current System
- Obsolescence of Technological Platforms and Architectures
Define System Objectives

- Functionality for the New System
  - Added
  - Automated
  - Improved
- Define Technical and Organizational Objectives
- Define Ranking Criteria to Evaluate Alternatives
Identify System Constraints

- Law and Regulations
- Technological
- Socio-political
- Financial
- Operational
- Functional
Identify Assumptions

- Include All Assumptions That Will Affect the Analysis
- Document the Logic Underlying the Assumptions
Identify Assumptions

- Cost and Budget
- Resources
- Functional and Programmatic
- Technical
- Organizational
- System Life
Initial Requirements

- Reorganize All of the Previous Work Into a List of Requirements the System Must Fulfill
- Ensure Requirements Definitions for the Current System Were Considered
- Identify the Universe of Existing and Theoretical Options
Create Evaluation Criteria

- Create high level criteria based on requirements definition
- Create weighting of high level criteria
- Create detailed (low level) evaluation criteria that build upon and further define high level criteria – be consistent
- Create weighting for evaluation scoring of the detailed, low level evaluation criteria – again, be consistent
- Consider using questionnaire or other user-friendly format for evaluation process – include systems and program staff as evaluators
Assess Project Feasibility Against the Universe of Options:

- Technical
- Political
- Impact on Users
- Cost
- Resources
- Risk
- Organizational
Apply the results of your analysis to the High Level Evaluation Criteria to Reduce the Universe of Potential Options to 2–4 Viable Possibilities

Transfer doesn’t necessarily need to make the cut of the 2–4 most viable – but it must have been considered via an analysis of all State systems to identify most viable system(s) to transfer

These Now Undergo Detailed Evaluation utilizing the Low Level Evaluation Criteria as Part of the “Analysis of Alternatives”
Alternatives Analysis

In Complex, Large Scale Application Development Projects
Alternatives Analysis

An Analysis Which Considers the Alternatives Available for Automation.
Development Alternatives

- Status Quo (Required)
- 2–4 of the following:
  - Enhance Existing System
  - New Development
  - Transfer
  - Hybrid
Technical Alternatives

- Client Server vs. Main Frame
- Thin Client vs. Thick Client
- Web Technology vs. Closed System
- Distributed vs. Centralized
- Custom vs. COTS
Alternatives Analysis

- Map Requirements to Hardware, Software, Processes and Personnel.
- Determine Risks and Effects
- Rank Alternatives
- Delete Non-viable Alternatives
Determine Risks and Effects

- Program Impact
- Equipment Impact
- Software Impact
- Information Impact
- Organizational Impact
- Operational Impact
- Developmental Impact
Cost Benefit Analysis

In Complex, Large Scale Application Development Projects
Cost Benefit Analysis

Detailed Evaluation of the Costs and Benefits of Each Alternative Identified During the Alternatives Analysis Is Critical …

… Pass or Fail Critical! From a Federal Standpoint!
Costs

- Cost the Status Quo
- Cost Alternatives to Status Quo
- Identify and Characterize All Costs
- Determine Whether to Use Constant or Current Dollars
- Build Each Cost Profile
  - Month-by-month costs
  - Sum to Yearly totals
Cost the Status Quo

- Cost of Maintaining Current System With No Enhancements.
- Used As Control Group to Evaluate Other Alternatives.
Cost Alternatives to Status Quo

• Recurring Costs

• Non-Recurring Costs
Identify and Characterize Costs

- Hardware
- Software
- Training
- Personnel
- Database Conversion
- Other (examples in Guide)
Build Each Cost Profile

- Estimate Effort Based on Metrics
- Use cost estimation tools and processes
- Compare to Similar Systems
- Run Experiments
- Measure Actuals
- Use the same cost estimation process for all alternatives
Benefits

- Identify and Characterize All Benefits
  - Tangible Benefits
  - Intangible Benefits
Identify and Characterize All Benefits

- Increased Collections
- Reduced Error Rates
- Reduced Costs
- Improved Security
- Improved Access
- Improved Interface
Tangible Benefits

- Derive Cost Saving From Benefit
- Document Assumptions Used in Derivation
Intangible Benefits

- List and Rate
- Examples
  - Worker Satisfaction
  - System Downtime
  - User Friendliness
  - Useful Life of System
Cost Benefit Analysis

- Convert Costs and Benefits to Current Dollars
- Compare Quantitative Factors
  - Net Benefit (Cost)
  - Benefit/Cost Ratio Based on the Full System Life Cycle
  - Breakeven or Payback
Cost Benefit Analysis: Issues

- Apply Assumptions, Costs, and Benefits Evenly Across All Alternatives
- Costs Are Not Always Known but May Be Estimated in a Range or With a Given Probability
- Decide Evaluation Criteria Up-front
- Intangible Benefits May Matter
Select an Alternative

- Apply the data collected during the Analysis of Alternatives and Cost/Benefit Analysis
- Perform a numerical analysis using the Evaluation Criteria and Relative Weightings developed at the start of the Feasibility Study process
- Compare the overall scores of each option analyzed to select the alternative that is best suited and most cost effective for your project
- If two alternatives tie or score very close together, you may consider using intangible benefits to help break the tie
Review Criteria For Cost Benefit Analysis
Review Criteria

- Are Results Credible
- Are Assumptions and Estimates Reasonable
- Are Results Reproducible
- Are Assumptions Applied Evenly Across All Alternatives
OCSE Evaluation Factors

What are the five factors that OCSE examines as part of its IV&V efforts

- Accuracy
- Measurability
- Repeatability
- Consistency
- Reasonableness
Common Errors

Mistakes: Inaccuracy

- Mathematical errors
- Incorrect formulae and algorithms
- Carryover errors compounded
- Missing math executions in a spreadsheet (hard-coded values instead of a calculation)
Common Errors

Mistakes: Lack of Measurability

- Missing or unpublished sources
- Lack of explanation for decisions
- Assumptions used versus real data
- Personal experience as foundation
- Assumptions and constraints are undefined
- Generic solution used for alternative (e.g. COTS)
Common Errors

Mistakes: Lack of Repeatability

• Missing data sources
• Missing formulae and algorithms
• Answers lack underlying math
• Assumptions and constraints are undocumented
• Personal experience as foundation
Common Errors

Mistakes: Lack of Consistency

- Same underlying sources not used
- Inconsistent application of criteria used in evaluating alternatives
- Weighting changes over time
- Different evaluators used for each of the various alternatives examined
Common Errors

Mistakes: Lack of Reasonableness

• Weighting variation is too extreme
• Unreasonable assumptions
• Too few criteria or lack of critical evaluation criteria (risk)
• Double counting of scores, benefits, etc., by using criteria different in name only
OCSE Analysis Techniques

How does OCSE analyze the Study?

• “What-if” analyses (scoring, criteria)
• Correct math errors and recalculate
• Eliminate unsupported scoring, faulty benefits, unfounded assumptions
• Determine if errors are cumulative, and if so, whether Study is fatally flawed
The OCSE Feasibility Study Guide provides the following guidelines for ensuring your analysis is complete:

• That a Status Quo is Thoroughly Described
• That All Reasonable Alternatives Were Considered
• That a Full Cost Benefit Analysis to at Least Two (2) Alternatives is Accomplished
• That Alternatives Were Evaluated on System Life Cycle Basis
Analysis Guide Checklist (cont’d)

- That Present Value Analysis Was Used
- That Cost and Benefit Projections Appear Reasonable
- That Net Benefits or Ratios Were Calculated for All Alternatives
- That the Study Resulted in a Clear Cost and Benefit Plan
- Results Are Summarized for Selection Justification in the IAPD
OCSE’s Typical Review Process
Typical FS Review

- OCSE Review Process Is Approximately Eight (8) Weeks
- Uses OCSE Staff and Contractors to Conduct the Review
- Review Initiated Upon State Submittal of a Feasibility Study and Cost/Benefit Analysis
- Some Prior Review and Technical Assistance of Preliminary Data (E.G. Evaluation Criteria)
FS Review: WEEK 1

- Assemble Team – OCSE Lead, OCSE Contractor Staff
- Start-Up Meeting to Discuss Overall Scope and Collect Documentation – FS, CBA, Status Quo Document, Historical Data
FS Review: WEEK 2

- Initial Contractor Staff Review of Documentation
- Develop Initial Set of Comments
- Develop List of Questions for State Staff
- Develop List of Additional Documentation and Artifacts Needed for Review
- Develop Agenda for On-Site Review with the State
FS Review: WEEK 3

- On-Site Review With State Staff
- Provide Initial Comments to the State
- Ask Questions Developed During Initial Review
- Interview State and Their Contractors On the Processes Used to Develop the FS
- Collect Additional Documentation
FS Review: WEEKS 4–6

- Detailed Review of FS, CBA, and Other Documentation
- Follow-Up Conference Calls With State Staff, As Required
- Draft Report Developed by OCSE Contractor and Submitted to OCSE Lead
FS Review: WEEKS 7–8

- OCSE Lead Review of the Draft Report
- Additional Follow-Up Calls With the State As Required
- Incorporate OCSE Lead Comments Into Report
- Provide Draft Report to State for Identification of Errors of Fact
- Review State Comments on Draft Report and Modify as Appropriate
- Release Final Report
FS Review: Documentation

- Final FS, CBA, and Status Quo Document
- Interim Versions of Documents
- White Papers
- Review Correspondence (Review Comments and Responses)
- Requirements Analysis Documentation
- Gap Analysis
FS Review: Documentation

- Spreadsheets and Other Tools and Work Products
- Evaluation Methodology Documents
- Analysis Assumptions and Constraints
- Meeting Minutes, Notes and E-mails
OCSE Report

What happens after OCSE’s IV&V?

- A report is issued to the State
- The report will explain the weaknesses found, ask they be corrected, and:
  - If the resultant selection didn’t change, to submit an IAPD as soon as possible
  - If the result did change, well ….
  - IAPD’s receive Federal funding approval, not Feasibility Studies
The Implementation APD

1. Executive Summary
2. Statement of Needs and Objectives
3. Feasibility Study *(Includes a summary of the study and the Analysis of Alternatives)*
4. Project Management Plan
5. Interface Requirements
6. Security
7. Budget *(Including cost allocation, if needed)*
8. Cost Benefit Analysis
Case Studies

Feasibility Study Reviews Of:

New York

South Carolina

Florida
New York Review

- New York Already Had a Federally Certified Statewide System
- The State Developed a Feasibility Study to Analyze Alternatives for Potential Replacement of Their System
- Goals: To Make System More Technically Up-to-Date, Consolidate Platforms, and Enhance System Performance
New York’s FS Approach

• Two Part Study:
  • Features Matrix and Cost/Benefit Analysis
  • Alternatives Analysis and Recommendation

• Contractor Hired (Renaissance – Now GovConnect) to Conduct the Analysis and Develop the Report
New York’s FS Approach

- Evaluation Criteria – Two Categories
  - Compliance – Ability to Meet Performance Goals, as Well as Functional and Technical Requirements and Level of Risk
  - Economic Value – Criteria By Which the Economic Viability of Each Alternative Could Be Assessed, Including Costs and Benefits
New York’s FS Approach

- **Compliance (2400 Points)**
  - Performance Goals – 800 Points: Meeting Federally Mandated Performance Goals
  - Functional Compliance – 700 Points: Meeting Federal Certification and State Requirements
New York’s FS Approach

- System Development Risk – 300 Points: Based On Development Process and Environment, and on the State’s Program Constraints (E.G. Resources, Interfaces)
New York’s FS Approach

- Economic Value (600 Points)
  - Total Cost – 400 Points
  - Cost/Benefit Ratio – 200 Points
New York’s FS Approach

• Four Options Considered
  • OPTION 1: Enhancement to Current System (Non–COTS Software Enhancements Only)
  • OPTION 2: Develop New System with Open Architecture
  • OPTION 3: Combination of New and Legacy System Architecture
  • OPTION 4: Transfer an Existing Certifiable System (Massachusetts’ “COMETS” and Los Angeles’ “ARS”)
New York’s FS Results

• Concluded That Option 3, the Hybrid Approach, Would Be the Most Beneficial to the State.
• Driven By the Following Conclusions:
  • Option 1 Does Not Provide Enough Benefit.
  • Options 2 and 4 are Contractor Managed and Therefore Incur the Cost of Quality Assurance and Project Management for Both the State and the Contractor
New York’s FS Results

- Options 1 and 3 Are Able to Start Accruing Benefits Periodically During Development, Whereas Options 2 and 4 Only Begin Accruing Benefits at the End of the Development Cycle.
- Option 4 Requires a High Degree of System Re-engineering.
New York – OCSE Findings
Status Quo Not Defined

- Option 1 Was a Modified Version of the State’s Current System
- Enhancements Allowed Provided They Do Not Require New Hardware or COTS Software
- This Does Not Meet Federal Guideline for Status Quo
- Recommendation – Rework Option 1 With No Changes to the Legacy System or Split Into Two Options
Assumed Options 1 & 3 Would Be State Managed, 2 & 4 Would Be Contractor Managed

In the Analysis, Option 3 Given Superior Cost Rating For Costs Saved By Using State Management

In Fact, Any of the Options Could Be State Managed

Recommendation – Separate Management Models From the Development Choice
• Improved Collections Expressed as X% Improvement Over Time
• In Fact, This Should Be Expressed as Exponential Over Time, Not Linear
• There Is, In Actuality, Some Finite Number of Cases That Can Be Collected (<100% of Total)
• Improvement Efforts Will Not Approach This Limit Evenly, But as Some Sort of Diminishing Returns Over Time
• Recommendation – Re–Think to More Accurately Reflect a Non–Linear Improvement Rate and the Finite Number of Cases That Can Be Collected
New York – OCSE Findings
Number of Releases in Option 3

- Option 3 Was Combination of New and Legacy Architecture
- Scheduled for Completion In 29 Months
- 20 Different Overlapping Program Releases Scheduled in This Time Frame
- Risks Associated With This Aggressive Approach Not Addressed
- Impacts Configuration Management, Quality Assurance, and Training
- Recommendation – Rework Options 1 & 3 With a Manageable Number of Releases
• “Reasonableness” Check on the Figures Indicated Transfer System Appeared to Score Lower Than One Might Expect
• Analysis Revealed This Was Due to an Estimate of 80% Rework Required for a Transfer System
• Figure Based Upon State, Federal, and Contractor Past Experience.
• Recommendation – Because It Has Such a Devastating Impact on the Transfer Option, the 80% Estimate Should Be Listed As An Assumption.
New York – OCSE Findings
Cost Avoidance

- Some Benefits Were Quantified by Multiplying the Number of Hours Saved by the Given Employee’s Hourly Rate
- Employees Were Full Time State Staff
- Must Take Care To Do This Only If the Employee’s Time Saved Can Be Used Processing Other Cases or Performing Other Savings-Generating Activities
- Recommendation – Recalculate as a Function of Extra Income Generated Rather Than Salaries Saved.
New York – Status

- Feasibility Study Withdrawn
- The State Terminated Their New System Development Effort For Financial Reasons
- Achieved PRWORA Certification With Their Existing System
- Subsequently Began a Phased Enhancement to the Existing System – Ongoing
South Carolina Review

- South Carolina Does Not Have a Federally Certified Statewide System
- Previous Development Effort Ended in Failure
- The State Developed a Feasibility Study to Examine Alternatives for Their Statewide System Solution
- Contractor Hired (AMS) to Conduct the Analysis and Develop the Report
South Carolina’s FS Approach

- Six-Phased Approach
  - Identify Viable Options
  - Compare the Functional and Technical Merits of Each Option
  - Evaluate Risks
  - Determine Costs and Benefits of Each Option
  - Assess the Technical Currency of Each Option’s Architecture
  - Score Each Option Based on Assigned Weighting Factors
South Carolina’s FS Approach Documentation Developed

- Baseline Requirements Report
  - Functional and Technical Requirements
  - Opportunities For Enhancement
  - System Objectives
  - System Constraints
  - System Assumptions
  - Performance Measures Defined By Key Stakeholders
Evaluation Framework Report
- Defines the Options to Be Assessed
- Details the Research and Analysis Methodology
- Establishes the Evaluation Criteria
- Specifies the Scoring (Weighting) and Ranking Methodology Used to Arrive at the Recommended Option
South Carolina’s FS Approach Documentation Developed

- Course of Action Plan (CAP)
  - Feasibility Study
  - Gap Analysis
  - Cost/Benefit Analysis
  - Ranking of Alternatives
- Status Quo Report
  - Separate Volume Containing Federally Required Status Quo Data
South Carolina’s FS Approach

- Evaluation Criteria – Four Categories
  - Comparative Assessment – 20%: Meeting Functional and Technical Requirements, Including Federal Certification
  - Cost/Benefit Analysis – 32.5%:
    - Total Cost
    - Total Benefit
    - Cost/Benefit Ratio
    - Break Even Point
Evaluation Criteria (continued)
- Risk Assessment – 15 %: Based on Technology, Staffing, Project Organization, Business, and Implementation Risks
- Technical Currency – 32.5 %: Meeting Specific Technical Requirements:
  - Component Based Design
  - N-Tier Architecture
  - Clusters of Servers
  - Object-Oriented Architecture
  - Visual Programming
  - RAD Tools
  - Web Presence
South Carolina’s FS Approach

- Three Options Considered:
  - OPTION 1: Modified CSES – Continue Development Using Uncompleted Software From the Failed Project (Transfer System)
  - OPTION 2: “Custom Integrated System” – New Centralized System
  - OPTION 3: “Custom Linked System” – Alternative System Linking a New Statewide Court System to a New IV-D System
South Carolina’s FS Results

- Concluded That Option 2, the New Custom Integrated System Approach, Would Be the Most Beneficial to the State
- Driven By the Following Conclusions:
  - Option 1 Does Not Provide a Long Term, Technically Viable Solution
  - Options 1 and 2 Are Able to Start Accruing Benefits Earlier Than Option 3
  - Option 3 is Not Eligible For Federal Financial Participation
South Carolina – OCSE Findings
Weighting Factors Issues

- Weight of CBA and Risk Expected to Be Higher Given State’s Past Experience
- Weighting Factors Were Changed Twice During the Course of the Analysis
- Most Significant Change Added the “Technical Currency” Factor
- This Changed the Final Outcome of the Analysis from the Modified CSES to the Custom Integrated System
Some Assumptions Appear Unrealistic and Arbitrary

- Design and Development of the Custom Integrated System is Only 1/3 Longer Than Modified CSES, Which is 70% Complete
- In Part Due To Initial Schedule Estimates Rounded to the Nearest 12–Month Period
South Carolina – OCSE Findings
Assumptions and Constraints

- System Constraints Not Clearly Defined
  - For the Status Quo, No Attempt is Made to Clarify and Summarize Constraints
  - References to Constraints Appear In Various Sections of the Report

- Recommendations –
  - Consolidate Assumptions and Constraints
  - Eliminate Excessive Rounding of Data
South Carolina – OCSE Findings
Benefit Data Incomplete

• Evaluation of Quantitative Benefits Was Limited to Increases in Collections
• Recommendation – Other Benefits Could Be Included:
  • Use of Integrated Database in Option 2 Would Reduce Cost, Risk, and Data Redundancy
  • N–Tier Technology May Reduce Programming Time and Errors
  • Increased Productivity
  • Increased Caseload Capacity
South Carolina – OCSE Findings
Number of Reports

- Number of Reports Required is Higher for Option 1 Than for Option 2
- AMS Indicated This Was Because Option 2 Would Be Capable of Generating More Reports
- CAP is Inappropriately Basing Requirements on System Capabilities
- Recommendation – Apply Consistent Requirements To All Options.
South Carolina – Status

• Based on re-examination of the analysis, the State concluded that Option 1 was more economically feasible and produced less risk
• State currently continuing work on a statewide system development effort
Florida Review

- Florida Already Had a Federally Certified (FSA ‘88) Statewide System
- The State Developed a Feasibility Study to Analyze Alternatives for Potential New System Development
- Contractor Hired (TRW) to Conduct the Analysis and Develop the Report
Florida’s FS Approach

- Evaluation Criteria:
- Two Primary Categories
  - Meeting System Objectives – Ability to Meet Objectives Taken From the ACF Feasibility Study Guide
  - Cost/Benefits Analysis
- Subjective Ratings Applied
- No Weighting Applied
Florida’s FS Approach

• Four Options Considered
  • OPTION 1: Transfer Existing CSE Software From State Mainframe to a Department of Revenue Platform
  • OPTION 2: Transfer From Another State (Not Identified)
  • OPTION 3: Develop New System
  • OPTION 4: Status Quo
Florida’s FS Results

• Concluded That Option 3, New System Development Would Be Most Beneficial to the State
• Driven By the Following:
  • Cost Effectiveness
  • Flexibility
  • Allows a UNIX Environment
  • Best Environment for GUI Front End
Florida – OCSE Findings

- Upon Submittal of Final FS Report (December 1998), OCSE Met With State
- Key OCSE Comment: Cost of New System Development Appeared Low Based on Experience From Other States
Florida – Status

- State Withdrew the Study and Decided to Re-Work the Analysis
- New Study Revealed Cost of New System Development Would Be Significantly Higher Than Original Analysis
REFERENCES
References


- Title 45 Public Welfare and Human Services Code of Federal Regulations (CFR), Part 95--General Administration–Grant Programs (Public Assistance and Medical Assistance)

- Title 45 Public Welfare and Human Services Code of Federal Regulations (CFR), Part 74 – Uniform Administrative Requirements for Awards and Subawards to Institutions of Higher Education, Hospitals, Other Nonprofit Organizations, and Commercial Organizations; and Certain Grants and Agreements with States, Local Governments and Indian Tribal Governments
References

References

Questions?