



Business Case Analysis

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CS 510

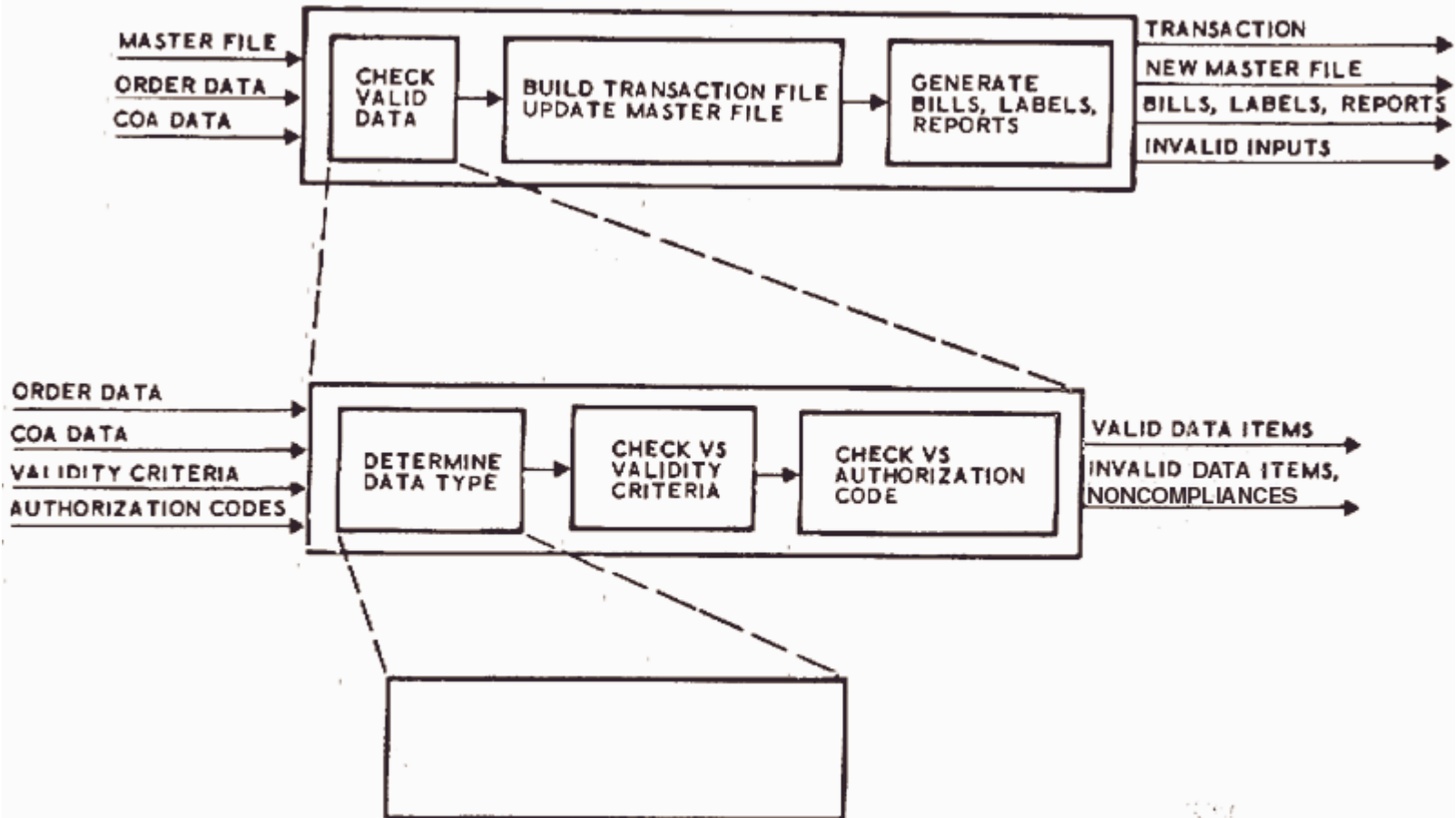


Business Case Analysis: Outline

- **Scientific American case study**
- **Business Case Analysis**
 - Objectives and Products
 - Process
- **Example I - Scientific American**
- **Example II - Product Line Management**
 - Megaprogramming and product line management
 - Examples



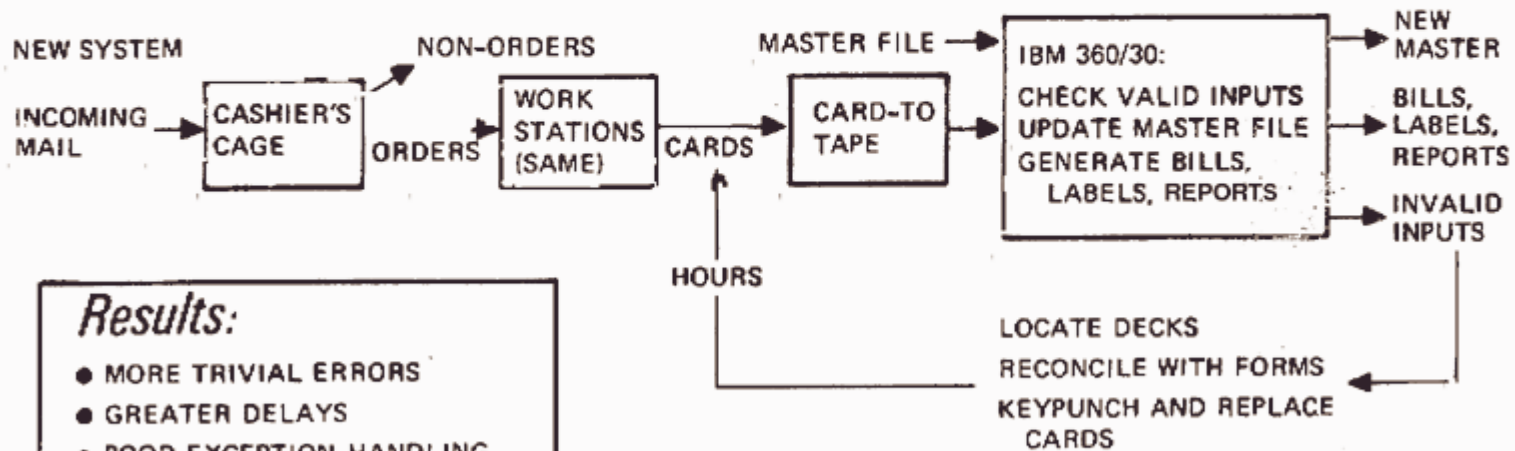
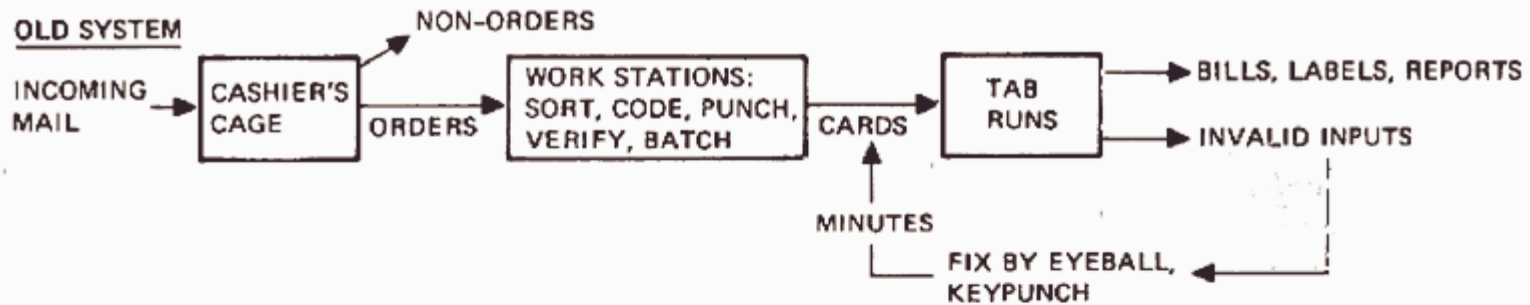
Typical Programming-Oriented Top-Down Development





Problems With Programming-Oriented Top-Down Development

“SCIENTIFIC AMERICAN” SUBSCRIPTION PROCESSING



- Results:**
- MORE TRIVIAL ERRORS
 - GREATER DELAYS
 - POOR EXCEPTION-HANDLING
 - CUMBERSOME INPUT CONTROLS
 - MORE LABOR-INTENSIVE



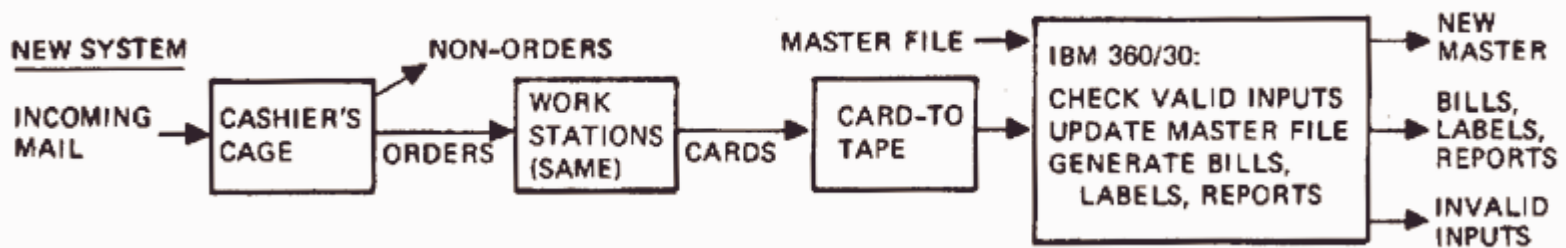
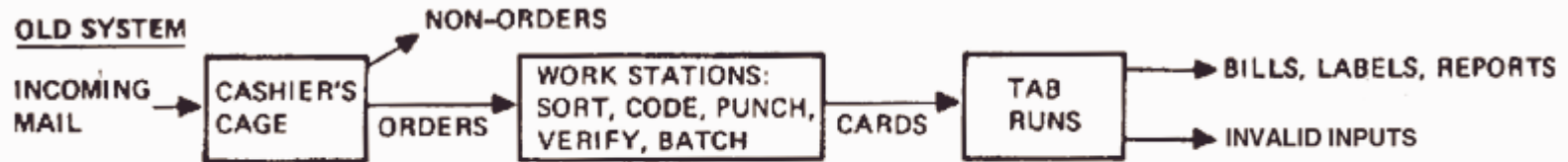
User-Oriented Top-Down Approach

1. **User Objective: What Are We Trying to Improve?**
 - Cost, Speed, Reliability
2. **User Activities: What Activities Determine Value of Objective Function?**
 - Functional Sequence Diagrams
 - Time and Motion Studies
 - Error Source Analysis
3. **User Controls: What Variables Do We Control Which Affect Objective?**
 - Mail: P.O. Boxes, Envelope Color and Size, Order Blanks
 - Sort Procedures: Manual, Tab, EDP
Dispersed, Central
 - Data Entry/ Screening: Key punch, OCR, Smart Terminal
 - Data Processing: Tab, Dedicated Computer, Service Bureau
4. **Design and Evaluate Balanced Alternative Systems**
5. **Implement Best Alternative, Evaluate, and Iterate**



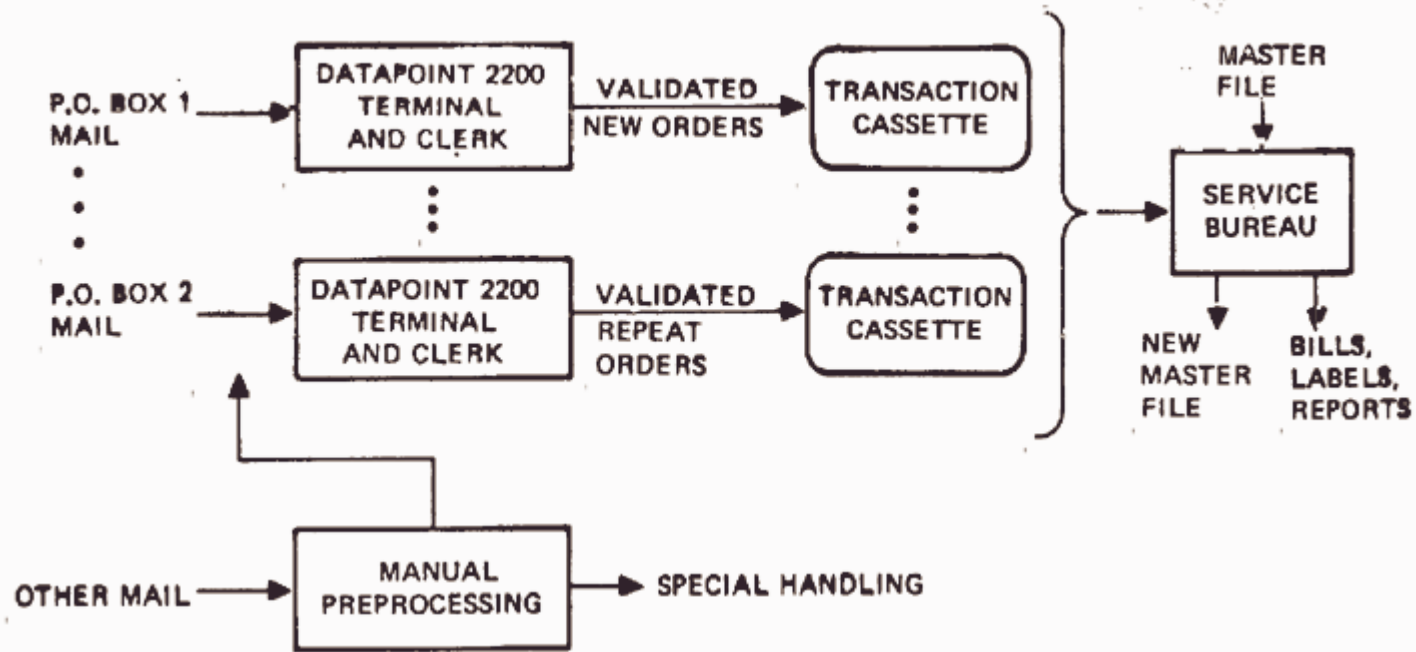
Problems With Programming-Oriented Top-Down Development

“SCIENTIFIC AMERICAN” SUBSCRIPTION PROCESSING





Result: Streamlined, Responsive, Reliable Operation



- Results:**
- < 20 CLERKS INSTEAD OF > 40
 - 33% MORE WORKLOAD
 - LOWER COST, HIGHER RELIABILITY
 - INTERACTIVE VALIDATION
 - FREQUENCY-OPTIMIZED ENTRY (21 KEYSTROKES NOMINAL)
 - INCREASED JOB SATISFACTION, LESS TURNOVER



Business Case Analysis: Objectives

- **Justify investments in information processing capabilities**
 - Worth pursuing
 - Superior to alternatives
- **Provide basis for system development, evaluation, and management**



Business Case Analysis: Overall Process

1. Identify top-level business-improvement objectives, constraints
2. Characterize current business approach w.r.t. objectives, constraints
3. Identify major sources of improvement (alternatives)
4. Filter alternatives w.r.t. objectives, constraints
5. Pick most promising alternative
6. Analyze cost-benefit relationships
7. Evaluate whether benefits justify costs
 - Break even point, return on investment (ROI)
8. Develop top-level system definition, process strategy
9. Refine cost-benefit, ROI analysis
10. Compile, present, discuss, iterate report



Business Case Analysis Product: Report

- 1. Business Objectives**
 - Current situation
 - Desired situation
- 2. Identification and Analysis of Alternatives**
 - Rationale for chosen alternative
- 3. Top-level system definition**
- 4. Top-level process strategy**
- 5. Return on Investment analysis**



1. Business Improvement Objectives & Constraints

Objectives

- Increase subscription fulfillment speed, reliability
- Reduce costs, staff level, turnover, customer complaints

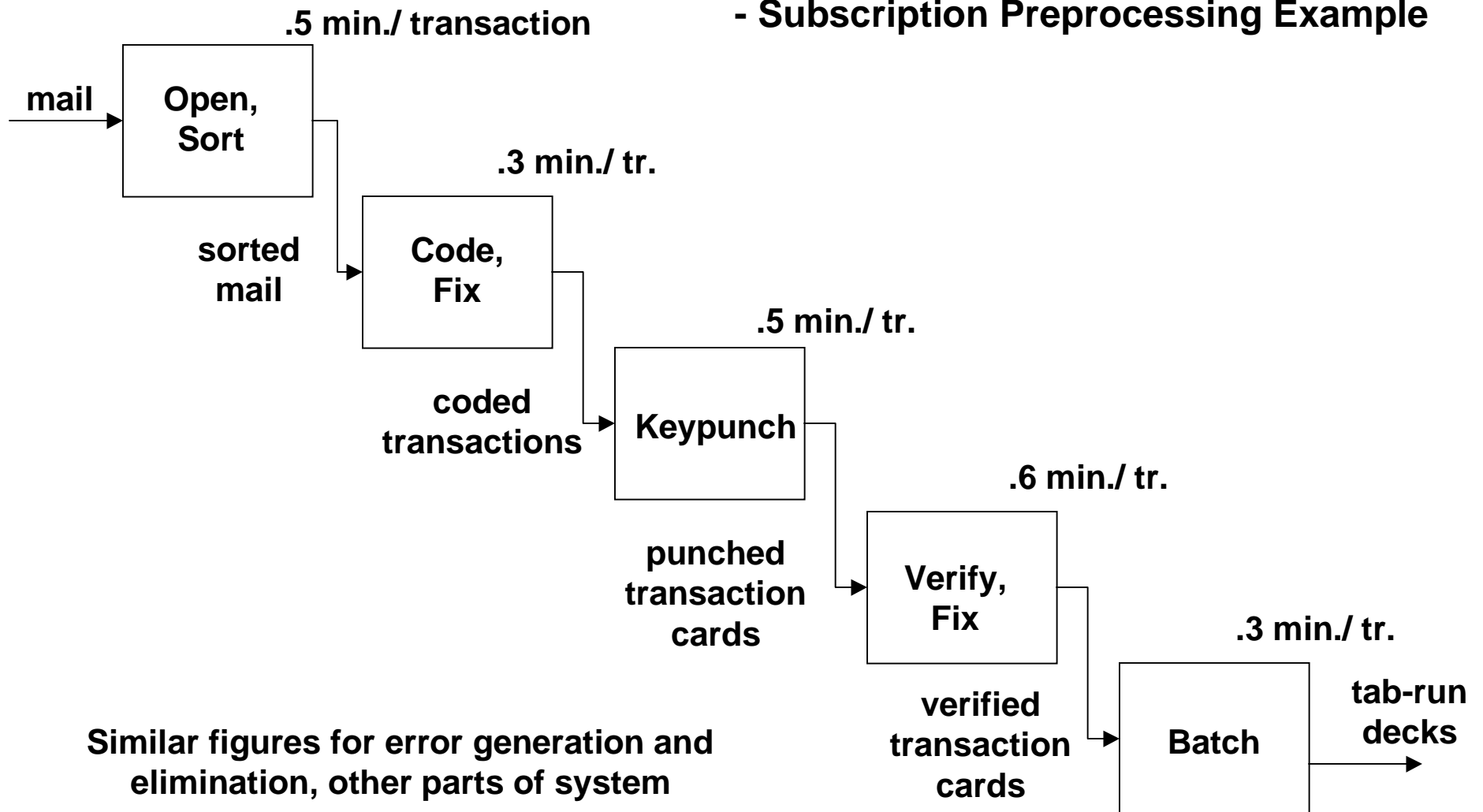
Constraints

- Interoperability with accounting & finance system
 - Audit trails on financial transactions



2. Current Business Approach: IDEF/ SADT Charts

- Subscription Preprocessing Example



Similar figures for error generation and elimination, other parts of system



3. Major Sources of Improvement

- **Contract programming**
- **Contract business process re-engineering**
- **Outsource**
- **Software package for subscription processing**



Feasibility Phase Screening Matrix

RATING SCALE		
	CRITERIA	ALTERNATIVES
-	unimportant	unacceptable
•	optional	marginal
••	important	acceptable
•••	critical	strong

	Importance	Existing system	In-house development	Vendor development						
COST										
Dollars - acquisition	•••	••	••							
Dollars - operation	•••	••	••							
Schedule	••	••	•							
Key personnel	••	•	•••							
Other:										
EFFECTIVENESS										
Functions:										
<i>Diagnostics</i>	••	••	•••							
<i>Performance Measurement</i>	••	••	•••							
<i>Accounting System</i>	•	••	•••							
Throughput	•••	••	••							
Response time	••	••	••							
Accuracy	•									
Ease of use	••	••	••							
Ease of maintenance	•••	•••	•							
Staff morale and growth	•••	•••	•							
Sales potential	•									
Reputation	•									
Side effects/Other:										
RISK										
Technology	•									
Availability/Reliability	•••	••	••							
Controllability	•••	•••	•							
Other:										



4. Subset of Screening Matrix

	Importance	Existing System	Contract Programming	Contract Re-engineering	Outsource	SW Package
COST						
Dollars - acquisition	***	***	**	**	**	***
Dollars - operation	***	■	■	***	*	**
'''						
'''						
Availability/ Reliability	**	■	■	***	***	**
Controllability	***	***	**	***	**	*

5. Pick most promising alternative: Contract Re-engineering



6. Cost-Benefit Analysis I

Costs:	Terminals:	\$50K	
	Programming:	70	4 months
	Installation:	10	} 1 month
	Training:	20	
	Total:	<hr/> \$150K	<hr/> 5 months

Benefit Parameters:

$$\frac{800,000 \text{ transactions/year}}{200 \text{ days/year}} = 4000 \text{ trans./workday}$$

$$(0.1 \text{ minutes/tr.})(4000 \text{ tr./day}) = 400 \text{ min./day} = 1 \text{ clerk}$$



6. Cost-Benefit Analysis II

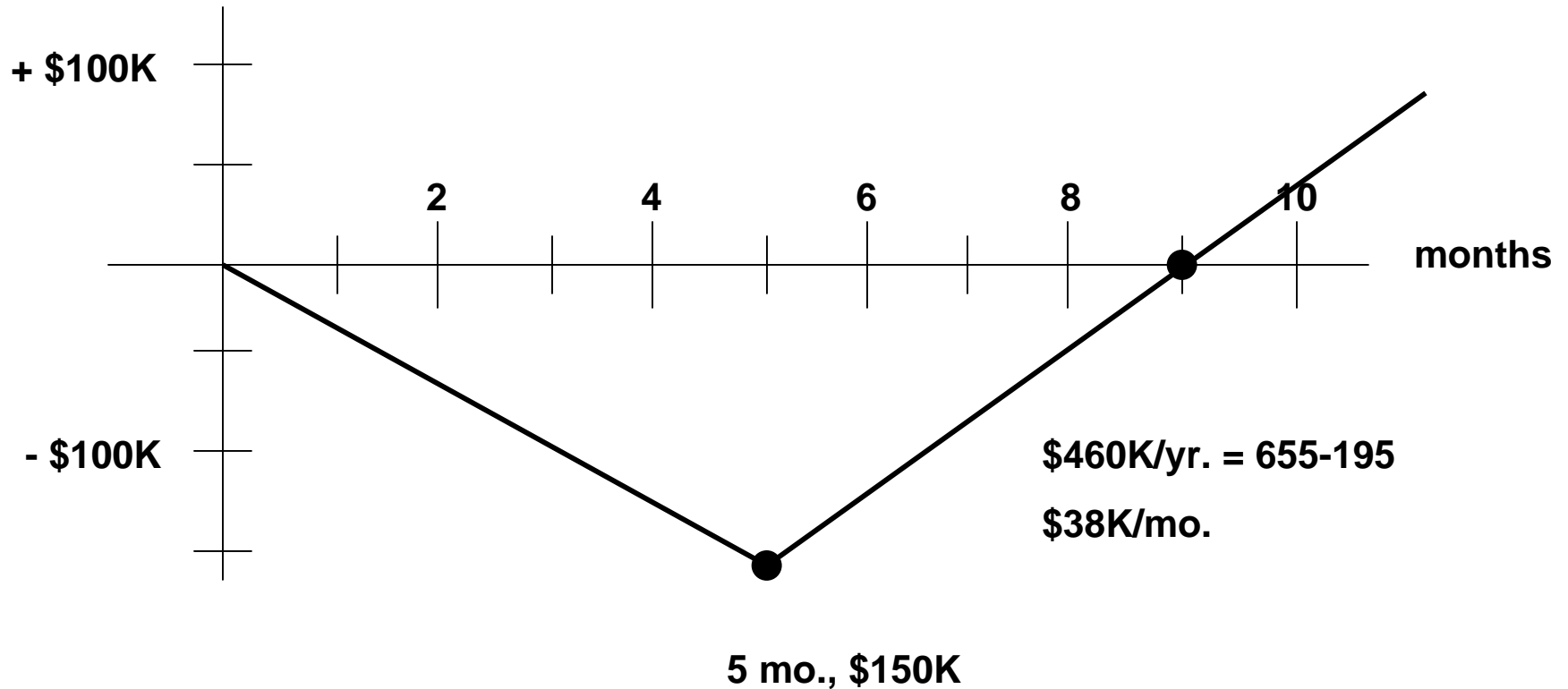
Benefits	Current System			New System		
	Function	min./tr.	clerks	\$K/yr.	min./tr.	clerks
Open, Sort	.5	5	125	.5	5	125
Code, Fix	.3	3	75			
Keypunch	.5	5	125			
Verify, Fix	.6	6	150			
Batch	.3	3	75	.1	1	25
Supervisors		3	105		1	35
Terminal Maintenance						10
Total		25	655		7	195



7. Return on Investment

$$\frac{\$655\text{K/yr.} - \$195\text{K/yr.}}{\$150\text{K}} = 300\%/yr. \quad \frac{\text{annual value of improvements}}{\text{investment cost}}$$

Breakeven Analysis





8. Top-Level System Definition

- **Interactive terminal operations concept**

Top-level process strategy

- **Refine system requirements, architecture**
- **Increment 1: Replace clerical preprocessing**
- **Increment 2: Replace tabular operations**
- **Continuing evaluation, refinement**

9. Refine cost-benefit, ROI analysis

- **Additional up-front costs, time to refine system requirements, architecture**

10. Compile, present, discuss, iterate report



Business Case Analysis: Subscription Processing System (SPS)

- 1. Top-level objective: profitable SPS**
Top-level constraint: 12-month market window
- 2. Current approach: No other software products; Need to develop an SPS for internal use**
- 3. Major alternatives: Buy, customize transaction processing system (TPS) framework**
Build
- 4. Filter alternatives: TPS has missing functions, high maintenance cost (\$15K/ yr), controllability problem**
- 5. Best alternative: Build**
- 6. Analyze cost-benefit relationships**



Software Product Line Economic Model: Costs

Cost Factors

- Domain engineering
- Architecture determination
- Reusable components development
- Legacy SW re-engineering
- Process redefinition
- Training, teambuilding
- Repository development, operations
- Component certification
- Component maintenance
- Marketed product costs

Major Cost Drivers

- Breadth, maturity of domain
- Architecture maturity; diversity of legacy and COTS software
- Breadth of reuse; other cost drivers
- Legacy SW structure, understandability
- Process maturity
- Novelty of PLM approach; no. of trainees
- Number of components; users
- Number of components; degree of certification
- Stability of application, technology, environment, infrastructure
- Type of product (package, service)



Software Product Line Economic Model: Benefits

Benefit Factors	Major Drivers
<ul style="list-style-type: none">•Cost avoidance•Cycle time reduction•Quality<ul style="list-style-type: none">•Error reduction•User interface•Risk reduction•Marketed product income	<ul style="list-style-type: none">•No. of products in product line; degree of component reuse•Completeness of PLM solution; training and experience<ul style="list-style-type: none">•Certification, process, training•Completeness of PLM solution in user interface area•Completeness of PLM solution; process used•Market size and share; price structure



Subscription Processing Product Line: Costs

Initial Costs

Domain engineering; architecture

12 pm (\$10K/ pm) = \$120K

Reusable components

\$800K (50%) = 400K

Repository preparation

10 pm (\$10K/ pm) = 100K

Repository facility

= 200K

Business operations preparation

48 pm (\$10K/ pm) = 480K

\$1300K

Annual Costs

Software maintenance

24 pm/ yr (\$10K/ pm) = \$240K/ yr

Repository operations: personnel
: facility

24 pm/ yr (\$10K/ pm) = \$240K/ yr
= 80K/ yr

Business operations

36 pm/ yr (\$10K/ pm) = 360K/ yr
\$920K/ yr

Sales, years 2 and 3

24 pm/ yr (\$10K/ pm) = \$240K/ yr



Subscription Processing Product Line: Benefits, ROI

Market: (200 companies)(25% penetration) = 50 systems

Year	1	2	3	4	5	6
Cumulative Sales		10	25	40	50	50
Purchases @ \$100K		\$1000K	1500	1500	1000	
Maintenance @ \$30K/ yr			300	750	1200	1500
Total Income		1000	1800	2250	2200	1500
Cumulative		1000	2800	5050	7250	8750
Total Cost	\$1300K	1160	1160	920	920	920
Cumulative	1300	2460	3620	4540	5460	6380
ROI	0	.41	.77	1.11	1.33	1.37



Breakeven Point Summary

