Return on Investment

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Objectives

- Review Return on Investment (ROI) basics
- Discuss important data elements for an effective ROI and proposal
- Evaluate two case studies for pharmacy automation
- Open Discussion

Why ROI?

- Limited funds within the organization
- Visibility of pharmacy projects is often reduced
- Demonstrates the financial value associated with the product
  - Value can be tangible or intangible
- Essential part of any automation proposal

Return on Investment Basics

- ROI is the ratio of money gained or lost on an investment relative to the amount of money invested
- Also described as the estimated return on a future investment

Internal Rate of Return (IRR)

- Capital budgeting method used to decide whether long-term investments are worthwhile
- A project is a good investment proposition if its IRR is greater than the rate of return that could be earned by alternative investments
- Calculated as a percentage
- Similar to Net Present Value (NPV), which is calculated as a dollar value

Tangible versus Intangible Benefits

- Tangible assets have a physical presence
  - Actual FTE reductions
  - Real new revenue
  - Drug savings through reduced use
- Intangible assets are not necessarily of lesser value, but are often referred to a “soft dollars”
  - Improved turnaround time
  - Incremental nursing time savings
  - Safety improvements (typically)

Additional Considerations

- Cost Avoidance can be an important factor, but may or may not be acceptable
- Payback Period is another common calculation
  - How long will it take for the project to pay for itself?

Cost Considerations

- Project cost must be “fully loaded”
  - Hardware, software, licenses, and maintenance
  - Site preparation and construction
  - Cost of consumables, if any
- Lease versus Purchase
  - Typically a site-specific determination
  - Depends on the time value of money

How to Calculate

$$NPV = 0 = \text{Initial Investment} + \sum_{t=1}^{N} \frac{C_t}{(1 + IRR)^t}$$

- Or just use Excel

Sample Project Calculation – COSTS

Sample Pharmacy Technology Project

YEAR	0	1	2	3	4	5	
PROJECT COSTS:							**TOTAL**
Hardware	$500,000						$500,000
Interface	$50,000	$4,000	$4,000	$4,000	$4,000	$4,000	$70,000
Site Preparation/Construction	$150,000						$150,000
Implementation Costs and Training	$50,000						$50,000
Software License	$250,000						$250,000
Maintenance at $25K/month		$25,000	$25,000	$25,000	$25,000	$25,000	$125,000
Disposable Costs		$7,000	$7,500	$8,000	$8,500	$9,000	$40,000
TOTAL PROJECT INVESTMENT (A):	**$1,000,000**	**$36,000**	**$36,500**	**$37,000**	**$37,500**	**$38,000**	**$1,185,000**

Sample Project Calculation – SAVINGS

SAVINGS POTENTIAL GENERATED:						
Hard Labor Savings	$150,000	$250,000	$260,000	$270,400	$281,216	$1,211,616
Other Equipment Cost Avoidance		$100,000				$100,000
Actual Drug Cost Savings	$80,000	$100,000	$106,000	$112,360	$119,102	$517,462
Improved Inventory Management	$20,000					$20,000
Medication Error Reduction (15% x $2,000/error)	$22,000					$ 22,000
TOTALS SAVINGS POTENTIAL (B):	**$272,000**	**$450,000**	**$366,000**	**$382,760**	**$400,318**	**$1,871,078**

Sample Project Calculation

Sample Pharmacy Technology Project

YEAR	0	1	2	3	4	5	TOTAL
PROJECT COSTS:							
Hardware	$500,000						$500,000
Interface	$50,000	$4,000	$4,000	$4,000	$4,000	$4,000	$70,000
Site Preparation/Construction	$150,000						$150,000
Implementation Costs and Training	$50,000						$50,000
Software License	$250,000						$250,000
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TOTALS SAVINGS POTENTIAL (B):		**$272,000**	**$450,000**	**$366,000**	**$382,760**	**$400,318**	**$1,871,078**
NET SAVINGS POTENTIAL (B-A):	($1,000,000)	$236,000	$413,500	$329,000	$345,260	$362,318	**$686,078**
NPV	**$391,352**						
IRR	**19.4%**						
CUMULATIVE SAVINGS:		$236,000	$649,500	$978,500	$1,323,760	**$1,686,078**	


Case Study: Pharmacy
Dispensing Robot

Project Description

- Implement centralized dispensing robot for daily fill of unit dose scheduled medications
- Utilize centralized barcode packaging and distribution
  - Reduce decentralized dispensing burden
  - Hybrid model leveraging decentralized automation and centralized robotics
  - Patient medications near the bedside
- Barcoding necessary for bedside scanning project

Bar coding

Centralized Dispensing

Administration

Decentralized & Non-Robot Dispensing
Inventory Storage & Management

Potential Advantages

- Error free dispensing
- Reduction of FTE hours
- Redeployment of pharmacists into patient care functions
- Reduction in nurse “vending time”
- Bar code foundation for point of care
- Reduction of expired medications
- Reduction of number of cabinets
- Potential bulk to UD savings

Financial Considerations and Justification

- Rental versus Purchase
- Fully load all expenses
- Needed barcode solution of some kind
- Labor impact – some hard, some soft
- Could actually reduce cabinet expense (changing vendors)
- Medication error reduction

ROI Calculation

Savings Realized With The ROBOT

Based On A 5 Year Period - Purchase Option

Baylor University Medical Center

	2004	Jan-Dec 2005	Jan-Dec 2006	Jan-Dec 2007	Jan-Dec 2008	Jan-Dec 2009	
YEAR	**0**	**1**	**2**	**3**	**4**	**5**	
ROBOT-Rx INVESTMENT:							**TOTAL**
Hardware	$600,000						$600,000
Interface[1]	$97,650	$4044	$4,044	$4,044	$4,044	$4,044	$113,826
Site Preparation[2]	$67,553						$67,553
Implementation	$50,000						$50,000
Software License	$250,000						$250,000
Software Support & Upgrade Fee		$34,000	$34,000	$34,000	$34,000	$34,000	$170,000
Hardware Maintenance		$40,000	$40,000	$40,000	$40,000	$40,000	$200,000
Estimated annual material costs (i.e. envelopes, labels, misc.)		$10,810	$10,810	$10,810	$10,810	$10,810	$54,050
Pak Plus-Rx Program Fee[3]		$223,845	$223,845	$223,845	$223,845	$223,845	$1,119,225
Annual Charge for UDL medications[4]		$18,434	$18,434	$18,434	$18,434	$18,434	$92,170
TOTAL ROBOT-Rx INVESTMENT (A):	**$1,065,203**	**$327,089**	**$331,133**	**$331,133**	**$331,133**	**$331,133**	**$2,716,824**
SAVINGS POTENTIAL GENERATED:							
Labor - 6.95 Technicians[5]		$250,385	$261,821	$273,770	$286,695	$299,991	$1,372,662
Labor -1.90 Pharmacist[6]							
Operation Supply Cost Savings[7]		$16,740	$17,577	$18,456	$19,379	$20,348	$92,500
Expired Medication Cost Savings[8]		$95,697	$104,310	$113,698	$123,931	$135,085	$572,721
Conversion Savings unit dose to bulk[9]		$64,546	$64,546	$64,546	$64,546	$64,546	$322,730
Omnicell Lease Reduction[10]			$60,443	$120,886	$120,886	$120,886	$423,101
Inventory Management Savings[11]		$7,200					$7,200
Standalone Barcode Packaging - Equipment Costs[12]	$260,000	$18,000	$18,000	$18,000	$18,000	$18,000	$350,000
Standalone Barcode Packaging - Labor cost[12]		$108,080	$113,016	$118,174	$123,753	$129,492	$592,516
Standalone Barcode Packaging - Material Costs[12]		$59,699	$62,684	$65,819	$69,110	$72,565	$329,877
Nursing Time Savings[13]							
ADE/Med Error Cost Impact[14]		$136,571					$ 136,571
TOTALS SAVINGS POTENTIAL (B):	**$260,000**	**$756,918**	**$702,398**	**$793,348**	**$826,300**	**$860,913**	**$4,199,878**
NET SAVINGS POTENTIAL (B-A):	($805,203)	$429,829	$371,265	$462,215	$495,167	$529,780	**$1,483,054**
NPV	**$1,079,948**						
IRR	**46%**						
CUMULATIVE SAVINGS:		$429,829	$801,095	$1,263,310	$1,758,477	**$2,288,257**	

Ultra-Conservative ROI Calculation

Savings Realized With The ROBOT
Based On A 5 Year Period - Purchase Option
Baylor University Medical Center

		2004	Jan-Dec 2005	Jan-Dec 2006	Jan-Dec 2007	Jan-Dec 2008	Jan-Dec 2009	
YEAR		0	1	2	3	4	5	
ROBOT-Rx INVESTMENT:								**TOTAL**
Hardware		$600,000						$600,000
Interface[4]		$97,650	$4044	$4,044	$4,044	$4,044	$4,044	$113,826
Site Preparation[4]		$67,553						$67,553
Implementation		$50,000						$50,000
Software License		$250,000						$250,000
Software Support & Upgrade Fee			$34,000	$34,000	$34,000	$34,000	$34,000	$170,000
Hardware Maintenance			$40,000	$40,000	$40,000	$40,000	$40,000	$200,000
Estimated annual material costs (i.e. envelopes, labels, misc.)			$10,810	$10,810	$10,810	$10,810	$10,810	$54,050
Pak Plus-Rx Program Fee[5]			$223,845	$223,845	$223,845	$223,845	$223,845	$1,119,225
Annual Charge for UDL medications[7]			$18,434	$18,434	$18,434	$18,434	$18,434	$92,170
TOTAL ROBOT-Rx INVESTMENT (A):		**$1,065,203**	**$327,089**	**$331,133**	**$331,133**	**$331,133**	**$331,133**	**$2,716,824**
SAVINGS POTENTIAL GENERATED:								
Labor - 4 Technicians[3]			$144,107	$150,689	$157,565	$165,004	$172,657	$790,022
Labor -1.90 Pharmacist[6]								
Operation Supply Cost Savings[7]			$16,740	$17,577	$18,456	$19,379	$20,348	$92,500
Expired Medication Cost Savings[8]			$50,000	$50,000	$50,000	$50,000	$50,000	$250,000
Conversion Savings unit dose to bulk[9]			$50,000	$50,000	$50,000	$50,000	$50,000	$250,000
Omnicell Lease Reduction[10]				$60,443	$120,886	$120,886	$120,886	$423,101
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Standalone Barcode Packaging - Material Costs[14]			$59,699	$62,684	$65,819	$69,110	$72,565	$329,877
Nursing Time Savings[15]								
ADE/Med Error Cost Impact[1]			$1					$ 1
TOTALS SAVINGS POTENTIAL (B):		**$260,000**	**$453,827**	**$522,409**	**$598,900**	**$616,132**	**$633,948**	**$3,085,217**
NET SAVINGS POTENTIAL (B-A):		($805,203)	$126,738	$191,276	$267,767	$284,999	$302,815	**$368,393**
	NPV	**$146,666**						
	IRR	**12%**						
CUMULATIVE SAVINGS:			$126,738	$318,014	$585,781	$870,780	**$1,173,596**	


Case Study: Chemotherapy
Compounding Robot

Project Description

- Unique automated compounding robot designed exclusively for chemotherapy
- Can compound approximately 20-30 preparations per hour
- Completely self-contained device
- Approximately the size of a traditional six-foot vertical hood
- No installations in the United States


Health Robotics
Unload All Items

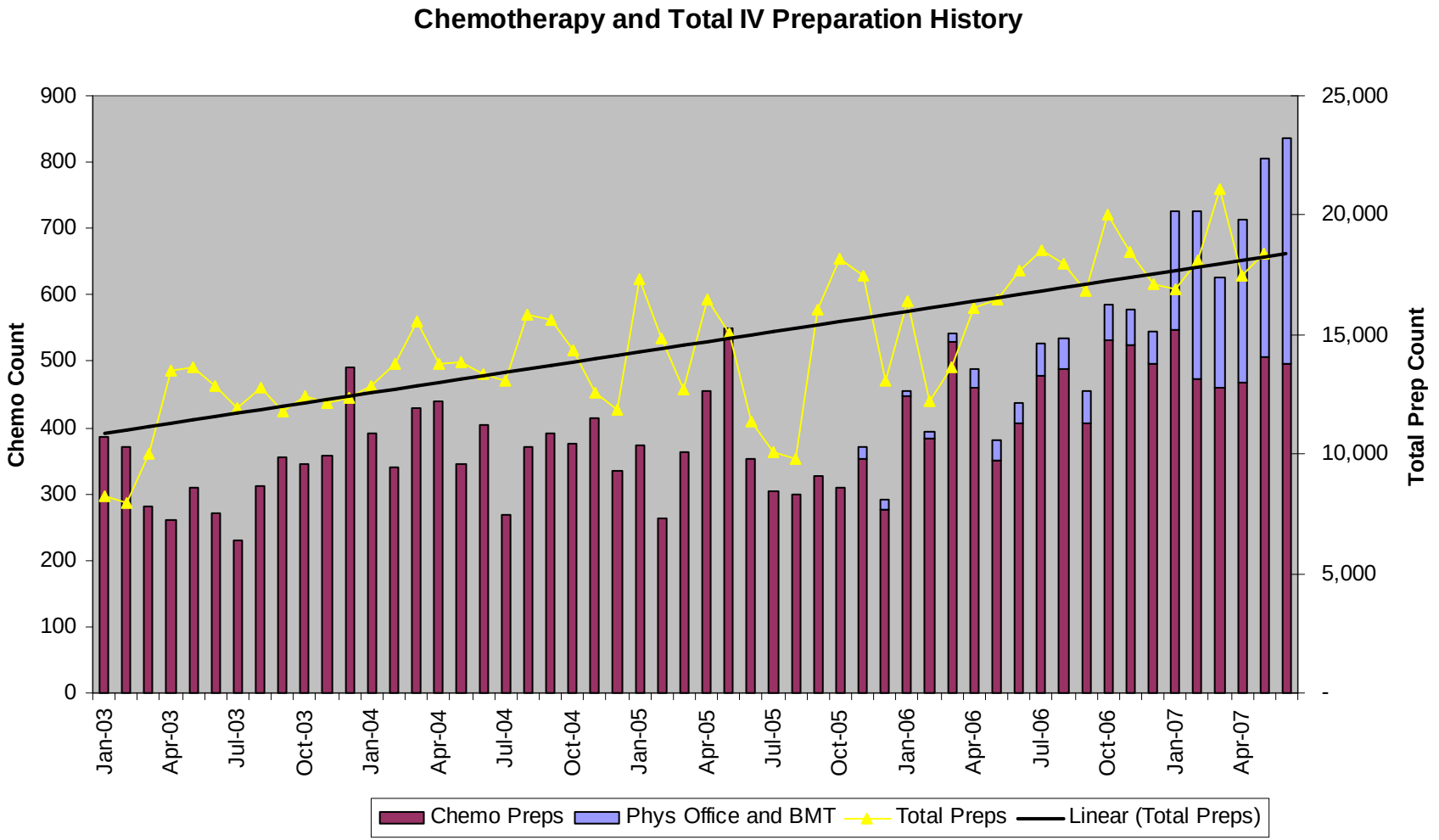
Potential Advantages

- Increased patient safety
  - Improved compounding accuracy
  - Added safeguards
- Reduced employee exposure
- Minimal space and construction requirements
- More timely compounding

Financial Considerations and Justification

- Rental versus Purchase
- Chemotherapy volume
- Waste conservation
- Protection system cost-avoidance
- Labor impact
- Safety impact

Chemotherapy Volume



Waste Conservation

Product	Vial Size	Quantity	IV Room Volume Remaining (ml)	BMTU Volume Remaining (ml)	Price	Cost/ml
Alkeran	50mg/10ml	2		6	$ 1,463.08	$ 877.85
Avastin	100mg/4ml	6	15		$ 534.60	$ 2,004.75
Camptosar	40mg/2ml	1	1.5		$ 238.59	$ 178.94
Carboplatin	150mg/5ml	2	25		$ 21.97	$ 109.85
Carboplatin	450mg/5ml	1	15		$ 50.78	$ 152.34
Cisplatin	50mg/50ml	3	70		$ 8.43	$ 11.80
Cytarabine	500mg/5ml	9	21		$ 4.85	$ 20.37
Cytarabine	2gm/20ml	1	7		$ 17.40	$ 6.09
Cytarabine	100mg/5ml	4		12	$ 2.03	$ 4.87
Cytarabine	500mg/10ml	3		7	$ 4.85	$ 3.40
Cytarabine	1gm/20ml	1		5	$ 9.63	$ 2.41
Cytovene	500mg/10ml	13	51		$ 31.38	$ 160.04
Cytoxan	1gm/50ml	5	60	35	$ 18.96	$ 36.02
Cytoxan	500mg/25ml	1		10	$ 9.48	$ 3.79
Daunorubicin	20mg/4ml	3	8		$ 57.83	$ 115.66
Doxorubicin	50mg/25ml	2	20		$ 34.02	$ 27.22
Doxorubicin	10mg/5ml	5	19		$ 6.80	$ 25.84
Etoposide	1gm/50ml	3		100	$ 42.77	$ 85.54
Floxuridine	500mg/5ml	6	25		$ 77.76	$ 388.80
Fludarabine	50mg/2ml	3	1	1.5	$ 241.92	$ 302.40
Gemzar	1gm/25ml	1	10		$ 604.25	$ 241.70
Gemzar	200mg/5ml	1	2		$ 120.85	$ 48.34
Hycamptin	4mg/4ml	1	3		$ 853.75	$ 640.31
Idarubicin	5mg/5ml	7	4	20	$ 274.11	$ 1,315.73
Idarubicin	10mg/10ml	3	12		$ 534.60	$ 641.52
Ifosfamide	3gm/60ml	4	100		$ 331.71	$ 552.85
Ifosfamide	1gm/20ml	4	40		$ 89.58	$ 179.16
Leukovorin	50mg/5ml	5	12.5		$ 2.24	$ 5.60
Mesna	1gm/10ml	7	55		$ 4.07	$ 22.39
Methotrexate	50mg/2ml	3	4.5		$ 2.82	$ 6.35
Oxaplatin	100mg/10ml	1	3		$ 1,740.18	$ 522.05
Rituxan	100mg/10ml	3	15		$ 473.32	$ 709.98
Taxol	30mg/5ml	1	4.5		$ 15.46	$ 13.91
Velcade	3.5mg/3.5ml	2		2	$ 1,098.36	$ 627.63
					Savings/Wk	**$ 10,045.50**
					Est. Annual	**$ 522,365.99**
					60% Estimate	**$ 313,419.59**

ROI Calculation

CHEMOTHERAPY ROBOT PROJECT

YEAR	0	1	2	3	4	5	
PROJECT COSTS:							**TOTAL**
Implementation	$20,000						$20,000
Site Preparation	$6,000						$6,000
Delivery Charge	$16,000						$16,000
Post-Installation Charge	$25,000						$50,000
Rental @ $15K/month		$180,000	$180,000	$180,000	$180,000	$180,000	$900,000
TOTAL PROJECT INVESTMENT (A):	**$67,000**	**$180,000**	**$180,000**	**$180,000**	**$180,000**	**$180,000**	**$992,000**
SAVINGS POTENTIAL GENERATED:							
Drug Waste Savings (60%)		$313,420	$332,225	$352,158	$373,288	$395,685	$1,766,775
Closed System Avoidance		$50,000	$53,000	$56,180	$59,551	$63,124	$281,855
TOTALS SAVINGS POTENTIAL (B):		**$363,420**	**$385,225**	**$408,338**	**$432,839**	**$458,809**	**$2,048,630**
NET SAVINGS POTENTIAL (B-A):	($67,000)	$183,420	$205,225	$228,338	$252,839	$278,809	**$1,056,630**
NPV	**$875,227**						
IRR	**284.9%**						
CUMULATIVE SAVINGS:		$183,420	$388,644	$616,983	$869,821	**$1,148,630**	

Ultra-Conservative ROI Calculation

CHEMOTHERAPY ROBOT PROJECT

YEAR	0	1	2	3	4	5	
PROJECT COSTS:							**TOTAL**
Implementation	$20,000						$20,000
Site Preparation	$6,000						$6,000
Delivery Charge	$16,000						$16,000
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Rental @ $15K/month		$180,000	$180,000	$180,000	$180,000	$180,000	$900,000
TOTAL PROJECT INVESTMENT (A):	**$67,000**	**$180,000**	**$180,000**	**$180,000**	**$180,000**	**$180,000**	**$992,000**
SAVINGS POTENTIAL GENERATED:							
Drug Waste Savings (30%)		$156,710	$166,112	$176,079	$186,644	$197,843	$883,388
Closed System Avoidance		$50,000	$53,000	$56,180	$59,551	$63,124	$281,855
TOTALS SAVINGS POTENTIAL (B):		**$206,710**	**$219,112**	**$232,259**	**$246,195**	**$260,966**	**$1,165,242**
NET SAVINGS POTENTIAL (B-A):	($67,000)	$26,710	$39,112	$52,259	$66,195	$80,966	**$173,242**
NPV	**$146,377**						
IRR	**55.9%**						
CUMULATIVE SAVINGS:		$26,710	$65,822	$118,081	$184,276	**$265,242**	

Final ROI Considerations

- Vendors can assist with calculations, but they should always be validated internally
- Business plans are helpful
- Many installations will have a reasonable ROI
  - Personnel
  - Tangible
  - Intangible
- Mixed results in the literature
  - Depends on implementation effectiveness

Conclusion

- Meaningful ROI calculations are an essential part of any automation proposal
- Follow-up analysis post-implementation is useful to determine goal achievement
- Coordination of ROI efforts with Finance and other departments can enhance the quality and credibility of the finished product


Discussion