

**Application of RFID in the  
Transfusion Medicine Supply Chain  
Impact Analysis  
& Return on Investment**

12 March 2008

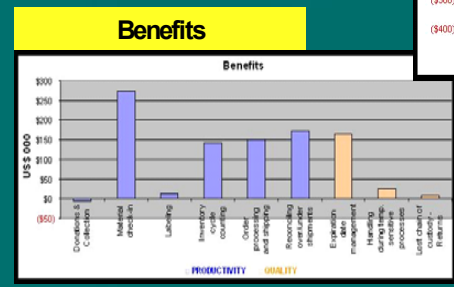
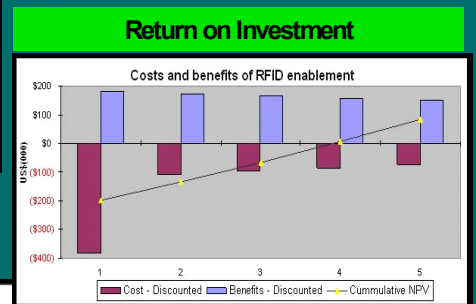
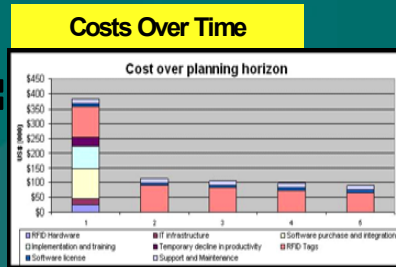
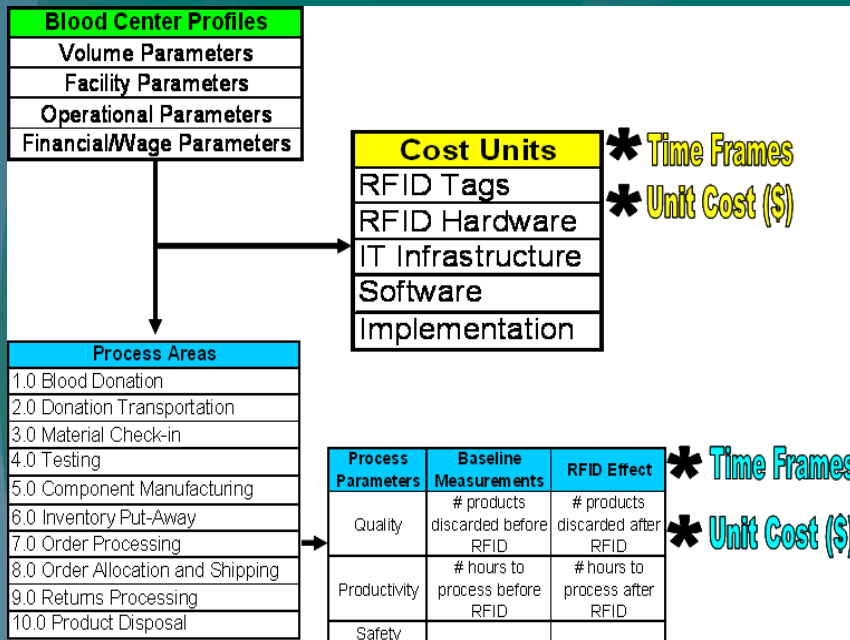
## Who and Why

The ROI model that will be described today is based on work performed by three blood centers in the USA (BloodCenter of Wisconsin in Milwaukee; Carter BloodCare in Dallas, TX; and Mississippi Blood Services in Jackson, MS) in conjunction with the University of Wisconsin RFID Lab.

The model assesses the cost and benefit components involved in implementing RFID-enabled processes and technologies on the blood center end of the transfusion medicine supply chain. Internal processes in the hospital will be incorporated into this model as the hospital assessment phase continues.

# Cost/Benefit Methodology

For Methodology  
Illustration  
purposes Only



# Impact Analysis

The model was developed as the result of our impact analysis study, the purpose of which was to estimate the impact that RFID will have on blood center operations in terms of productivity, quality, and safety.

The Impact Analysis consists of three main sections:

- Business Profile,
- RFID-Enabled Process Analysis, and
- Organizational Impact Analysis.

Subject matter experts from each organization considering RFID implementation should provide the input for each one of these analyses.

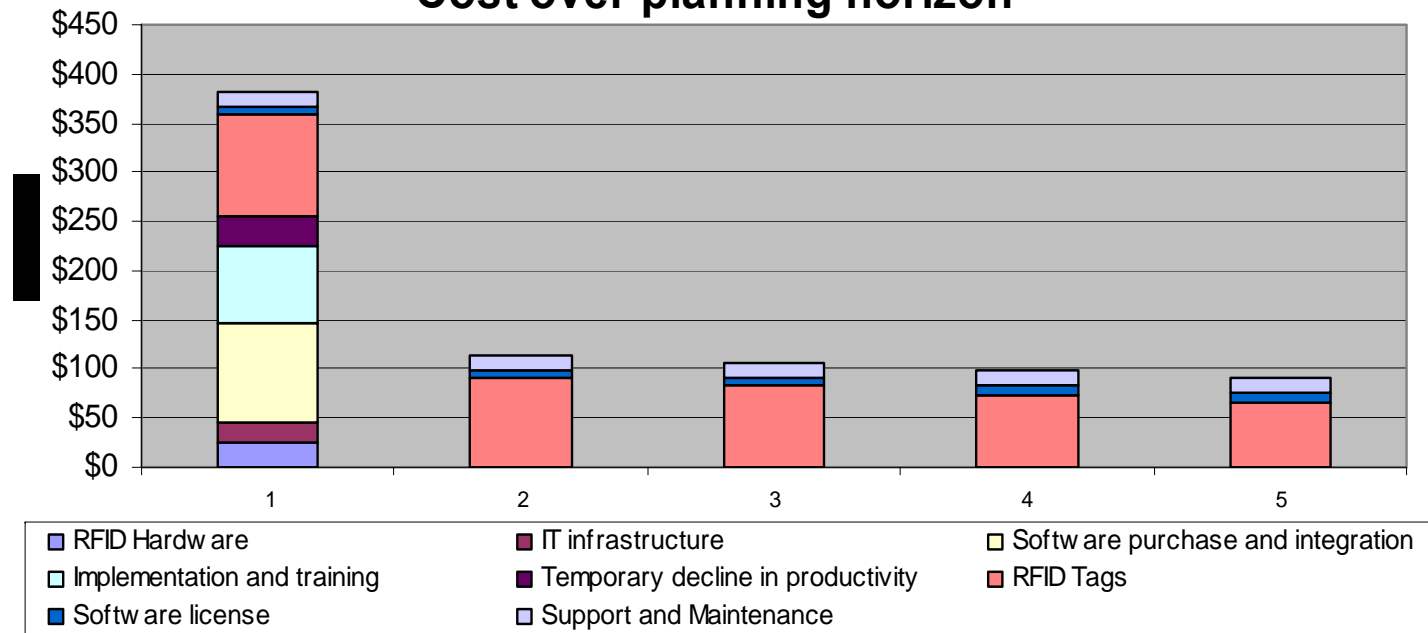
## Model Assumptions

- Baseline results are calculated for an average medium-to-large sized blood center (200~250K collections per year) in these examples.
- All Monetary values in the model are expressed in US dollars.

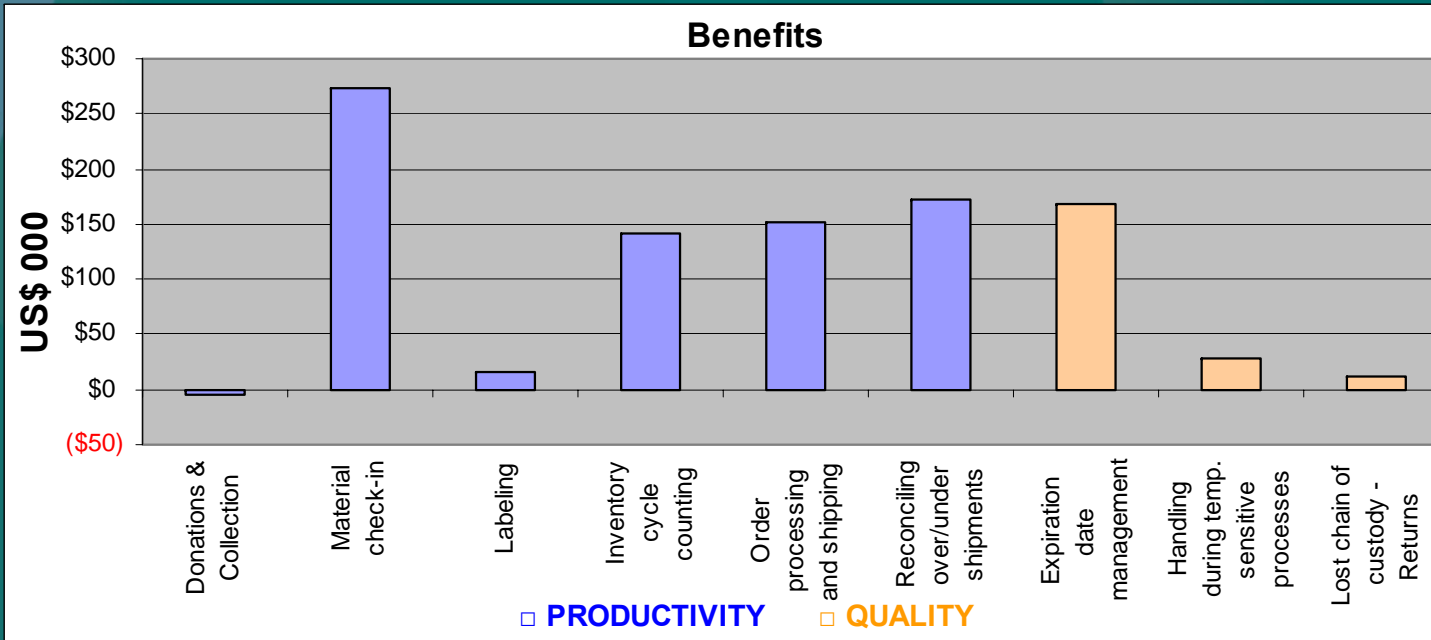
# Business Profile

Variable	Value	Variable	Value
<b>Volume Parameters</b>		<b>Facility Parameters</b>	
Total number of donations collected per year	225,000 bags	Number of fixed collection sites	8
Number of products labeled per year	400,000 bags	Number of mobiles	12
Number of products shipped to customers per year	350,000 bags	Number of manufacturing centers	1
Number of products returned per year	2,500 bags	Number of distribution centers	1
Number of products sent to disposal per year	20,000 bags	<b>Financial / Wage Parameters</b>	
Average number of products in inventory	7,000 bags	Average value of one bag of product	\$223
Number of employees in operations	70 FTEs	Technician hourly wage (fully loaded)	\$ 21
		Supervisor hourly wage (fully loaded)	\$25
		Annual internal rate of return (IRR) used for decision-making	5%

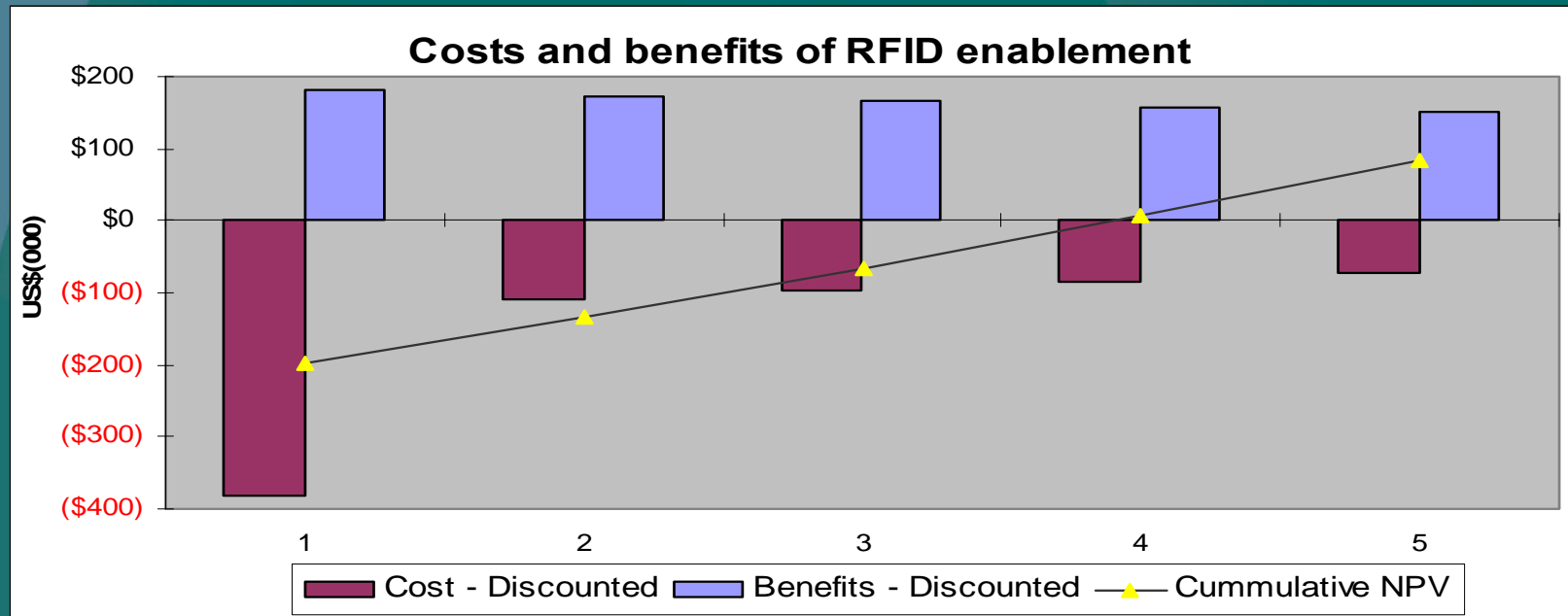
## Cost over planning horizon



	Year	1	2	3	4	5
<b>Costs</b>						
<b>Start-up Costs</b>		<b>\$256,000</b>				
RFID Hardware		\$26,000	\$0	\$0	\$0	\$0
IT infrastructure		\$20,000	\$0	\$0	\$0	\$0
Software purchase and integration		\$100,000	\$0	\$0	\$0	\$0
Implementation and training		\$80,000	\$0	\$0	\$0	\$0
Temporary decline in productivity		\$30,000	\$0	\$0	\$0	\$0
<b>Recurring Costs</b>		<b>\$125,000</b>	<b>\$114,800</b>	<b>\$105,620</b>	<b>\$97,358</b>	<b>\$89,922</b>
RFID Tags		\$102,000	\$91,800	\$82,620	\$74,358	\$66,922
Software license		\$8,000	\$8,000	\$8,000	\$8,000	\$8,000
Support and Maintenance		\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
<b>Total</b>		<b>\$381,000</b>	<b>\$114,800</b>	<b>\$105,620</b>	<b>\$97,358</b>	<b>\$89,922</b>
Present value of total costs		\$381,000	\$109,333	\$95,800	\$84,102	\$73,979



	Year	1	2	3	4	5
<b>Benefits</b>						
<b>Productivity</b>		<b>\$149,940</b>	<b>\$149,940</b>	<b>\$149,940</b>	<b>\$149,940</b>	<b>\$149,940</b>
Donations & Collection		(\$1,050)	(\$1,050)	(\$1,050)	(\$1,050)	(\$1,050)
Material check-in		\$54,600	\$54,600	\$54,600	\$54,600	\$54,600
Labeling		\$3,150	\$3,150	\$3,150	\$3,150	\$3,150
Inventory cycle counting		\$28,350	\$28,350	\$28,350	\$28,350	\$28,350
Order processing and shipping		\$30,240	\$30,240	\$30,240	\$30,240	\$30,240
Reconciling over/under shipments		\$34,650	\$34,650	\$34,650	\$34,650	\$34,650
Expiration date management		\$33,450	\$33,450	\$33,450	\$33,450	\$33,450
Handling during temp. sensitive processes		\$5,575	\$5,575	\$5,575	\$5,575	\$5,575
Lost chain of custody - Returns		\$2,230	\$2,230	\$2,230	\$2,230	\$2,230
<b>Total</b>		<b>\$191,195</b>	<b>\$191,195</b>	<b>\$191,195</b>	<b>\$191,195</b>	<b>\$191,195</b>
Present value of total benefits		\$182,090	\$173,420	\$165,161	\$157,297	\$149,806



	Year	1	2	3	4	5
<b>Costs</b>						
Start-up Costs		\$256,000				
Recurring Costs		\$125,000	\$114,800	\$105,620	\$97,358	\$89,922
<b>Benefits</b>						
Productivity		\$149,940	\$149,940	\$149,940	\$149,940	\$149,940
Quality		\$41,255	\$41,255	\$41,255	\$41,255	\$41,255
Net benefit (cost)		(\$189,805)	\$76,395	\$85,575	\$93,837	\$101,273
Present value of net benefit (cost)		(\$198,910)	\$64,086	\$69,361	\$73,195	\$75,827
Cummulative NPV		(\$198,910)	(\$134,823)	(\$65,462)	\$7,733	\$83,560
<b>Total Net Present Value</b>		<b>\$83,560</b>				
% Return on Investment (ROI)		11.2%				
Payback (Years)		3.9				

## Additional Benefits

- Stakeholders in the transfusion medicine supply chain can expect additional benefits from RFID enablement. Most notably, an RFID-enabled system **will enable an infrastructure for improving patient safety on the hospital side** by adding a safety layer against blood/patient mismatches.
- RFID enablement also increases visibility throughout the blood product supply chain and real-time information sharing that can help reduce the number of expired products. Advance shipping notification (ASN) of incoming units from collection sites, a feature of the RFID system being designed, improves scheduling and rush/expedited order management, smoothes production planning, and aids in balancing inventory.

Sensitivity Analysis (One-way)					
ROI Baseline reference >>>>					
<b>Parameters</b>	<b>Base Value</b>	<b>" +50% "</b>	<b>NPV</b>	<b>%ROI</b>	<b>Payback (Yrs)</b>
Technician hourly wage per hour	\$ 21	\$ 11	(\$241,021)	(32%)	3.9
Quantity of tags purchased per year	300,000	450,000	(\$108,269)	(12%)	7.2
RFID tag (each)	\$ 0.34	\$ 0.51	(\$108,269)	(12%)	7.2
Total effort hours exerted in material check-in (Reduction)	65%	32.50%	(\$34,635)	(5%)	5.6
Value of average bag or blood product	\$ 223	\$ 112	(\$5,746)	(1%)	5.1
Reconciling over/undershipments - Reduction (hours)	75%	38%	\$8,552	1%	4.9
Number of products lost due to expiration date (Reduction)	5%	3%	\$11,149	1%	4.8
Order processing and shipping - Reduction (hours)	40%	20%	\$18,098	2%	4.7
Total effort hours exerted performing inventory counts (Reduction)	75%	38%	\$22,189	3%	4.7
Software purchase and integration	\$ 100,000	\$ 150,000	\$33,560	4%	4.6
Annual change in tag cost	-10%	-5%	\$45,541	6%	4.3
Discount rate	5.0%	7.5%	\$48,663	7%	4.3
Software annual license	\$ 8,000	\$ 12,000	\$65,376	9%	4.1
RFID readers	\$ 26,000	\$ 39,000	\$70,560	9%	4.1
IT infrastructure	\$ 20,000	\$ 30,000	\$73,560	10%	4.0
Number of products lost due to temp. violation (Reduction)	25%	13%	\$71,491	10%	4.0

For quick interpretation of the table, observe the column labeled “Payback (Yrs)”, which extrapolates time to recover the investment given the change of each individual factor with respect to the baseline payback time (3.9 years).