Life Cycle Cost Analysis
Of a
Unified Messaging Solution

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Executive Summary

Williams College is considering the purchase of a telecommunications system intended to consolidate delivery of voicemail and electronic mail into a single inbox. E-mail has been in use at Williams for over ten years. Voicemail was introduced about five years ago. At the time voicemail was introduced, e-mail was well entrenched as a ubiquitous and pervasive method of communication. Voicemail has failed to catch on to the same extent; most voicemail users just treat it as a fancy answering machine. The system proposed here will integrate delivery of messaging and increase the value of both messaging networks.

A life cycle cost model was created and the analysis of that model is presented in this paper. The result is a compelling cost justification for the purchase of the proposed new system.

Introduction

Unified Messaging is a technology that brings together the worlds of data networking and traditional voice networking. Voicemail has been a part of enterprise voice systems for many years. Traditionally it has been implemented as an add-on to the voice switch or PBX (Private Branch eXchange). It has been said that when voicemail first became available, it’s value was simply as a way to have the phone answered when there was nobody available to actually take a call\(^1\), it was only an added value that callers could actually leave a message.
During the 1980s, voice messaging became a standard feature in many organizational environments. The ability to store voice messages, forward them to other interested parties, and record a reply regardless of whether the other party was available or not, became an integral part of communication in many corporate cultures. In the 1990s electronic mail based in the desktop computer became common. Originally available as a mainframe function via dumb terminals, and only heavily used in high-tech oriented organizations, e-mail took off when the Internet and desktop personal computers made it possible for users to send and receive e-mail with virtually anyone. In some organizational cultures, e-mail has become the preferred method of communication even over picking up the telephone. The result of this explosion of e-mail use is that most people need to manage at least two message stores: their voicemail box, and their primary e-mail account. When people have more than a single e-mail account, and either a FAX machine or a FAX modem on their PC, things start getting complicated.

Unified messaging promises to bring these different types of messaging together. It permits a user to receive messages sent from a variety of sources in a single mailbox of his choosing. If he is more comfortable with electronic mail and its ability to manage large quantities of messages in some kind of organized fashion, then that is where messages can be received regardless of whether they were left as voicemail, sent as FAX, or even typed in as an e-mail message. It becomes unnecessary to remember to check multiple mailboxes to make sure that a message has not been missed. Unified messaging clearly brings Metcalf’s law to bear. Converging e-mail and voicemail and combining the users of these services into one virtual network increases the value of that network by a factor of 4 (assuming a similar number of users of each).
At Williams College, the target of this study, e-mail had become strongly entrenched in the organizational culture long before voicemail was made available in the mid 1990s. Students, Faculty, and Staff, all check their e-mail several times a day, but may not check their voicemail inbox more than once every day or two. Students in particular are very e-mail oriented; this has been exacerbated by the fact that until recently students had no way to know if a voicemail was waiting for them. Students purchase their own telephone instruments and generally do not buy a model with a message waiting light. In the summer of 2001, students gained the ability to hear a stutter in the dial tone when going off-hook to alert them that unread voicemail was waiting. The Provost of the college stated recently that she did not feel that voicemail was a reliable way to reach students since “they never check their voicemail”\(^2\). The system proposed here will provide a mechanism for members of the college community to redirect their voicemail messages to their e-mail inbox. New voicemail can be left in the voicemail inbox in order to maintain real-time (message waiting indicator) notification of new message arrival. The new system will allow users to receive, organize, and forward, voicemail messages in the same way, and using the same tools, that e-mail is handled. The resulting benefit to the organization will be in the improved flow of communications and easy access to common communications delivery mechanisms no matter the sender’s location or network access.

**Context**

Williams College is an elite liberal arts college. Consistently ranked in the top 3 colleges nationally by U.S. News & World Report, Williams prides itself on the intimate
nature of the education it provides to its students. A close contact and personal relationship between faculty and students is a cornerstone of the pedagogical model that Williams exemplifies.

Aside from the scholarly achievements of the faculty, there are a number of factors that are customarily looked at in comparing schools that follow this model: faculty student ratio; class size; the number of seminar vs. lecture style courses… All of these factors are, at root, measures of the level of personal communication between the faculty and students. In today’s world, variety in modalities of communication goes far beyond what was available when Mark Hopkins sat on the end of a log. As stated earlier, electronic mail is a key form of communication between and among students and faculty at Williams College.

Williams has had ubiquitous e-mail available to the college community since 1991. It is well entrenched in the college culture. Voicemail was introduced in 1996 with the purchase of an Octel Serenade system as an adjunct to the college’s Definity G3r PBX. As with e-mail, voicemail was made available to all members of the community at no additional cost (to the user). Although well used, voicemail has not caught on to the extent that e-mail has as a communications mode. I postulate here that this may be, at least in part, due to the reluctance to deal with the added complexity of more than one messaging inbox.

**The Proposed System**

The unified messaging system proposed by Avaya Communications is called “Message Bridge” and is a product of Trango Software Corporation. Message Bridge is
basically what the name implies: it provides a bridge between the voicemail system and standards based e-mail systems. The Message Bridge runs on an Intel server running the Windows NT operating system. Basic message bridge functionality is that an incoming voicemail message, either voice or FAX, triggers a data transfer to the Message Bridge server. The server converts voice messages into WAV format and FAX messages into TIFF format, adds text header data to provide information to the recipient regarding the identity of the sender, source phone number (if known) and time of delivery, and then uses the SMTP protocol to deliver the message to the recipient’s designated e-mail system and address. Its configuration functions are available to users via a web interface running on the bridge. Users can set options including:

- Whether to move messages from the voicemail system to the user’s e-mail inbox
- The e-mail address that the user wants voice/FAX messages forwarded to
- Whether or not to leave a copy of the message in the user’s voicemail inbox
- Whether to mark the copy left on the voicemail system as “read”

Use of the Message Bridge requires an upgrade to the existing Octel voicemail system. As a byproduct, that upgrade will add the ability for users to receive FAX messages in their voicemail accounts. This becomes particularly useful when those FAXes are received in e-mail and are available to print (or not), for forwarding to other users, or for inclusion in other documents. There are potential savings in a reduction of the number of FAX machines on campus. That savings is not calculated here but could be considered in the purchase decision.
**Defining the Model**

In preparing the Life Cycle Cost analysis of the messaging system the following procedure was followed:

1. Define all requirements of operating the system
2. Describe the system life cycle and identify activities in each phase
3. Develop a cost breakdown structure
4. Establish/estimate costs for each activity and category in the CBS
5. Develop a cost model for the system using Analytica modeling software
6. Identify benefits and drawbacks and attempt to assign values
7. Evaluate the cost model and make a go/no-go recommendation

In developing the cost model variables needed to be defined and assigned cost values. The Cost Breakdown Structure and the variable definitions are listed in the appendices.

**Existing Systems and Sunk Costs**

The Octel Serenade voice messaging system that was purchased in 1996 represents a sunk cost of several hundred thousand dollars. For the purposes of this analysis it is assumed that a complete replacement of the Octel system is not an option. As stated later in this paper, in order to recommend this purchase we are looking for an increase in the value of the sunk cost which exceeds the life-cycle cost of the proposed system. The College’s e-mail system also represents a sunk cost. Only minimal upgrades to the e-mail system will be necessary to accommodate the increase in traffic. Those costs are represented in the cost model.
Current Support Infrastructure

Williams College currently has a help desk consisting of five expert technicians, a networking and systems administration team of eight highly trained and capable systems administrators, and a voice telecommunications support staff of one PBX administrator and one data entry clerk. It is assumed in this analysis that there will be no increase in FTE staffing and that current personnel will absorb the additional workload. The network backbone and e-mail server systems are extremely robust and capacity planning includes a 30% buffer beyond observed growth rate to account for new technologies. This system would fall easily into that buffer and require no additional expansion of network capacity.

Proposed New System

Projected Life of the System

The college’s PBX voice system has just received hardware and software upgrades intended to provide an additional ten years of useful life. The life cycle cost model developed here assumes that the Message Bridge system will be in use throughout that ten years and be decommissioned when the PBX is replaced at the end of that period.

The Message Bridge system supports a maximum of one thousand users per server. This analysis proposes an initial implementation of one server to support an early-adopter population of not more than one thousand users. In the following year an additional server would be added to support a total population of up to two thousand users, and in the third year a final server would be added. The terminal configuration
would be a farm of three servers supporting a maximum of three thousand users. This is in line with the number of active e-mail users on campus.

**Incremental Costs**

Incremental costs for operating the system once purchased and installed are relatively small. Existing personnel will easily absorb the additional workload during the first and second years, and currently planned increases in technical support staff will accommodate growth in succeeding years. Server hardware maintenance will be outsourced.

**End of Life Costs**

Retirement and decommissioning costs are extremely small consisting of merely de-racking and discarding the equipment.

**Business Case Analysis**

Unified messaging brings closer to reality the promise (or threat) of being fully available, anytime, anywhere. The trend in many organizations over the last ten years has been to free employees from their office desk. Telecommuting and home offices have become a normal part of doing business. This is certainly true in higher education where adjunct and/or visiting faculty may not have a permanent office or desk at the institution.

The concept of unified messaging has been around as long as e-mail and voicemail have co-existed. It is easy to think of unified messaging as just bringing
voicemail capabilities into what is, basically, an e-mail system. David Zimmer of the Unified Messaging Consortium says this is simply not true. He claims that there is a fundamental difference in that unified messaging “combines message exchange functions (a non-real-time activity) with real-time notification/delivery/call connectivity.” Unified messaging can become greater than the sum of its parts, claims Zimmer (bringing to mind Metcalf’s law again). What he means by this is that unified messaging can provide the real-time notification of message delivery that voice communication provides, either by voicemail style message waiting notification or by an actual phone call or pager alert, while also providing the message storage, archival, and editing capabilities of e-mail.

Unified messaging represents an evolutionary shift in the communications business model. Two hundred years ago all business communications, other than face to face, were by paper mail. One hundred years ago telephone was added to the communications model allowing immediate communication, but losing the record of what was said (although Thomas Edison actually invented the concept of recording telephone calls concurrently with the original invention of the telephone itself). In the nineteen thirties voicemail became possible when AT&T made available a technology that would forward a call to a remote switchboard, this gave rise to answering services where an operator would write down a message from a caller. Simultaneously mechanical answering machines that would record a message became commercially available.

Twenty-five years ago e-mail was added, bringing more immediacy to text based messaging. In the last ten years e-mail acquired multimedia capabilities, and now unified messaging can bring together text, voice, and image based messaging while adding the real-time features that Zimmer points out. This evolution supports the change in many
organizations from a centralized, hierarchical, structure to a customer focused matrix oriented structure. Immense importance is also placed on the flow of communications to and from that customer contact position which, in a college or university, is held primarily by the teaching faculty.

It is typically difficult in a college, non-profit, setting to apply standard ROI analysis to an equipment purchase. This may be particularly true of networking equipment. However there are some measures that we may find of use. Metcalfe’s Law mentioned twice earlier, states that the value of a network is equal to the square of the number of users. This can be seen intuitively by comparing the value of a telephone network with two users, a person can call one other person, to a telephone network with four users, a person can call three other people. Metcalfe’s Law would show a quadrupling of the value of that network. We can apply Metcalfe’s Law to the current analysis with the following calculations:

The Octel voicemail system was purchased in 1996 for $251,040.00. To simplify matters, let’s call that the value of the voicemail network. Let’s postulate that in the Williams community of two thousand students and one thousand employees, one quarter of those users do not check their voicemail regularly and therefore voicemail is not a useful method of reaching them. That would mean that 2250 people regularly use voicemail and 750 do not. Metcalfe’s Law would give a value rating of 5,062,500 to the network. If we add in the 750 non-users by allowing them to receive voicemail in their e-mail, the value rating goes to 9,000,000 an increase of almost 78%. Applied to the purchase price of the Octel voicemail system that would mean an increase of the dollar value of the network from $251,040.00 to $446,851.00, an increase in value of
$195,811.20. The result of running the cost model provides a statistical range within which the total cost of the proposed system would fall. The median result is $159,500.00. This total lifetime cost is $36,311.20 less than the increase in value to the existing system. The purchase is clearly justified. The cost used here for the existing voicemail system is artificially low, considering as it does only the purchase price of the system. A more accurate representation of the true present value of the voicemail system would only make the argument more cogent.
Appendices

Price Quotes and Technical Data (for use as an example only, not current true pricing)

Software Pricing

- Velocity Upgrade for all existing mailboxes (Includes LAN Card, Fax, Visual Desktop, Octel Access Software, Mailbox Manager, and all server hours authorized) $10,965
- Visual Desktop and Fax Implementation Remote Professional Services $3,500
- Serenade Release 2 to 4 Upgrade including Implementation $4,090
- Message Bridge Application
  - (20) Users $5,000
  - (100) Users $14,000
  - (500) Users $32,000
  - (1000) Users $35,000
  - Implementation $5,760 any users

Hardware Pricing

Dell Higher Education Store
Full Catalog Software, Peripherals & Parts

The PE 1550 is a general-purpose (GP) ultra rack-dense 1U (1.75-inch) server targeted to support Internet and network infrastructure applications, including PDC/BDC gateways, DNS servers, and DHCP servers.

PowerEdge 1550 with Pentium III Processor
PowerEdge 1550 Pentium III 933MHz w/256K Cache

Memory
512MB SDRAM, 2 DIMMS

Keyboard
Standard Windows Keyboard

Monitor
No Monitor Option

1st Hard Drive
9GB Ultra3, 1 IN, 10K RPM, SCSI Hard Drive

2nd Hard Drive
9GB Ultra3, 1 IN, 10K RPM, SCSI Hard Drive

3rd Hard Drive
9GB Ultra3, 1 IN, 10K RPM, SCSI Hard Drive

Primary Controller
PERC3-DCL RAID Card w/64MB Cache 1
Int/1 Ext Channel

Diskette Drive
3.5 Inch, 1.44MB Floppy Drive

Operating System
NO Factory Installed Operating System

First Network Adapter
This system includes Dual Embedded 10/100 NICs

CD ROM
24X IDE CD ROM

Hard Drive Configuration
Add-In Raid Card, RAID 5

Rack Installation
1U Dell 24U/42U Rack Kit

Hardware Support Services
3Yrs Same Day 4Hr Response Parts + Onsite Labor (M-F 8am-6pm)

Price*: $3,082.71
Cost Breakdown Structure

Total System Value

- Economic Factors
  - Benefits
    - Increased Network Value
    - Per Metcalfe's Law
  - Life Cycle Cost

- Purchase and pre-installation design
  - Software price
  - Hardware price
  - System Design
  - Data collection

- Installation setup and config
  - Hardware install
  - Software install
  - Initial data entry
  - Network addressing and setup
  - Training of support personnel
  - Integration into existing directory systems

- Ongoing Operations
  - Help Desk
  - Data entry
  - System Administration
  - System Capacity Upgrades
  - Network Utilization
  - Network Problem Resolution
  - Incremental load on e-mail system

- Retirement and Decommissioning
  - Decommissioning and disposal
**Variable definitions**

{ From user mberman, Model Messagebridge at Tue, Aug 07, 2001 8:59 PM}
Softwareversion 2.0.5

{ System Variables with non-default values: }
Typechecking := 1
Checking := 1
Saveoptions := 2
Savevalues := 0
Webhelper := -1

{ Non-default Time SysVar value: }
Time := [0,1,2]
Title Time: Time

Model Messagebridge
Title: Message Bridge cost model
Description: Message Bridge Unified Messaging solution cost model
Author: Mark Berman
Date: Fri, Jul 27, 2001 10:31 AM
Saveauthor: mberman
Savedate: Tue, Aug 07, 2001 8:59 PM
Defaultsize: 48,24
Diagstate: 1,1,0,953,628,17
Windstate: 1,309,330
Fontstyle: Arial, 13
Att__diagramprintsca: 100,1,1,1,1,1,2794,2159,1

Variable Purchase_price
Title: Purchase Price
Units: $
Description: Initial Purchase Cost
Definition: Total_hardware+Total_software
Nodelocation: 248,112,1
Nodesize: 48,24
Aliases: Alias Purchase_price1, Alias Purchase_price2
Displayinputs: ,

Variable Support
Title: Support
Units: $
Description: Total Recurring Support Costs
Definition: Data_entry+Help_desk+System_admin+Help_desk_training
Nodelocation: 248,520,1
Nodesize: 48,24
Valuestate: 1,88,98,416,303,0,STAT

Chance Data_entry
Title: Data_entry
Units: $
Description: PV of 25 hrs data entry each yr for 10 yrs. @ $15/hr.
Definition: \( \text{Pv}(0.03, 10, -\text{Normal}(375,50)) \)
Nodelocation: 88,440,1
Nodesize: 48,24
Valuestate: 1,200,210,416,303,0,STAT

Chance Help_desk
Title: Help Desk
Units: $
Description: PV: Help desk support time at approx. 50 hrs/yr. @$20/hr.
Definition: \( \text{Pv}(0.03, 10, -\text{Normal}(20*50, 20*20)) \)
Nodelocation: 88,512,1
Nodesize: 48,24
Windstate: 1,238,146
Valuestate: 1,312,322,416,303,0,STAT

Chance System_admin
Title: System Admin
Description: PV of ~20hrs/yr Sysadmin time at $25/hr.
Definition: \( \text{Pv}(0.03, 10, -\text{Normal}(20*25, 100)) \)
Nodelocation: 88,584,1
Nodesize: 48,24
Windstate: 1,208,156
Valuestate: 1,56,66,416,303,0,STAT

Objective System_cost
Title: System Cost
Description: Total Lifetime System Costs
Definition: \( \text{Pv} + \text{Total_maintenance} + \text{Support} + \text{Decommissioning_cost} + \text{Integration_cost} + \text{Network_cost} \)
Nodelocation: 408,304,1
Nodesize: 48,24
Windstate: 1,354,105
Valuestate: 1,235,112,416,303,1,STAT
Aliases: Alias System_cost1

Variable Network_cost
Title: Network Cost
Units: $
Description: Total incremental network costs
Definition: \( \text{Addressing_and_setup} + \text{Bandwidth_monitoring} + \text{Off_campus_forwarding} + \text{Problem_resolution} \)
Nodelocation: 576,136,1
Nodesize: 48,24
Windstate: 1,72,82,416,303,0,STAT

Chance Bandwidth_monitoring
Title: Bandwidth Utilization
Units: $
Description: Incremental Network Bandwidth consumed by application. $300.00/yr over ten years is a guess.
Definition: \( \text{Pv}(0.03, 10, -300) \)
Nodelocation: 728,136,1
Nodesize: 48,24

Variable Addressing_and_setup
Title: Addressing and Setup
Units: $
Description: Approx. 2 hrs Network Admin time @25.00/hr.
Definition: 50
Nodelocation: 728,72,1
Nodesize: 48,24

Chance Problem_resolution
Title: Problem Resolution
Units: $
Description: Network Administrator time taken resolving network issues related to the new service. Approx. 6 hrs/yr over ten years.
Definition: $\text{Pv}(0.03, 10, \text{-Normal}(150, 50))$
Nodelocation: 728,208,1
Nodesize: 48,24

Chance Off_campus_forwarding
Title: Off-Campus Forwarding
Units: $
Description: Network cost of traffic forwarded off campus over DS3. Approx. 0.5% of traffic over 10 yrs.
Definition: $\text{Pv}(0.03, 10, \text{-Normal}(300, 30))$
Nodelocation: 728,280,1
Nodesize: 48,24

Variable Integration_cost
Title: Integration Cost
Units: $
Description: Total cost of integration into existing systems
Definition: $E_{\text{mail}_\text{system_disk_s}} + E_{\text{mail}_\text{system_load}} + E_{\text{incremental}_{\text{mail}_s}} + \text{Ldap_integration}$
Nodelocation: 536,432,1
Nodesize: 48,24
Valuestate: 1,216,226,416,303,0,STAT

Chance Ldap_integration
Title: LDAP Integration
Units: $
Description: Programmer time to integrate the service into LDAP directory service. Approx. 20 hrs @ 25/hr.
Definition: $\text{Normal}(20 \times 25, 5 \times 25)$
Nodelocation: 728,384,1
Nodesize: 48,24

Chance E_mail_system_load
Title: E-Mail system load
Units: $
Description: Cost of additional load on e-mail server.
Definition: 0
Nodelocation: 728,456,1
Nodesize: 48,24
Windstate: 1,183,59

Chance E_mail_system_disk_s
Title: E-Mail system disk space
Units: $
Description: Cost of additional storage required on e-mail server:
estimate 100MB/day transient, + 1.5GB medium term storage, + 1GB/yr permanent. @ $100/GB for server storage.
Voice msgs 8k, FAX msgs 100k.

Definition: 100*11.6
Nodelocation: 672,544,1
Nodesize: 48,29

Chance Incremental_e_mail_s
Title: Incremental e-mail systems administration
Units: $
Description: Additional Systems Admin time for e-mail system.
     Inconsequential.
Definition: 0
Nodelocation: 544,560,1
Nodesize: 48,36
Nodeinfo: 1,1,1,1,1,1,,0,
Nodefont: Arial, 12

Module Software_cost
Title: Software Cost
Author: mberman
Date: Thu, Aug 02, 2001 8:18 PM
Defaultsize: 48,24
Nodelocation: 88,160,1
Nodesize: 48,24
Diagstate: 1,176,86,490,303,17

Variable Octel_upgrade
Title: Octel Upgrade
Units: $
Description: Octel Velocity upgrade incl. current revision, unlimited usage, networking component
Definition: 10965.00
Nodelocation: 96,40,1
Nodesize: 48,24

Variable Message_bridge
Title: Message Bridge
Units: $
Description: Message Bridge software purchase price, 1000 user license
Definition: 35000.00
Nodelocation: 96,120,1
Nodesize: 48,24

Variable Installation_charges
Title: Installation charges
Units: $
Description: outsource implementation of Octel upgrade and Message Bridge install & setup
Definition: 4090+5760
Nodelocation: 232,176,1
Nodesize: 48,24

Objective Total_software
Title: Total Software
Units: $
Description: Sum of Software components
Definition: Installation_charges+Message_bridge+OctelUpgrade
Nodelocation: 288,64,1
Nodesize: 48,24

Alias Purchase_price1
Title: Purchase Price
Definition: 0
Nodelocation: 360,136,1
Nodesize: 48,24
Original: Purchase_price

Close Software_cost

Module Hardware_cost
Title: Hardware Cost
Author: mberman
Date: Thu, Aug 02, 2001 8:18 PM
Defaultsize: 48,24
Nodelocation: 88,64,1
Nodesize: 48,24
Diagstate: 1,65,68,413,236,17

Variable Server_cost
Title: Server Cost
Units: $
Description: Rack Mount server w/RAID5
Definition: 3082.71
Nodelocation: 104,40,1
Nodesize: 48,24

Chance Installation_cost
Title: Installation Cost
Units: $
Description: Sysadmin labor to install Server: $25/hr, approx. 10 hrs.
Definition: Normal( 250, 50 )
Nodelocation: 104,144,1
Nodesize: 48,24

Objective Total_hardware
Title: Total Hardware
Units: $
Description: Total Hardware installed
Definition: Installation_cost+Server_cost
Nodelocation: 288,40,1
Nodesize: 48,24

Alias Purchase_price2
Title: Purchase Price
Definition: 0
Nodelocation: 280,128,1
Nodesize: 48,24
Original: Purchase_price

Close Hardware_cost

Module Upgrades__maintenan
Title: Upgrades & Maintenance

- viii -
Title: Software Upgrades & Maintenance
Units: $
Description: PV of additional 1000 user license in 2nd year & 1000 users in 3rd year
Definition: \((35000 \times (1/(1+.03)^2)) + (35000 \times (1/(1+.03)^3))\)
Nodelocation: 96,48,1
Nodesize: 48,29
Valuestate: 1,152,162,416,303,0,MIDM

Title: Hardware Upgrades & Maintenance
Units: $
Description: PV: additional servers in 2nd & 3rd years @ $3k + 4hr install
Definition: \((3100 \times (1/(1+.03)^2)) + (3100 \times (1/(1+.03)^3))\)
Nodelocation: 56,128,1
Nodesize: 48,29

Title: Maintenance
Units: $
Description: Maintenance costs over 10 years
Definition: \(Pv(.03, 10, -600)\)
Nodelocation: 160,184,1
Nodesize: 48,24
Valuestate: 1,136,146,416,303,0,MIDM

Title: Total Upgrades & Maintenance
Units: $
Description: Total Upgrades & Maintenance
Definition: Annual_license___mai+Hardware_upgrades+Maintenance1
Nodelocation: 264,80,1
Nodesize: 48,29
Windstate: 1,165,312

Title: System Cost
Definition: 0
Nodelocation: 344,160,1
Nodesize: 48,24
Original: System_cost

Title: Decommissioning_cost
Definition: 0
Nodelocation: 344,160,1
Nodesize: 48,24
Original: Decommissioning Cost
Units: $
Description: Cost of removing and disposing of system at end of 10 yrs.
Definition: 200
Nodelocation: 408,520,1
Nodesize: 48,24
Nodeinfo: 1,1,1,1,1,1,,0,
Nodefont: Arial Narrow, 12

Chance Help_desk_training
Title: Help Desk Training
Units: $
Description: Training Help Desk personnel
Definition: Normal( 10*20, 2*20 )
Nodelocation: 88,360,1
Nodesize: 48,24
Modeling Results

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<th>Result</th>
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<td>Min</td>
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<tr>
<td>Mean</td>
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**Cost Model Diagram**

[Cost Model Diagram Image]
Endnotes


