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Print from Anywhere to Anywhere Anytime

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Background:

Technology has allowed companies to provide many advances in services to its customers over the years. These advances have increased productivity and shortened business cycles on all fronts from order fulfillment to service delivery. Consider the advantages of E-mail or voice mail over the more conservative snail mail. Business decisions can now be made in hours or even minutes instead of days. The one area where advances have fallen short of these marks is in output management. Our customers continue to have a very basic need of knowing when and where theie output will be printed.

The challenge of this question is compounded by the same fact that has lead to so many other advances in productivity, that is technology! Over the years, companies have increased the diversity of their computing platforms to address different needs brought on by such advances as client/server, data warehouses, executive information services or work at home computing. The challenge of providing reliable output services in this environment becomes almost overwhelming. Consider the problems raised by a large number of customers geographically dispersed, using different systems who need to create output on different printers. With all of our advances in technology we still have the same problem that existed years ago. That is 'Where is my report?'. It was not long ago that this query could be answered with a simple, 'It's printing on the data center printer.' But not today, as we have migrated printers out to workgroups and even homes, that single process of moving print from the mainframe to its printer has been complicated may times over. We now have users that have access to dozens of systems and even more printers from which to create and direct their output. And since these systems are no longer homogeneous, the task of tracking that output becomes even more difficult.

Project:

Based on the above issues, a project was established to address these needs within our user community. The users had expressed dissatisfaction with the reliability of moving output from source system to destination printer. This process was both complex and slow and often resulted in the user having to recreate their output.

The user community serviced is made up of 16,000 employees geographically dispersed from Canada to South America, with access to 500 computers running MPE/iX, HP-UX and Windows (3.1, NT or 95), serviced by 2,500 printers. The project was known as PIE or "Print Is Easy". The name was chosen by the participants to represent the overall goal of providing a simple output process to the entire community.

Goals & Strategies:

In order to have a successful project, goals need to be established in the beginning. For our project the following goals where established after discussions with management. The overall goals where divided into three main areas; customer satisfaction, cost containment and simplification. Within each of these goals(), various strategies() where also developed to help guide the project.

Customer Satisfaction

Address as many customer issues as possible.
Insure that the recommended solution fixes all critical and urgent issues.
Promote the use of print guidelines to insure application print functionality.
Review print solution on a regular basis to keep up with the times.
Encourage the use of a printer support plan to upgrade equipment in a timely manner.
Provide 'cradle-to-grave' output monitoring and management.
Utilize network based workgroup printing.
Provide monitoring for both the end user and support personnel tailored to their needs.
Provide visibility and accessibility to all network printers for all users.
Aggressively implement on-line report viewing.

Cost Containment

Be cost effective by utilizing existing equipment and personnel whenever possible
Create an architecture that minimizes the number of technologies used
Leverage existing local expertise
Re-use tools and processes whenever possible
Use HP-marketed or HP-supported products
Borrow best practices from other entities where possible

Simplification

Implement a single software technology.
Alter processes as needed to allow them to fit with a single software tool.
Implement a common tool set on all platforms.
Allow configuration of printers 'on-the-fly' without requiring a reboot.
Utilize tool specific configuration instead of operating system configuration.
Remove existing platform limitations on the number of supported printers.
Test all potential tools with a maximum configuration.
Don't require existing printers to be changed or re-configured.
Verify that all legacy applications can continue to print without changes.

Provide the ability to print to all printers from all platforms.

Insure that solution interfaces with print architectures that exist at other entities.

Implement a simple output routing strategy

Design an architecture that efficiently used the LAN/WAN topology.

Allow for automatic alternate routing.

Analysis:

Efforts to define an acceptable solution focused on three areas; Process, technologies and consumer issues.

Process

The first area evaluated were the processes involved in printing. This information was gathered by interviews with many personnel primarily in the support community. It was soon discovered that processes involved the coordination of many departments. For example, the process of adding a new printer required five departments and could take up to 21 days to complete! From the issues gathered from the consumers it became apparent that any print solution must result in improved processes.

Technologies

A very thorough investigation of available technologies was undertaken. This investigation involved gathering information directly from vendors, posting inquiries on the Internet and other on-line services to solicit feedback from other companies, as well as obtaining demos and attending trade shows like COMDEX. Criteria where determined and a decision support tool was used to eliminate personal bias or subjective evaluation. A short list of technologies was created.

Criteria used:

Remote monitoring capabilities

Represented the ability for support staff to locate output from a single point of inquiry.

Availability

Was defined that the tool was actually available within the time frame needed by the project.

Vendor support

Rate the quantify and quality of vendor support.

Operating System support

Was defined as the need for the tool to support as many operating systems used in the current environment as possible.

Logging information

Looked at the capability of the tool to provide exact information needed for status queries, tracking, and statistics.

User control

Is the ability for the end user to monitor and manage their own output.

Available training

Was training required and available to efficiently use the tool.

Maintenance Cost

Was the relative cost of maintenance and support fees for the product.

Billing information

Looked at the availability of the necessary information to allow departmental billing for all output produced.

Device capacities

Represented the number of concurrent devices a tool could support.

Bannering capabilities

Looked at the scope of bannering features within the software.

On-line report viewing

Rated the availability of an integrated on-line viewing tool that accurately represents the printed page.

Archive/Re-Queue availability

Reviewed the level the software supported archiving output and the subsequent re-queueing of needed output.

During the evaluation process, nine different products were reviewed from seven vendors. These products covered a range from traditional spoolers to paging technology. All products had a chance to provide sales presentation and vendor demos as appropriate. The final candidates were invited to provide evaluation software so that full load and functionality tests could be performed. This was felt to be important to test these tools under actual conditions.

The following chart represents the results arrived at after evaluating the products from the short list. Weighing factors were assigned based upon user input gathered from interviews.

Criteria	Weighting	Product A	Product B	Product C	Nbspool
Criteria	**Weighting**	**Score**	**Score**	**Score**	**Score**
Remote Monitoring	8	1	1	6	8
Availibility	7.00	8.00	8.00	8.00	8.00
Vendor Support	9.00	5.00	2.00	3.00	10.00
Operating Systems	9	6	6	5	7
Logging Information	6	3	3	6	6
User Control	10.00	1.00	1.00	6.00	7.00
Training	5.00	1.00	1.00	3.00	6.00
Maintenance Cost	6	3	3	3	3
Billing Information	3	0	0	0	0
Device Capacities	9	7	10	10	10
Bannering Capabilities	7	8	1	3	10
On-Line Viewing	1.00	1.00	1.00	3.00	3.00
Archive/ Re-Queue	1	5	0	10	10
Totals (criteria weighting X score)/100		3.39	2.85	4.29	6.00

scale: 1-10 (lowest to highest)

Based on the above results, NBSpool was chosen as the best software package to address the PIE needs.

Consumer Issues

For a period of 3 months members of the project team met with consumers at their home offices to collect information. This data collection effort was designed to both characterize the current state of print as well as identify future trends and business needs (refer to Appendix A, PIE Questionaire). These information sessions were conducted in a variety of settings. From these meetings, discussions, memos, etc, 600+ individual comments were compiled. Using an affinity diagramming process, these comments were then summarized into 88 unique print issues.

Some of the major issues defined by consumer interviews were:

The process to add a new printer was time-consuming and complicated,
the users are unable to manage their own print,
there is a lack of updated equipment (i.e printers),
no print guidelines are defined, and
there are no published print strategies for small or large processing centers.

For a complete list of user issues, see Appendix B.

The summary of the users input follows:

360 people interviewed,
18 sites visited,
600 individual comments collected,
88 unique issues identified,
4 of the issues are not part of the print strategy,
4 of the issues were best directed to another project team, and
64 of the remaining 80 issues are addressed by the PIE solution known as the Americas Print Solution (APS).

Architecture:

The current architecture consists of multiple software products and the hardware to support the concepts of hubbing and print engines. The typical flow of output through the current topology is complicated and requires the usage of mulitple machines and multiple software products through a print hub, to a print engine, to a print server, and finally to the printer. Obviously this flow is overly complicated and time-consuming. With the APS these factors are either eliminated or decreased. The new architecture, as shown in Appendix C, relies on one software package, NBSpool, and the elimination of

print hubs and print engines. The flow will nowfrom the be source machine to the final print server.

Recommendations:

After evaluating consumer issues, interviews with internal support personnel and interviews with other divisions, PIE developed the following implementation strategies. With reference to the goals already stated in this paper the strategies fulfill these goals. All strategies need to be fully implemented to ensure a successful print solution. The complete list of strategies and tactics can be found in Appendix D.

Customer Satisfaction

Address as many customer issues as possible.

Insure that the recommended solution fixes all critical and urgent issues.

In order for the new APS to be fully embraced by its users, the implementation must address all issues identified as either critical or urgent and as many others as possible.

Promote the use of print guidelines to insure application print functionality.

Guidelines for users and developers will be established and published by Output Services. they should include hardware requirements, reduction of slave printing and the promotion of any ongoing print projects.

Review print solution on a regular basis to keep up with the times.

It is of vital importance to the success of APS that the state of implementation and future needs be reviewed continuously in order to insure that this solution remains viable.

Encourage the use of a printer support plan.

This plan should include criteria for hardware upgrades, user maintenance and support agreements.

Provide 'cradle-to-grave' output monitoring and management.

Utilize network based workgroup printing.

To allow for a complete solution of print from anywhere to anywhere, workgroup printers are the only option to support output from any platform.

Provide monitoring for both the end user and support personnel .

During consumer interviews the issue of user queue management became very visable. By providing this capability, the customer will be able to delete print requests, review queue lists, and re-route their print files without involving support personnel.

Provide visibility and accessibility to all network printers for all users.

This strategy make a reality of the concept of printing from anywhere to anywhere. Without it, customers will not be able to decide where they need to print.

Aggressively implement on-line report viewing.

By fully utilizing the recommended on-line viewing tool, the need and desire for hardcopy print will be decreased. By decreasing this need, the print environment is less complex and less cluttered.

Cost Containment

Be cost effective by utilizing existing equipment and personnel whenever possible

Create an architecture that minimizes the number of technologies used.

This strategy will remove the expense of support for the multiple software products that are currently being used. Also, the depth of local expertise will undoubtably increase when a single product is used.

Leverage existing local expertise.

By chosing a product that was already being used to some extent, the knowledge and experinces of the local support personnel will not be wasted and a lengthly retraining cycle can be avoided.

Re-use tools and processes whenever possible.

This strategy is similar to the one above only related to existing home grown tools and processes that can be re-engineered to fit into the APS.

Use HP-marketed or HP-supported products.

Borrow best practices from other entities if possible.

To save time and take advantage of best practices that will speed implementation and acceptance of the APS, this is a must.

Simplification

Implement a single software technology.

Alter processes as needed to allow them to fit with a single software tool.

Aimed at the overriding goal, that a one time effort to re-engineer processes to support the single tool concept is smarter than continuing the muli-tool environment.

Implement a common tool set on all platforms.

To support such a large environment, this is a must. A single tool set makes support as straight forward as possible and minimizes training of support personnel as well.

Allow configuration of printers 'on-the-fly' without requiring a reboot.

Utilize tool specific configuration instead of operating system configuration.

On the HP3000 specifically, printers must be configured on the system before they could be used by most tools, in an environment where 10 new printers are added weekly, this forced all systems to be reconfigured and rebooted weekly. This is an expense in time and effort that can no longer be tolerated. By moving to a tool specific configuration, this requirement can be eliminated.

Remove existing platform limitations on the number of supported printers.

Test all potential tools with a maximum configuration.

Too many problems have been encountered over the years as our environment has continued to grow to allow arbitrary limits to continue to be an issues. With over 2500 printers and the potential need for more continuing, the APS must be free of any vendor set limits.

Don't require existing printers to be changed or re-configured.

Verify that all legacy applications can continue to print without changes.

The analysis of print uncovered a lack of print standards in applications. All applications must be identified and any print problems will be resolved. Standards must be established and all must adhere to these standards.

Provide the ability to print to all printers from all platforms.

Insure that solution interfaces with print architecture's that exist at other entities.

Review interfaces to all known other print environments ensuring that print can be passed transparently to/from these sites. If changes are needed, they should be made in the APS and not required of these other environments.

Implement a simple output routing strategy

Design an architecture that efficiently used the LAN/WAN topology.

To allow for efficient delivery of output, this output should only be transported on the network as few times as possible.

Allow for automatic alternate routing.

Another issue from the interviews was the necessity to provide for alternate print destinations. This is critical when business deadlines are imminent and the principle printer is broken.

Appendix A

PIE Feedback Questions

(In the interest of space, these question have been condensed without the usual spacing needed to record the answers)

DEMOGRAPHIC INFORMATION:
Entity Number: _____
Location Name: _____
Person(s) Interviewed: _____
Date: _____

GENERAL FEEDBACK (INTRO):
Overall, are your printing needs being satisfied?

APPLICATIONS:
1. What reports do you receive which are time-critical?
Have you been satisfied with your ability to receive these reports when you need them?

2. Are there any printouts you receive on a regular basis which you don't really need?
Which ones?

EQUIPMENT:
3. Is the printer you use only used within your department or is it shared with others?

4. Do you have an alternate (or backup) printer?

5. Are the printer conveniently located for your use?
If not, what is your printer name?

PRINTER FEATURES AND REQUIREMENTS:
6. In general, what is the urgency of your print?

7. Have you been satisfied with your ability to generate "special" output, including color print, special forms, duplex print, labels, slides, etc?

8. Is there a time (time of day?, time of month?) when print is cosistently more important to you?

9. Do you have access to an on-line viewing tool?
If yes, have you been satisfied with this tool?

If no, would you make use of a tool which lets you view your print on-line, including text searching and selective hard-copy printing?

10. Do you foresee your printing requirements changing in the future?
If so, how?

PROCESS FEEDBACK:
11. Are you aware of the process for resolving a print related problem?

If so, are you satisfied with that process?

12. Are you aware of the process for adding a printer?
    If so, are you satisfied with that process?

13. Are your currently receiving bulk (high volume) print?
    If so,
        What kind of reports are you getting?
        How do you use these reports?
        How long do you retain these reports?
        Do these reports need to be bulk printed?
        Are you satisfied with the distribution of these reports?

14. What is the print distribution process for your workgroup printer(s)?
    Are you satisfied with this process?

15. Is ther often a need to change priority of print already in the queue?

16. Do you ever have the need to cancel unwanted output before it prints or while it is printing?

GENERAL FEEDBACK (CLOSING):

17. Are there any other specific problems you encounter that you'd like to mention?

18. In summary, what print-related issues do you think need to have significant attention placed on them?

Which print-related issue is the top one, in your opinion?

Appendix B

AMERICAS PRINT SOLUTION

Consumer Issues (88)

No.	Strategy. Tactic	Issue	Weight (0 - 10)
30.00	7.1,7.2	Need location of any network printer	9.86
68.00	1.30	MPE system limits are a road block to printer configuration	9.86
87.00	APS	Need small office print strategy	9.71
48.00	1.3,9.2,9.3	Adding a new printer takes too long	9.71
86.00	APS	Need large office print strategy	9.71
85.00	APS	Need Americas print strategy for network printers (workgroup printing)	9.71
32.00	2.1,2.2	Need networked printers	9.71
88.00	APS	Need print strategy defined for processing centers	9.71
57.00	CORT	Customers are not consistently receiving acknowledgement, status, and/or closure call backs	9.43
11.00	10.3,11.1	Applications are not designed to print consistently	9.29
36.00	3.10	Need to be able to manage print queues	9.29
17.00	11.4	There is a need for quotes to be routed to a dedicated printer	9.14
28.00	11.2,11.3,11.4	More printers are needed - quantity and up-to-date	9.14
55.00	APS	No central point of contact to answer print questions	9.00
25.00	6.3,6.4	VISTA customers find the tools difficult to use and training inadequate	9.00
49.00	APS	The printer request form requires too much technical knowledge & time consuming	8.86
34.00	13.20	Need guidelines on maintaining printer locally	8.71
47.00	1.3,9.2,9.3	The process to configure an exsisting printer to a HP3000 takes too long	8.71
24.00	6.20	On-line viewing tools are not uniformly available	8.71
27.00	11.40	Need faster and additional color devices	8.71
35.00	11.30	Need guidelines for ordering correct printer hardware	8.57
6.00	10.4	SPORTS should allow for selected printing	8.57
83.00	1.6,1.7	Need/Want print servers	8.57
82.00	1.3,7.3	Need ability to print anywhere within HP's infrastructure	8.57
89.00	1.3,3.1	Need backup printer strategy and plan	8.43
5.00	10.4	Timeliness of SPORTS printing is unsatisfactory	8.43
91.00	BPO	IQS workgroup configurations are incorrect and not consistent across ISE/IQS systems	8.43
33.00	1.30	Need to know which printers are configured to which systems (HP3000 host systems)	8.29
54.00	3.20	There is inadequate set of tools and training to resolve print problems	8.29
1.00	APS	Reports are not received in a timely manner specific: SASY, WWOMS, IQS, SHIP	8.14
45.00	1.3,9.2,9.3	The process to add a new printer is confusing	8.14
51.00	CORT/APS	The print problem resolution process is too slow	8.14
62.00	11.3	Need to be able to print postscript files	8.14
52.00	PRKPI	Print problem escalation process is not consistently being followed	8.14
29.00	7.1,7.2	Need visibility of locations of printers in office (local site)	8.14
81.00	NI	Need ability to print at home	7.86
63.00	1.3	Need ability to easily print 2-up or 4-up on PCL printers	7.71
84.00	1.40	Communication of adopted print strategies is lacking	7.71
65.00	11.3	Provide duplex printing capability as needed	7.71
76.00	2.2,6.3,6.4,6.5	Customers need more basic training on printing and alternatives to printing	7.71
78.00	11.4	Need work group print distribution process	7.57
22.00		Some reports are printed but not used	7.57
31.00	11.40	Need convenient placement of printers	7.57
12.00	10.3,11.1	There are no adhered to standards for form printing from applications	7.57

20.00		Bulk reports are lost or delivered in untimely manner	7.29
74.00	11.40	Need print contacts on site	7.29
43.00	1.3,3.1	There is inadequate monitoring of printers and print hubs	7.29
46.00	APS	Need process to control & document printer moves	7.29
41.00		Users want to be able to fax from their applications	7.00
4.00	NI	LITSTATION is not able to meet printed literature requirements	7.00
71.00		Customers are not notified when a print problem affecting them occurs	6.71
53.00		Customers have to restate print problems to several people	6.43
69.00		Confidential print should be adequately controlled	6.29
77.00		Need standard work group bannering guidelines	6.14
18.00		Need more descriptive bulk bannering	5.86
64.00	11.3	Certain applications generate "memory overflow" conditions	5.71
79.00	1.5,1.6,1.7	Increased print infrastructure server and print hub uptime is needed	5.57
72.00		Support personnel are not aware of print problems	5.43
56.00		Print problems reoccur; they are not coordinated and/or permanently resolved	5.29
37.00	1.3,3.1	Need intelligent spoolfile routing	5.29
44.00	APS	Overall, there is inadequate print process	5.14
93.00		Need ability to print to external customer sites	5.00
19.00		It takes too long to get banner names changed	4.86
38.00	3.10	Inadequate spoolfile tracking tools	4.57
2.00		Print volume is higher and timeliness is more critical at the customers month end cycle	4.14
59.00		There is a need for printing on large size paper ("E" size)	4.00
75.00	1.60	There are not field owners for HP3000 print engines	4.00
39.00		Eliminate blank pages in output	3.43
70.00	6.3,6.4	There are security issues associated with on-line viewing	3.43
58.00	1.70	Need ability to switch from protrait and landscape printing	3.14
7.00		Some applications do not allow preview of draft documents	2.86
73.00	13.20	There is not a known uniform printer (hardware) support contract solution	2.43
60.00	11.40	Printers do not hold enough paper	2.29
67.00		Need ability to print with one inch left margin	2.14
9.00		Need better support for CASH application regarding print issues	2.14
21.00		There is still a need for fan fold print	2.14
61.00		Letterhead paper can cause printer jams	1.86
14.00	1.7	Applications do not always reset printers to standard configurations (e.g., lines per page)	1.86
10.00	11.20	Power tool documents are in PCL 5 format only	1.71
15.00		JETFORM causes print to be generated accidently	1.71
8.00	3.10	Customers need unispool tracking reports on a regular basis	1.57
42.00	NI	There are slave printing configuration problems	1.57
80.00		There is no supported screen capture alternative for workstations on boot servers	1.43
40.00	APS	Need better naming conventions for printers	1.43
3.00		Customers are unable to print IQS quotes to alternate devices (e.g., slave printers)	1.29
16.00	NI	Printing from a HP3000 to a networked printer doesn't work with a LJ4 driver using ADVLINK	1.29
13.00		Some reports currently bulk printed and distributed need alternative methods of delivery	1.29
92.00	11.4	Some customers want application print (other than IQS) to be routed to dedicated printer	0.57

Legend:

APS = Americas Print Solution

CORT = Belongs to Call Ownership and Resolution Task Force

NI = This is not a Print Strategy Issue

BPO = Business Process Owner
PRKPI = Print Resolution Key Process Initiative

Appendix C

APS Architecture

Appendix D

APS Strategy & Tactics

AMERICAS PRINT SOLUTION

Prepared by: P.I.E. Task Force **Date:** 8/2/94

STRATEGY	TACTICS	MEASURE
1. Create a print architecture that minimizes the number of technologies used	1.1 Name an ATC NBspool Product Champion	owner named
	1.2 Make NBspool available across all MPE and HP-UX platforms	% of systems installed
	1.3 Implement NBspool across all ATC MPE and HP-UX platforms	% of systems configured
	1.4 Publish ATC Print Architecture to Development teams and interested managers	Print architecture published
	1.5 Phase out HP3000 Print Hubs	# of print hubs remaining
	1.6 Replace HP3000 Print Servers with HP9000 Print Servers	# HP3000 print servers remaining
	1.7 Implement HP9000 Print Servers in all offices	% completed
2. Increase network-based work group printing at all sites, giving customers the ability to print from any platform (e.g., MPE, HP-UX, DOS, Windows, NT, etc.)	2.1 Convert all DTC output to networked output	% accomplished
	2.2 Encourage the use of network printing through consulting	% of business units completed
3. Provide print monitoring and queue management capabilities for end users in addition to support personnel	3.1 Implement HP-UX and PC NBspool print monitoring, print tracking, and queue management components	% completed
	3.2 Conduct training for NBspool components	% completed
	3.3 Establish CTSA print servers as the only spool file source for CTSA JetDirect printers	% completed
4. Efficiently use	4.1 Reduce BOOTP traffic from newly connected	Monitoring

LAN/WAN topology for transport of print data from source to destination	network printers	established
	4.2 Eliminate BOOTP booting printers across routers	completion of 1.7
	4.3 Monitor print usage of network bandwidth	Tool in place
5. Implement an AITC architecture that is able to interface with other ITC print architecture's	5.1 RLP will be available for sending and receiving spool files from other ITC's	Documentation available
	5.2 Create documentation for dissemination to other ITC's	Documentation available
6. Increase the use of on-line viewing to reduce dependency on printed output	6.1 Name an CTSA Vista Product Champion	owner named
	6.2 Make Vista available on all CTSA platforms	# platforms available
	6.3 Create a network of knowledgeable Vista advocates from Product Champion to customer's business unit	% of advocates trained
	6.4 Communicate on-line viewing success stories and how-to-use information via the Vista advocate network	% customer base aware of Vista
	6.5 Develop incentive program for increased Vista usage	Program Established
7. Provide visibility and accessibility to all network printers	7.1 Create Data Base with appropriate printer information	Done (Yes or No)
	7.2 Provide printer Data Base access tools for end users and support personnel	Done (Yes or No)
	7.3 Configure NBspool to allow accessibility to all CTSA networked printers	Done (Yes or No)
8. Review print solution on a regular basis	8.1 Establish a standing committee to review the continuing viability of the CTSA print strategy	Is the committee formed
	8.2 Establish a standing committee to review the implementation of the CTSA print tactics	Is the committee formed
	8.3 Define key print PPM's	PPM's defined
	8.4 Ensure ongoing review of print PPM's within infrustructure process team	TBD
9. Implement solutions to minimize the impact of infrastructure limitations	9.1 New project design review to ensure compatibility with the CTSA print infrastructure	Signoff on each project
	9.2 Move all printer related DNS activities into Output Services	Move completed
	9.3 Improve the process of obtaining IP addresses	Process in place

10. Ensure that existing applications (e.g., legacy systems) are able to generate print	10.1 Identify legacy systems that exist as of 9/1/94	% of systems identified
	10.2 Resolve print problems that exist within legacy systems	% of problems resolved
	10.3 Establish print legacy process	Process implemented
11. Promote the use of print guidelines	11.1 Establish guidelines for future applications	Guidelines released
	11.2 Update all CTSA supported output devices to a minimum of PCL5	% non PLC5 devices remaining
	11.3 Develop guidelines for ordering printers and printer options	New guidelines established and published
	11.4 Promote the "***Phoenix***" project for all sites	% sites converted
	11.5 Reduce the use of slaved printers at all sites	% slaved printers remaining
12. Implement a common tool set to report print usage	12.1 Ensure that necessary information is logged by spooler tools to provide usage and billing data	% implemented
	12.2 Define monthly statistics	Statistics defined
13. Establish an ATC printer support plan	13.1 Develop equipment upgrade plan	Plan developed
	13.2 Set up appropriate printer hardware support agreement for all network printers	Agreement established
	13.3 Document user maintenance program	Program documented