CIFE CENTER FOR INTEGRATED FACILITY ENGINEERING

Potential Benefits of Internet-Based Project Control Systems – A Study On Monthly Progress Billings Processing *Appendix C*

By

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APPENDIX C. BILLINGS PROCESS ANALYSIS AND RESULTS

This section describes the analysis and results we obtained for the monthly billings process model. We first present the single parameter results, followed by the multi-parameter results.

C.1. Results of Monthly Billings Process Analysis - Single Parameter

This section presents an overview of how each dimension varies as a function of each parameter in the monthly billings process modeled.

C.1.1. Overall Process Analysis Results

C.1.1.1. Total Number of Activities

How many activities would the project participants perform in the monthly progress billings process with the paper-based system vs. with an internet-based system?

Paper-based process

- The total process consisted of 5060 activities per monthly billings process.

Internet-based process

- The total process would consist of 4968 activities per monthly billings process.
- 92 would be eliminated with the internet-based system - a decrease of 2% (Figure C-1-a).

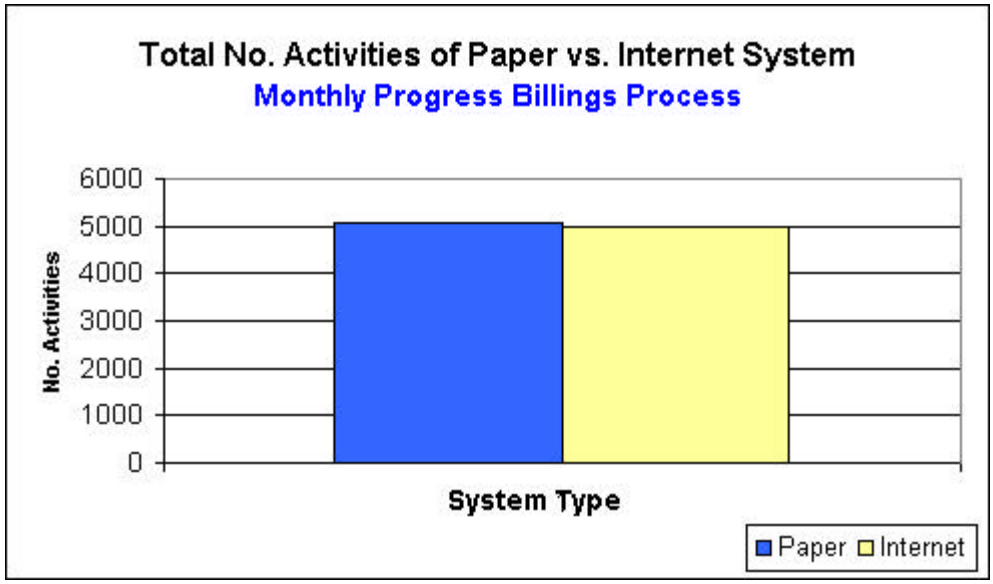


Figure C-1-a. *Comparison of total number of activities in the monthly billings process with the paper-based system vs. an internet-based system.*

System Type	Paper	Internet	% Change
TOTAL Number of activities	5060	4968	-2%

Table C-1-a. *An internet-based system would decrease the total number of activities for the monthly billings process with a paper-based system by 2%.*

C.1.1.2. Total Processing Effort

How much effort would the project participants expend for the monthly billings process cycle with the paper-based system vs. with an internet-based system? What increase in productivity would this imply?

Paper-based process

- The total processing effort was 541 minutes or approximately 9.0 work-hours per monthly progress billings cycle.
- Each cycle includes preparation of monthly schedule of values and applications of payment, review and negotiation, and issuance of payment requests.

Internet-based process

- The total processing effort would be 89 minutes or approximately 1.5 work-hours per monthly billings cycle.
- The difference in effort is about 84% or an increase in productivity by a factor of 6:1 (Figure C-1-b).

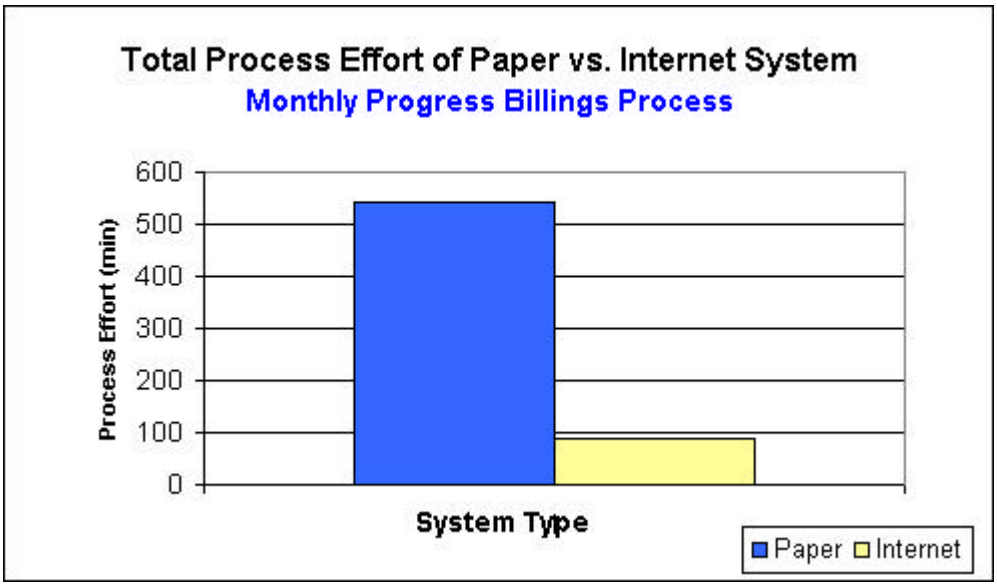


Figure C-1-b. *Comparison of total processing effort for monthly billings process cycle with the paper-based system vs. an internet-based system.*

System Type	Paper (min)	Internet (min)	% Change
TOTAL Processing Effort	541	89	-84%

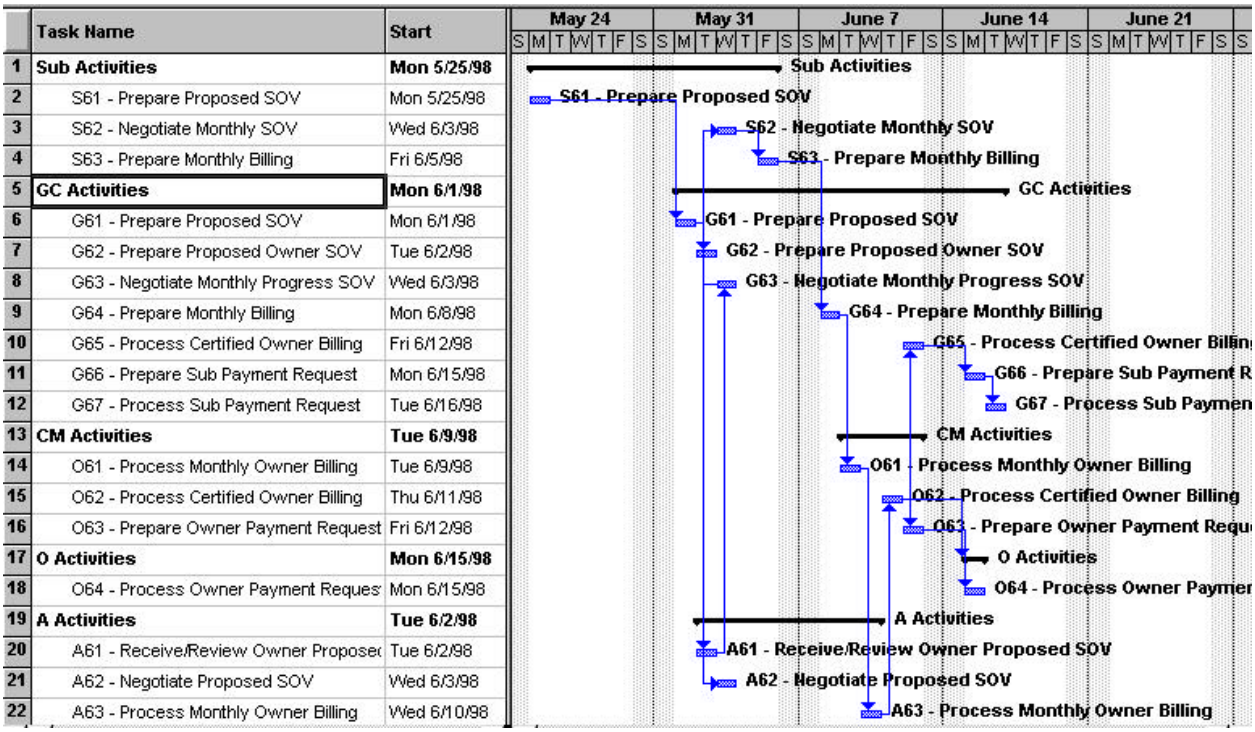
Table C-1-b. *An internet-based system would decrease the total processing effort to process billings with a paper-based system by 84% – an increase in overall productivity of 6 times.*

C.1.1.3. Total Calendar Time

How many days did the project participants take to process billings with the paper-based system vs. with the internet-based system? What decrease in overall process duration would this imply?

Paper-based process

- The duration between transaction "S61 - Prepare Sub Billing" and "G67 - Post Payment Request" is approximately 3 weeks (see Figure C-1-c).
- Although perhaps not obvious from this schedule, the main reason for the delay is because the monthly billings for each subcontractor varied in level of detail and structure making it difficult to verify and approve the amounts billed. Therefore, the negotiation effort required to reach an agreement and process the billings took longer due to the nature and inherent inefficiencies of the paper-based systems.

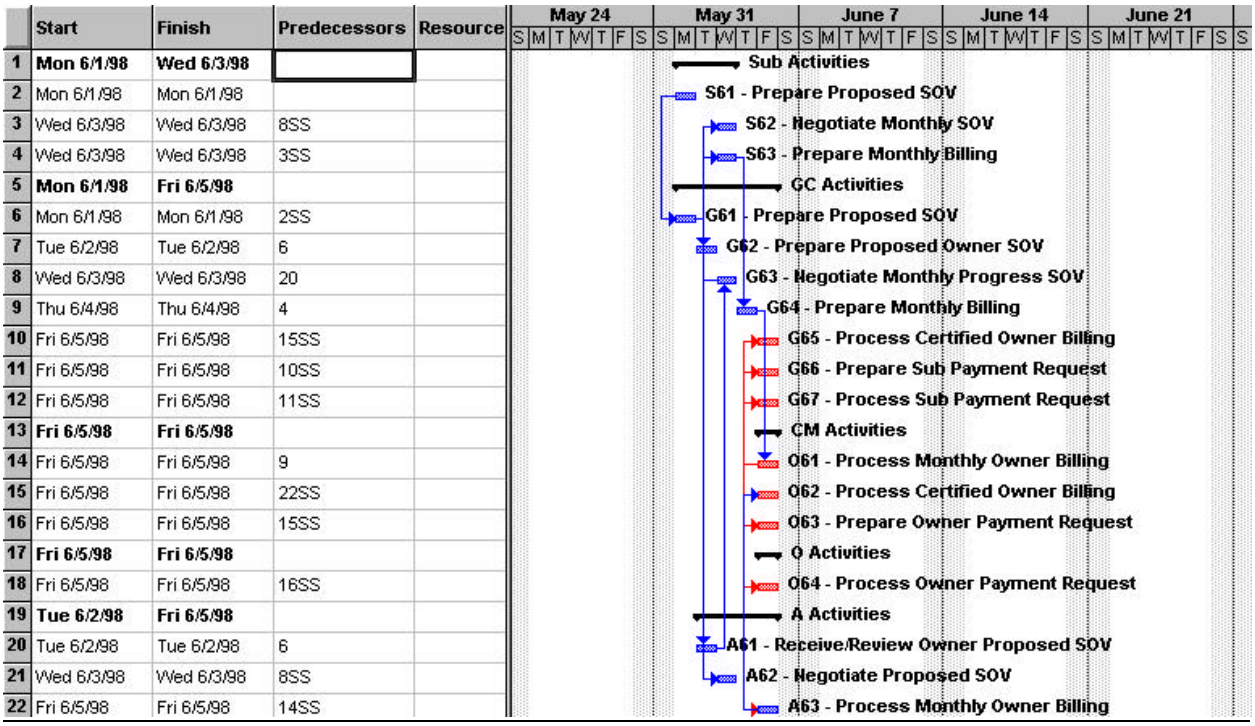


	Task Name	Start
1	**Sub Activities**	**Mon 5/25/98**
2	S61 - Prepare Proposed SOV	Mon 5/25/98
3	S62 - Negotiate Monthly SOV	Wed 6/3/98
4	S63 - Prepare Monthly Billing	Fri 6/5/98
5	**GC Activities**	**Mon 6/1/98**
6	G61 - Prepare Proposed SOV	Mon 6/1/98
7	G62 - Prepare Proposed Owner SOV	Tue 6/2/98
8	G63 - Negotiate Monthly Progress SOV	Wed 6/3/98
9	G64 - Prepare Monthly Billing	Mon 6/8/98
10	G65 - Process Certified Owner Billing	Fri 6/12/98
11	G66 - Prepare Sub Payment Request	Mon 6/15/98
12	G67 - Process Sub Payment Request	Tue 6/16/98
13	**CM Activities**	**Tue 6/9/98**
14	O61 - Process Monthly Owner Billing	Tue 6/9/98
15	O62 - Process Certified Owner Billing	Thu 6/11/98
16	O63 - Prepare Owner Payment Request	Fri 6/12/98
17	**O Activities**	**Mon 6/15/98**
18	O64 - Process Owner Payment Reques	Mon 6/15/98
19	**A Activities**	**Tue 6/2/98**
20	A61 - Receive/Review Owner Propose	Tue 6/2/98
21	A62 - Negotiate Proposed SOV	Wed 6/3/98
22	A63 - Process Monthly Owner Billing	Wed 6/10/98

Figure C-1-c. *Calendar time for the monthly billings process with the paper-based system. The duration between management activities "S61 - Prepare Sub Billing" and "G67 - Post Payment Request" would be approximately 3 weeks.*

Internet-based process

- We assume with an internet-based system, the subcontractors would have used the data from time cards and Earned Value calculations to estimate the % complete for the month, instead of having to "guesstimate" as is usually done today.
- We assume the internet-based system would allow the GC to simply "merge" the sub billings to create the Owner billing without any need for special interpretation of each paper document.
- Therefore, the duration between transaction "S61 - Prepare Sub Billing" and "G67 - Post Payment Requests" could be approximately 1 week, since many transactions would be completely automated (Figure C-1-d).
- This would be a potential savings of approximately 67% in calendar processing time!



	Start	Finish	Predecessors	Resource
1	**Mon 6/1/98**	**Wed 6/3/98**		
2	Mon 6/1/98	Mon 6/1/98		
3	Wed 6/3/98	Wed 6/3/98	8SS	
4	Wed 6/3/98	Wed 6/3/98	3SS	
5	**Mon 6/1/98**	**Fri 6/5/98**		
6	Mon 6/1/98	Mon 6/1/98	2SS	
7	Tue 6/2/98	Tue 6/2/98	6	
8	Wed 6/3/98	Wed 6/3/98	20	
9	Thu 6/4/98	Thu 6/4/98	4	
10	Fri 6/5/98	Fri 6/5/98	15SS	
11	Fri 6/5/98	Fri 6/5/98	10SS	
12	Fri 6/5/98	Fri 6/5/98	11SS	
13	**Fri 6/5/98**	**Fri 6/5/98**		
14	Fri 6/5/98	Fri 6/5/98	9	
15	Fri 6/5/98	Fri 6/5/98	22SS	
16	Fri 6/5/98	Fri 6/5/98	15SS	
17	**Fri 6/5/98**	**Fri 6/5/98**		
18	Fri 6/5/98	Fri 6/5/98	16SS	
19	**Tue 6/2/98**	**Fri 6/5/98**		
20	Tue 6/2/98	Tue 6/2/98	6	
21	Wed 6/3/98	Wed 6/3/98	8SS	
22	Fri 6/5/98	Fri 6/5/98	14SS	

Figure C-1-d. *Calendar time for the monthly billings process with an internet-based system. The duration between management activities "S61 - Prepare Sub Billing" and "G67 - Post Payment Request" would be approximately 1 week. This would be a savings of almost 67% in calendar processing time!*

C.1.2. Analysis Results per Transaction

The monthly progress billings process consists of many sets of transactions beginning with a subcontractor submitting a Monthly Sub Billing and ending with the General Contractor issuing and posting a Sub Payment Request. The following charts have been broken down by the major transaction sets that are representative of the logical sequence of events.

C.1.2.1. Transactions per Organization & Position

What transactions does each project organization and actor perform in the monthly billings process for the paper-based system vs. an internet-based system? How many handoffs exist?

S61 - Manage Monthly Sub Billing:

- The subcontractor performs the following transactions:

		Paper-Based System	Internet-Based System
Transaction	**Description**	**Actor**	**Actor**
S611 -	Calculate Self-Progress % Complete (Earned Value)	Sub Project Manager	Sub Project Manager
S612 -	Prepare Monthly Sub Billing	Sub Project Manager	Sub Project Manager
S613 -	Authorize Monthly Sub Billing	Sub Project Manager	Sub Project Manager
S614 -	Log Sub Billing in Sub's Sub Accounting Log	Sub Project Manager	Sub Project Manager
S615 -	Send Sub Billing to GC	Sub Clerk	Sub Project Manager

G61 - Process Monthly Sub Billing:

- The general contractor (GC) performs the following transactions:

			Paper-Based System	Internet-Based System
	Transaction	**Description**	**Actor**	**Actor**
-	G611 -	Receive Monthly Sub Billing	GC Field Clerk	GC Project Accountant
-	G612 -	Review Monthly Sub Billing	GC Project Accountant	GC Project Accountant
-	G613 -	Archive Monthly Sub Billing	GC Field Clerk	-

G62 - Prepare Proposed Monthly Owner Schedule of Values (SOV):

- The GC performs the following transactions:

			Paper-Based System	Internet-Based System
	Transaction	**Description**	**Actor**	**Actor**
-	G621 -	Calculate Self-Progress % Complete (Earned	GC Project	GC Project

		Value)	Accountant	Accountant
-	G622 -	Prepare Proposed Owner Schedule of Values	GC Project Accountant	GC Project Accountant
-	G623 -	Send Proposed Owner SOV to A	GC Field Clerk	GC Project Accountant

A61 - Process Proposed Monthly Owner Schedule of Values:

- The Field Architect (FA) who represents the Owner performs the following transactions:

			Paper-Based System	**Internet-Based System**
	Transaction	**Description**	**Actor**	**Actor**
-	A611 -	Receive Proposed Owner Schedule of Values (SOV)	FA Field Clerk	FA Architect
-	A612 -	Review Proposed Owner Schedule of Values (SOV)	FA Architect	FA Architect
-	A613 -	Respond to Proposed Owner Schedule of Values (SOV)	FA Architect	FA Architect

S62, G63, A62 - Negotiate Monthly Billing:

- If the Monthly Schedule of Values is not approved as submitted, the project participants may need to meet to negotiate any unresolved issues until appropriate % complete in progress is agreed upon.

			Paper-Based System	**Internet-Based System**
	Transaction	**Description**	**Actor**	**Actor**
-	S62 -	Negotiate Sub Billing (SOV)	Sub Project Manager	Sub Project Manager
-	G63 -	Negotiate Owner Billing (SOV)	GC Project Manager	GC Project Manager
-	A62 -	Negotiate Owner Billing (SOV)	FA Architect	FA Architect

G64 - Prepare Monthly Owner Billing:

- The GC performs the following transactions:

			Paper-Based System	**Internet-Based System**
	Transaction	**Description**	**Actor**	**Actor**
-	G641 -	Receive Approved Monthly Owner SOV	GC Clerk	GC Project Accountant
-	G642 -	Prepare Monthly Owner Billing	GC Project Accountant	GC Project Accountant
-	G643 -	Authorize Monthly Owner Billing	GC Project Accountant	GC Project Accountant
-	G644 -	Log Owner Billing in GC's Owner Accounting Log	GC Project Accountant	GC Project Accountant

-	G645	Copy Owner Billing	GC Field Clerk	-
-	G646 -	Send Owner Billing to Owner (CM)	GC Field Clerk	GC Project Accountant
-	G647 -	Archive Owner Billing	GC Field Clerk	-

O61 - Process Monthly Owner Billing:

- The Construction Manager (CM) who represents the Owner performs the following transactions:

			Paper-Based System	**Internet-Based System**
	Transaction	**Description**	**Actor**	**Actor**
-	O611 -	Receive Monthly Owner Billing	CM Field Clerk	CM Project Manager
-	O612 -	Review Monthly Owner Billing	CM Project Manager	CM Project Manager
-	O613 -	Send Monthly Owner Billing to FA for Certification	CM Project Manager	CM Project Manager

A63 - Process Monthly Owner Billing:

- The Field Architect (FA) performs the following transactions:

			Paper-Based System	**Internet-Based System**
	Transaction	**Description**	**Actor**	**Actor**
-	A631 -	Receive Monthly Owner Billing	FA Clerk	FA Architect
-	A632 -	Review Owner Billing	FA Architect	FA Architect
-	A633 -	Certify Owner Billing	FA Architect	FA Architect
-	A634 -	Copy Certified Owner Billing	FA Clerk	-
-	A635 -	Send Certified Owner Billing to Owner	FA Clerk	FA Architect
-	A636 -	Archive Certified Owner Billing	FA Clerk	-

O62 - Process Certified Owner Billing (Field Office):

- The Owner (CM) performs the following transactions:

			Paper-Based System	**Internet-Based System**
	Transaction	**Description**	**Actor**	**Actor**
-	O621 -	Receive Certified Monthly Owner Billing	CM Field Clerk	CM Project Manager
-	O622 -	Copy Monthly Billing	CM Field Clerk	-
-	O623 -	Send Monthly Billing to GC	CM Project Manager	CM Project Manager
-	O624 -	Archive Monthly Billing in O's Billing Folder	GC Field Clerk	-

G65 - Process Certified Owner Billing (Home Office):

- The General Contractor (GC) performs the following transactions:

	Transaction	Description	Paper-Based System Actor	Internet-Based System Actor
-	G651 -	Receive Certified Owner Billing	GC Home Office Clerk	GC Project Manager
-	G652 -	Review & Approve Certified Owner Billing	GC Accounting Entry	GC Project Manager
-	G653 -	Archive Monthly Owner Billing in GC's Owner Billing Folder	GC Home Office Clerk	-

O63 - Prepare Owner Payment Request (Field Office):

- The Owner (CM) performs the following transactions:

	Transaction	Description	Paper-Based System Actor	Internet-Based System Actor
-	O631 -	Prepare Owner Payment Request (for posting)	CM Project Manager	CM Project Manager
-	O632 -	Log Owner Payment Request in O's Owner Accounting Log	CM Project Manager	CM Project Manager
-	O633 -	Copy Owner Payment Request	CM Clerk	-
-	O634 -	Send Owner Payment Request to Accounting (for posting)	CM Clerk	CM Project Manager
-	O635 -	Archive Owner Payment Request in O's Payment Request Folder	CM Clerk	-

O64 - Process Owner Payment Request (Home Office):

- The Owner (O) performs the following transactions:

	Transaction	Description	Paper-Based System Actor	Internet-Based System Actor
-	O641 -	Receive Owner Payment Request	O Home Office Clerk	CM Project Manager
-	O642 -	Post Owner Payment Request in Accounting Database	O Accounting Entry	CM Project Manager
-	O643 -	Archive Owner Payment Request in O's Payment Request Folder	O Home Office Clerk	-

G66 - Manage Sub Payment Request (Field Office):

- The GC performs the following transactions:

	Transaction	Description	Paper-Based System Actor	Internet-Based System Actor
-	G661 -	Prepare Sub Payment Request	GC Project Accountant	GC Project Accountant
-	G662 -	Update GC's Sub Accounting Log	GC Project Accountant	GC Project Accountant
-	G663 -	Send Sub Payment Request to Accounting (for posting)	GC Field Clerk	GC Project Accountant

G67 - Process Sub Payment Request (Home Office):

- The General Contractor (GC) performs the following transactions:

	Transaction	Description	Paper-Based System Actor	Internet-Based System Actor
-	G671 -	Receive Sub Payment Request (for posting)	GC Home Office Clerk	GC Project Accountant
-	G672 -	Review Sub Payment Request	GC Accounting Entry	GC Project Accountant
-	G673 -	Post Sub Payment Request	GC Accounting Entry	GC Project Accountant
-	G674 -	Archive Sub Payment Request	GC Accounting Entry	-
-	G575 -	Update GC's Sub Accounting Log (Posted)	GC Accounting Entry	GC Project Accountant

Paper-based process

In the paper-based system, a total of 13 people, or 2-5 actors per organization, are needed to prepare and process the monthly billing documents. There are at least 30 hand-offs of the billing documents between project participants.

Internet-based process

In the internet-based system, only 5 people, or 1-2 actors per organization are needed to prepare and process monthly billings. There are only 10 hand-offs of the monthly billing documents between project participants. More direct communication by excluding intermediaries may be one of the greatest factors that will enable the expected savings of 84% in process time and process effort.

C.1.2.2. Number of Activities and Process Effort per Transaction

S61 & G61 - Manage Monthly Sub Billing (MSD Sub):

C.1.2.2.1. Number of Activities per Transaction

How many activities are included in each transaction to prepare & process the MSD Sub Billing Request with the paper-based system vs. with an internet-based system?

Paper-based process

- Transaction "S611 - Calculate Self-Progress % Complete (Earned Value)" includes 1 activity or 0.0% of the total activities.
- Transaction "S612 - Prepare Monthly Sub Billing" includes 919 activities or 18% of the total activities.
- Transaction "S613 - Authorize Monthly Sub Billing" includes 6 activities or 0.1% of the total activities.
- Transaction "S614 - Log Sub Billing in Sub's Sub Accounting Log" includes 141 activities or 3% of the total activities.
- Transaction "S615 - Send Sub Billing to GC" includes 21 activities or 0.4% of the total activities.
- Transaction "G611 - GC Monthly Sub Billing (MSD Sub)" includes 4 activities or 0.1% of the total activities.
- Transaction "G612 - Review Monthly Sub Billing" includes 2 activities or 0.0% of the total activities.
- Transaction "G613 - Archive Monthly Sub Billing (temporarily until processed)" includes 10 activities or 0.2% of the total activities.

Internet-based process

- Most transactions include the same number of activities as in the paper-based system.
- The main exception is transactions "S612" since the work to copy and print documents would be eliminated with the internet-based system (Figure C-2-a).

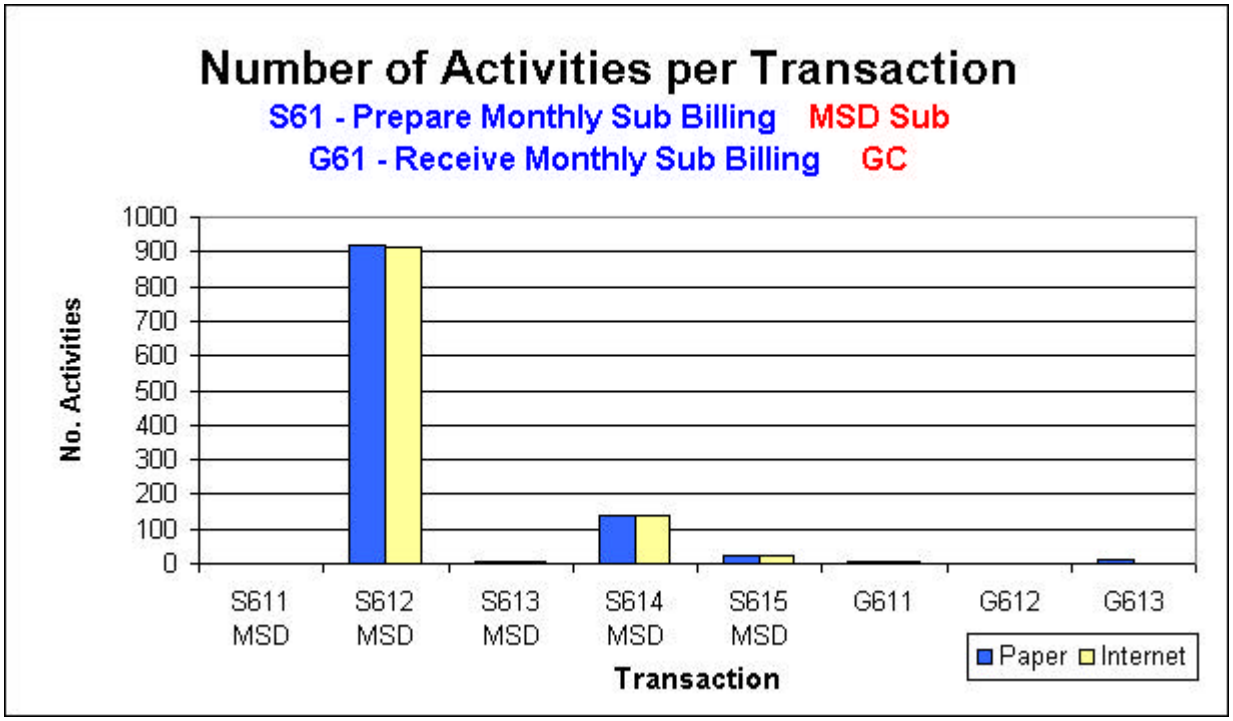


Figure C-2-a. *Comparison of activities per transaction to prepare & process the MSD Sub Billing Request with the paper-based system vs. an internet-based system.*

Transaction	Paper	% of Activities	Internet	% of Activities
S611 - Calculate Self-Progress % Complete	1	0.0%	1	0.0%
S612 - Prepare Monthly Sub Billing (MSD Sub)	919	18%	917	18%
S613 - Authorize Monthly Sub Billing	6	0.1%	6	0.1%
S614 - Log Sub Billing in MSD's Sub Accounting Log	141	3%	141	3%
S615 - Send Sub Billing to GC	21	0.4%	21	0.4%
G611 - Receive Monthly Sub Billing	4	0.1%	4	0.1%
G612 - Review Monthly Sub Billing	2	0.0%	2	0.0%
G613 - Archive Monthly Sub Billing	10	0.2%	1	0.0%
TOTAL Number of activities	**1104**	**22%**	**1093**	**22%**

Table C-2-a. *Distribution of activities per transaction for each type of system.*

C.1.2.2.2. Processing Effort per Transaction

How much effort would each transaction take to prepare & process the MSD Sub Billing Request with the paper-based system vs. with an internet-based system?

S51 & G51 - Process Sub Billing Request (MSD Sub):

Paper-based process

- Transaction "S611 - Calculate Self-Progress % Complete (Earned Value)" took 5 minutes or 1% of the total processing effort.
- Transaction "S612 - Prepare Monthly Sub Billing (MSD sub)" took 49 minutes or 9% of the total effort.
- Transaction "S613 - Authorize Monthly Sub Billing" took 3 minutes or 1% of the total processing effort.
- Transaction "S614 - Log Sub Billing in MSD's Sub Accounting Log " took 8 minutes or 2% of the total processing effort.
- Transaction "S615 - Send Sub Billing to GC" took 3 minutes or 1% of the total processing effort.
- Transaction "G611 - GC Receive Monthly Sub Billing (MSD Sub)" took 1 minute or 0.1% of the total processing effort.
- Transaction "G612 - Review Monthly Sub Billing" took 10 minutes or 2% of the total processing effort.
- Transaction "G613 - Archive Monthly Sub Billing (temporarily until processed)" took 1 minute or 0.1% of the total processing effort.

Internet-based process

- Transaction "S612 - Prepare Monthly Sub Billing " would take 1 minute or 1% of the total processing effort. This is a reduction of 99% in processing effort.
- Transaction "S613 - Authorize Monthly Sub Billing" would take 3 minutes or 3% of the total processing effort.
- Transaction "S615 - Send Sub Billing to GC" would take 1 minute or 1% of the total processing effort.
- Transaction "G612 - Review Monthly Sub Billing " would take 5 minute or 6% of the total processing effort. This is a reduction of 49% in processing effort.
- All other transactions would take 0 minutes because they are either automated by the internet-based system or are completely eliminated from the process (Figure C-2-b).

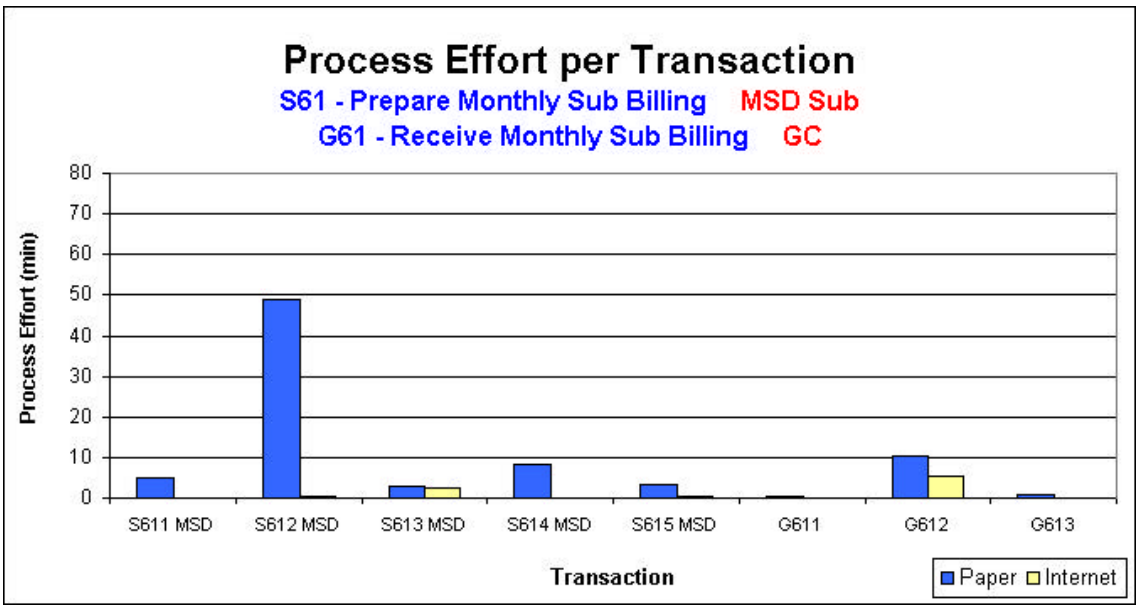


Figure C-2-b. *Comparison of processing effort per transaction to prepare & process the MSD Sub Billing Request with the paper-based system vs. an internet-based system.*

Transaction	Paper	% of Activities	Internet	% of Activities
S611 - Calculate Self-Progress % Complete	5	1%	0	0%
S612 - Prepare Monthly Sub Billing (MSD Sub)	49	9%	1	1%
S613 - Authorize Monthly Sub Billing	3	1%	3	3%
S614 - Log Sub Billing in MSD's Sub Accounting Log	8	2%	0	0%
S615 - Send Sub Billing to GC	3	1%	1	1%
G611 - Receive Monthly Sub Billing	1	0.1%	0	0%
G612 - Review Monthly Sub Billing	10	2%	5	6%
G613 - Archive Monthly Sub Billing	1	0.2%	0	0%
TOTAL Processing Effort	**80**	**15%**	**9**	**10%**

Table C-2-b. *Distribution of processing effort per transaction for each type of system.*

Transaction	Paper (min)	Internet (min)	% Change
S611 - Calculate Self-Progress % Complete	5	0	-100%
S612 - Prepare Monthly Sub Billing (MSD Sub)	49	1	-99%
S613 - Authorize Monthly Sub Billing	3	3	-14%
S614 - Log Sub Billing in MSD's Sub Accounting Log	8	0	-100%
S615 - Send Sub Billing to GC	3	1	-85%
G611 - Receive Monthly Sub Billing	1	0	-100%
G612 - Review Monthly Sub Billing	10	5	-49%
G613 - Archive Monthly Sub Billing	1	0	-100%
TOTAL Processing Effort	**80**	**9**	**-89%**

Table C-2-c. *Percentage decrease in processing effort per transaction due to an internet-based system.*

S51 & G51 - Process Sub Billing Request (WI Sub):

C.1.2.2.3. Number of Activities per Transaction

How many activities are included in each transaction to prepare & process the WI Sub Monthly Sub Billing with the paper-based system vs. with an internet-based system?

Paper-based process

- Transaction "S611 - Calculate Self-Progress % Complete (Earned Value)" includes 1 activity or 0.0% of the total activities.
- Transaction "S612 - Prepare Monthly Sub Billing" includes 479 activities or 18% of the total activities.
- Transaction "S613 - Authorize Monthly Sub Billing" includes 4 activities or 0.1% of the total activities.
- Transaction "S614 - Log Sub Billing in Sub's Sub Accounting Log" includes 143 activities or 3% of the total activities.
- Transaction "S615 - Send Sub Billing to GC" includes 21 activities or 0.4% of the total activities.
- Transaction "G611 - GC Monthly Sub Billing (MSD Sub)" includes 4 activities or 0.1% of the total activities.
- Transaction "G612 - Review Monthly Sub Billing" includes 2 activities or 0.0% of the total activities.
- Transaction "G613 - Archive Monthly Sub Billing (temporarily until processed)" includes 10 activities or 0.2% of the total activities.

Internet-based process

- Most transactions include the same number of activities as in the paper-based system.
- The main exception is transactions "S612" since the work to copy and print documents would be eliminated with the internet-based system (Figure C-2-c).

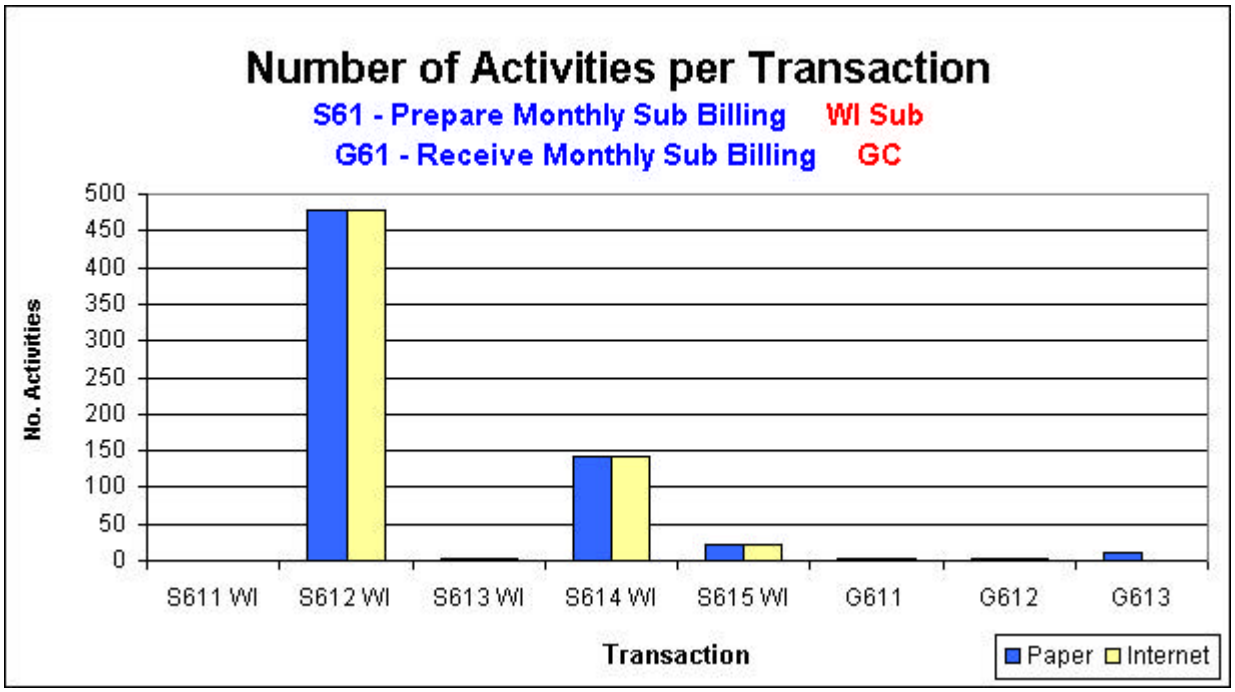


Figure C-2-c. *Comparison of activities per transaction to prepare & process the WI Sub Billing Request with the paper-based system vs. an internet-based system.*

Transaction	Paper	% of Activities	Internet	% of Activities
S611 - Calculate Self-Progress % Complete	1	0.0%	1	0.0%
S612 - Prepare Monthly Sub Billing (WI Sub)	479	9%	477	10%
S613 - Authorize Monthly Sub Billing	4	0.1%	4	0.1%
S614 - Log Sub Billing in WI's Sub Accounting Log	143	3%	143	3%
S615 - Send Sub Billing to GC	21	0.4%	21	0.4%
G611 - Receive Monthly Sub Billing	4	0.1%	4	0.1%
G612 - Review Monthly Sub Billing	2	0.0%	2	0.0%
G613 - Archive Monthly Sub Billing	10	0.2%	1	0.0%
TOTAL Processing Effort	**664**	**13%**	**653**	**13%**

Table C-2-d. *Distribution of activities per transaction for each type of system.*

C.1.2.2.4. Processing Effort per Transaction

How much effort would each transaction take to prepare & process the WI Sub Billing Request with the paper-based system vs. with an internet-based system?

S61 & G61 - Process Sub Billing Request (WI Sub):

Paper-based process

- Transaction "S611 - Calculate Self-Progress % Complete (Earned Value)" took 5 minutes or 1% of the total processing effort.
- Transaction "S612 - Prepare Monthly Sub Billing (WI sub)" took 25 minutes or 5% of the total effort.
- Transaction "S613 - Authorize Monthly Sub Billing" took 3 minutes or 1% of the total processing effort.
- Transaction "S614 - Log Sub Billing in WI's Sub Accounting Log " took 9 minutes or 2% of the total processing effort.
- Transaction "S615 - Send Sub Billing to GC" took 3 minutes or 1% of the total processing effort.
- Transaction "G611 - GC Receive Monthly Sub Billing (MSD Sub)" took 1 minute or 0.1% of the total processing effort.
- Transaction "G612 - Review Monthly Sub Billing" took 10 minutes or 2% of the total processing effort.
- Transaction "G613 - Archive Monthly Sub Billing (temporarily until processed)" took 1 minute or 0.1% of the total processing effort.

Internet-based process

- Transaction "S612 - Prepare Monthly Sub Billing " would take 1 minute or 1% of the total processing effort. This is a reduction of 98% in processing effort.
- Transaction "S613 - Authorize Monthly Sub Billing" would take 3 minutes or 3% of the total processing effort.
- Transaction "S615 - Send Sub Billing to GC" would take 1 minute or 1% of the total processing effort.
- Transaction "G612 - Review Monthly Sub Billing " would take 5 minute or 6% of the total processing effort. This is a reduction of 49% in processing effort.
- All other transactions would take 0 minutes because they are either automated by the internet-based system or are completely eliminated from the process (Figure C-2-d).

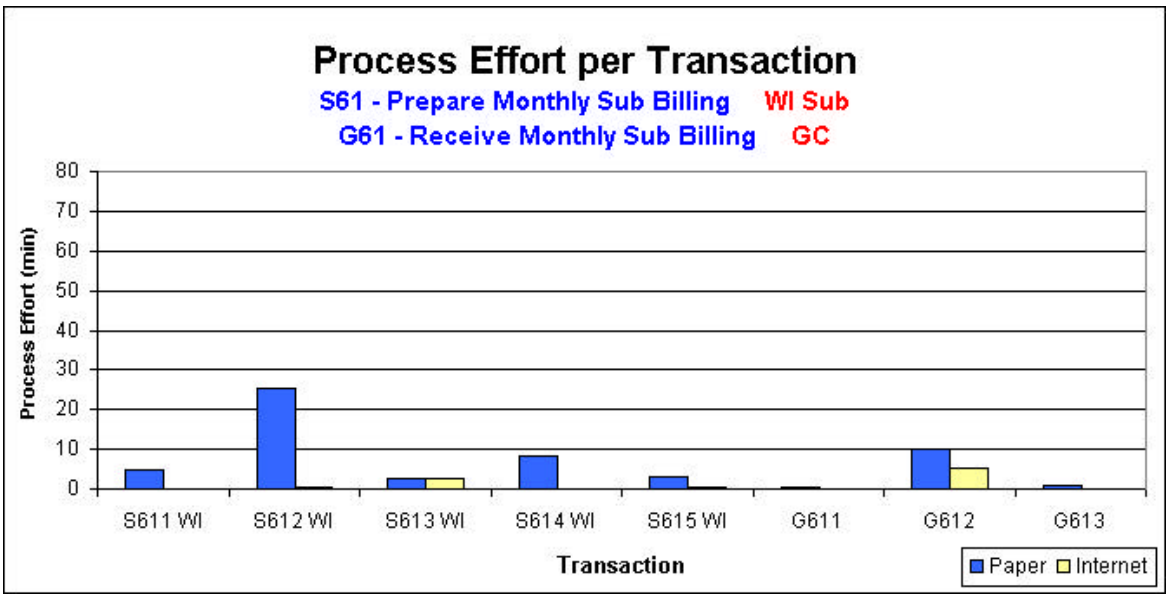


Figure C-2-d. *Comparison of processing effort per transaction to prepare & process the WI Sub Billing Request with the paper-based system vs. an internet-based system.*

Transaction	Paper	% of Activities	Internet	% of Activities
S611 - Calculate Self-Progress % Complete	5	1%	0	0.0%
S612 - Prepare Monthly Sub Billing (WI Sub)	25	5%	1	0.6%
S613 - Authorize Monthly Sub Billing	3	0.5%	3	3%
S614 - Log Sub Billing in WI's Sub Accounting Log	9	2%	0	0.0%
S615 - Send Sub Billing to GC	3	0.6%	1	0.6%
G611 - Receive Monthly Sub Billing	1	0.1%	0	0.0%
G612 - Review Monthly Sub Billing	10	2%	5	6%
G613 - Archive Monthly Sub Billing	1	0.1%	0	0.0%
TOTAL Processing Effort	**57**	**10%**	**9**	**10%**

Table C-2-e. *Distribution of processing effort per transaction for each type of system.*

Transaction	Paper (min)	Internet (min)	% Change
S611 - Calculate Self-Progress % Complete	5	0	-100%
S612 - Prepare Monthly Sub Billing (WI Sub)	25	1	-98%
S613 - Authorize Monthly Sub Billing	3	3	-6%
S614 - Log Sub Billing in WI's Sub Accounting Log	9	0	-100%
S615 - Send Sub Billing to GC	3	1	-85%
G611 - Receive Monthly Sub Billing	1	0	-100%
G612 - Review Monthly Sub Billing	10	5	-49%
G613 - Archive Monthly Sub Billing	1	0	-100%
TOTAL Processing Effort	**57**	**9**	**-85%**

Table C-2-f. *Percentage decrease in processing effort per transaction due to an internet-based system.*

G62 & A61 - Prepare & Process Proposed Monthly Owner Schedule of Values (SOV):

C.1.2.2.5. Number of Activities per Transaction

How many activities are included in each transaction to prepare & process the proposed Monthly Owner Schedule of Values with the paper-based system vs. with an internet-based system?

Paper-based process

- Transaction "G621 - Calculate Self-Progress % Complete (Earned Value)" included 1 activity or 0.0% of the total activities.
- Transaction "G622 - Prepare Proposed Owner Schedule of Values " included 1108 activities or 21.9% of the total activities.
- Transaction "G623 - Send Proposed Owner SOV to Field Architect (FA)" included 11 activities or 0.2% of the total activities.
- Transaction "A611 - FA Receive Proposed Owner Schedule of Values (SOV)" included 4 activities or 0.1% of the total activities.
- Transaction "A612 - Review Proposed Owner Schedule of Values (SOV)" included 1 activity or 0.0% of the total activities.
- Transaction "A613 - Respond to Proposed Owner Schedule of Values (SOV)" included 5 activities or 0.1% of the total activities.

Internet-based process

- All transactions would include the same number of activities as in the paper-based system.

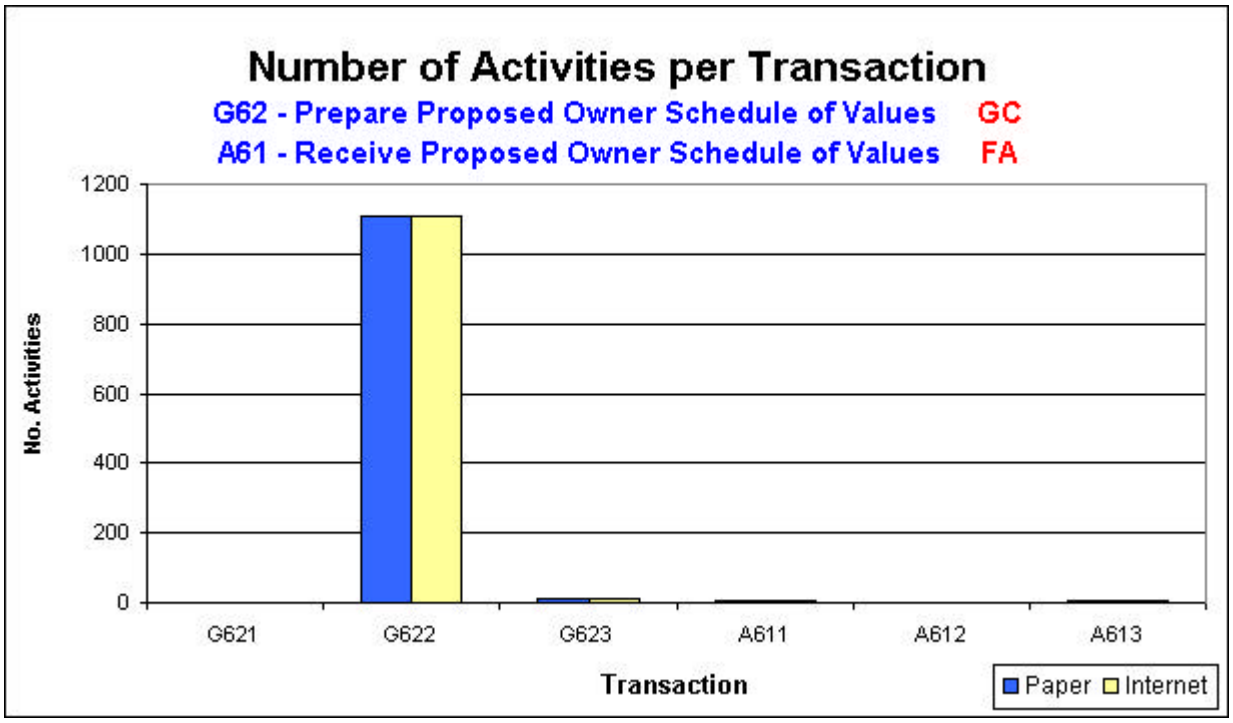


Figure C-2-e. *Comparison of activities per transaction to prepare & process the proposed Owner Schedule of Values with the paper-based system vs. an internet-based system.*

Transaction	Paper	% of Activities	Internet	% of Activities
G621 - Calculate Self-Progress % Complete (Earned Value)	1	0.0%	1	0.0%
G622 - Prepare Proposed Owner Schedule of Values	1108	21.9%	1108	22.3%
G623 - Send Proposed Owner SOV to A	11	0.2%	11	0.2%
A611 - Receive Proposed Owner Schedule of Values (SOV)	4	0.1%	4	0.1%
A612 - Review Proposed Owner Schedule of Values (SOV)	1	0.0%	1	0.0%
A613 - Respond to Proposed Owner Schedule of Values (SOV)	5	0.1%	5	0.1%
TOTAL Number of activities	**1130**	**22%**	**1130**	**23%**

Table C-2-g. *Distribution of activities per transaction for each type of system.*

C.1.2.2.6. Processing Effort per Transaction

How much effort would each transaction take to prepare & process the proposed monthly Owner Schedule of Values with the paper-based system vs. with an internet-based system?

G62 & A61 - Prepare & Process Proposed Monthly Owner Schedule of Values (SOV):

Paper-based process

- Transaction "G621 - Calculate Self-Progress % Complete (Earned Value)" took 3 minutes or 0.6% of the total processing effort..
- Transaction "G622 - Prepare Proposed Owner Schedule of Values " took 74 minutes or 14% of the total effort.
- Transaction "G623 - Send Proposed Owner SOV to Field Architect (FA)" took 2 minutes or 0.3% of the total processing effort.
- Transaction "A611 - FA Receive Proposed Owner Schedule of Values (SOV)" took 1 minute or 0.1% of the total processing effort.
- Transaction "A612 - Review Proposed Owner Schedule of Values (SOV)" took 30 minutes or 6% of the total processing effort.
- Transaction "A613 - Respond to Proposed Owner Schedule of Values (SOV)" took 8 minutes or 1.4% of the total processing effort.

Internet-based process

- Transaction "G623 - Send Proposed Owner SOV to Field Architect (FA)" would take 1 minute or 0.6% of the total processing effort. This would be a reduction of 71% in processing effort.
- Transaction "A612 - Review Proposed Owner Schedule of Values (SOV)" would take 10 minutes or 11% of the total processing effort. This would be a reduction of 67% in processing effort.
- All other transactions would take 0 minutes because they would be either automated by the internet-based system or completely eliminated from the process (Figure C-2-f).

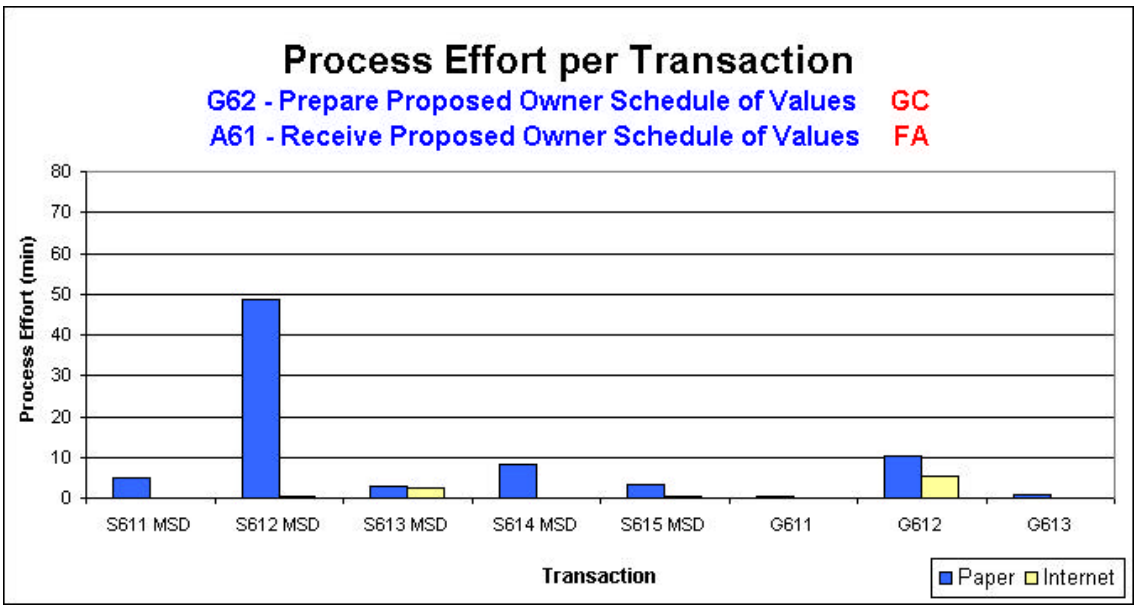


Figure C-2-f. *Comparison of processing effort per transaction to prepare & process the proposed Owner Schedule of Values with the paper-based system vs. an internet-based system.*

Transaction	Paper	% of Activities	Internet	% of Activities
G621 - Calculate Self-Progress % Complete (Earned Value)	3	0.6%	0	0.0%
G622 - Prepare Proposed Owner Schedule of Values	74	14%	0	0.0%
G623 - Send Proposed Owner SOV to A	2	0.3%	1	0.6%
A611 - Receive Proposed Owner Schedule of Values (SOV)	1	0.1%	0	0.0%
A612 - Review Proposed Owner Schedule of Values (SOV)	30	6%	10	11%
A613 - Respond to Proposed Owner Schedule of Values (SOV)	8	1.4%	7	8%
TOTAL Number of activities	**117**	**22%**	**18**	**20%**

Table C-2-h. *Distribution of processing effort per transaction for each type of system.*

Transaction	Paper (min)	Internet (min)	% Change
G621 - Calculate Self-Progress % Complete (Earned Value)	3	0	-100%
G622 - Prepare Proposed Owner Schedule of Values	74	0	-100%
G623 - Send Proposed Owner SOV to A	2	1	-71%
A611 - Receive Proposed Owner Schedule of Values (SOV)	1	0	-100%
A612 - Review Proposed Owner Schedule of Values (SOV)	30	10	-67%
A613 - Respond to Proposed Owner Schedule of Values (SOV)	8	7	-2%
TOTAL Number of activities	**117**	**18**	**-85%**

Table C-2-i. *Percentage decrease in processing effort per transaction due to an internet-based system.*

S62, G63 & A52 - Approve / Negotiate Monthly Billing:

C.1.2.2.7. Number of Activities per Transaction

How many activities are included in each transaction to approve / negotiate the monthly billing with the paper-based system vs. with an internet-based system?

Paper-based process

- Transaction "S62 (MSD Sub) - Negotiate Sub Billing" included 1 activity or 0.02% of the total activities.
- Transaction "S62 (WI Sub) - Negotiate Sub Billing" included 1 activity or 0.02% of the total activities.
- Transaction "G63 - Negotiate Owner Billing" included 1 activity or 0.02% of the total activities.
- Transaction "A62 - Negotiate Owner Billing" included 1 activity or 0.02% of the total activities.

Internet-based process

- All transactions would include the same number of activities as in the paper-based system.

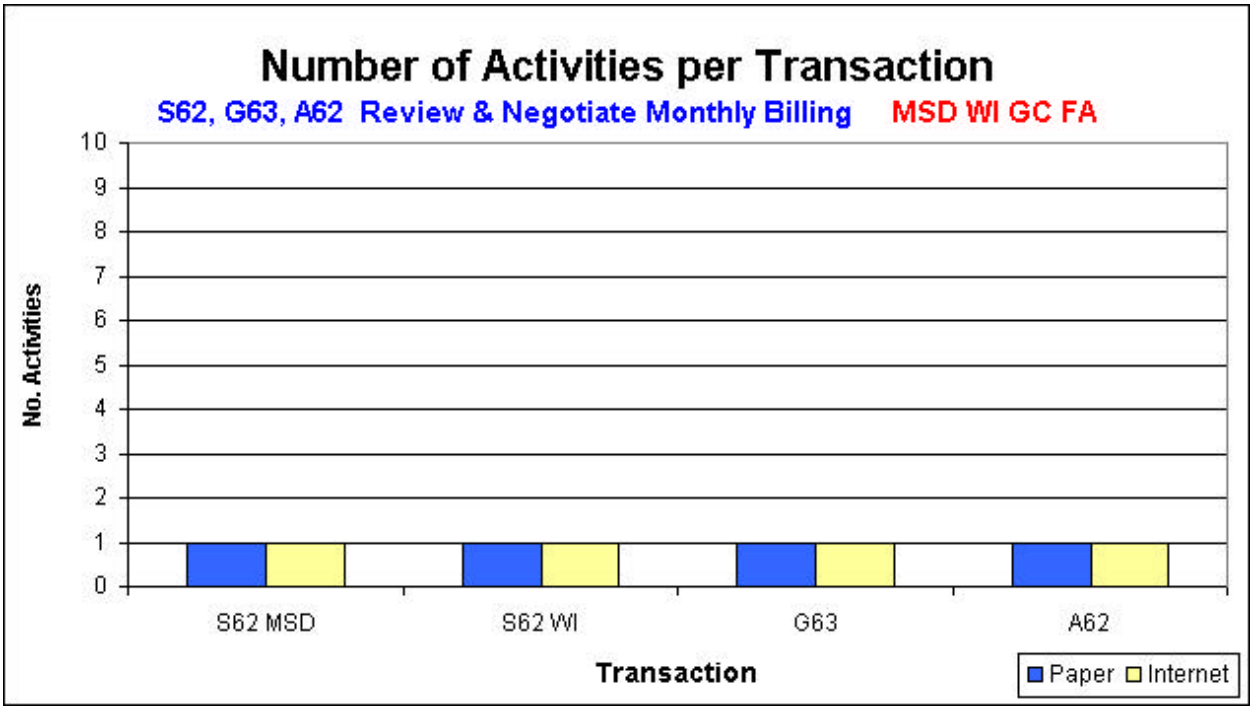


Figure C-2-g. *Comparison of activities per transaction to review / negotiate the Owner monthly billing with the paper-based system vs. an internet-based system.*

Transaction	Paper	% of Activities	Internet	% of Activities
S52 - Negotiate Sub Billing (MSD Sub)	1	0.02%	1	0.02%
S52 - Negotiate Sub Billing (WI Sub)	1	0.02%	1	0.02%
G53 - Negotiate Owner Billing	1	0.02%	1	0.02%
O52 - Negotiate Owner Billing	1	0.02%	1	0.02%
TOTAL Number of activities	**4**	**0.1%**	**4**	**0.1%**

Table C-2-j. *Distribution of activities per transaction for each type of system.*

C.1.2.2.8. Processing Effort per Transaction

How much effort would each transaction take to review / negotiate a monthly Owner billing with the paper-based system vs. with an internet-based system?

S62, G63 & A52 - Approve / Negotiate Monthly Billing:

Paper-based process

- Transaction "S62 (MSD Sub) - Negotiate Sub Billing" included 30 minutes or 6% of the total processing effort.
- Transaction "S62 (WI Sub) - Negotiate Sub Billing" included 30 minutes or 6% of the total processing effort.
- Transaction "G63 - Negotiate Owner Billing" included 30 minutes or 6% of the total processing effort.
- Transaction "O62 - Negotiate Owner Billing " included 15 minutes or 3% of the total processing effort.

Internet-based process

- Transaction "S62 (MSD Sub) - Negotiate Sub Billing" would take 5 minutes or 6% of the total processing effort. This would be a reduction of 83% in processing effort.
- Transaction "S62 (WI Sub) - Negotiate Sub Billing" would take 5 minutes or 6% of the total processing effort. This would be a reduction of 83% in processing effort.
- Transaction "G3 - Negotiate Owner Billing" would take 10 minutes or 11% of the total processing effort. This would be a reduction of 67% in processing effort.
- Transaction "O52 - Negotiate Owner Billing" would take 5 minutes or 6% of the total processing effort. This would be a reduction of 67% in processing effort.
- The negotiations may be held online or in meetings, but are assumed to reduce since the % complete will be derived with the daily time cards and thus there would be less need to negotiate (Figure C-2-h).

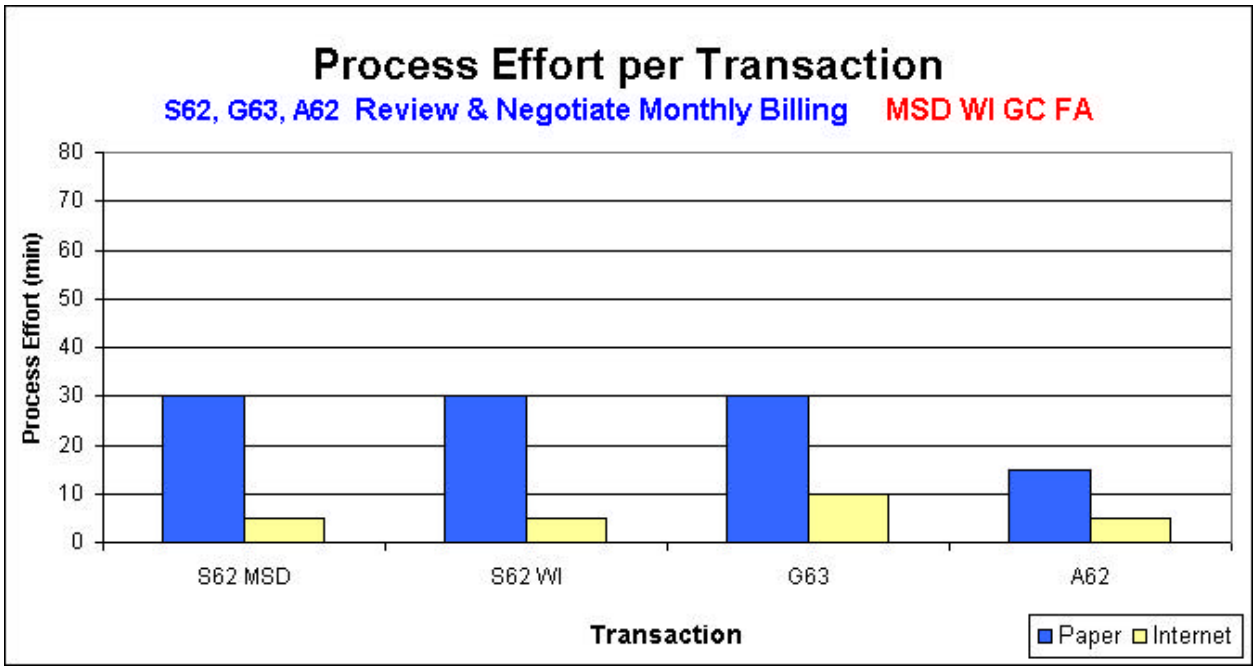


Figure C-2-h. *Comparison of processing effort per transaction to review / negotiate the monthly Owner Billing with the paper-based system vs. an internet-based system.*

Transaction	Paper	% of Activities	Internet	% of Activities
S52 - Negotiate Sub Billing (MSD Sub)	30	6%	5	6%
S52 - Negotiate Sub Billing (WI Sub)	30	6%	5	6%
G53 - Negotiate Owner Billing	30	6%	10	11%
O52 - Negotiate Owner Billing	15	3%	5	6%
TOTAL Processing Effort	**105**	**19%**	**25**	**28%**

Table C-2-k. *Distribution of processing effort per transaction for each type of system.*

Transaction	Paper (min)	Internet (min)	% Decreased
S52 - Negotiate Sub Billing (MSD Sub)	30	5	-83%
S52 - Negotiate Sub Billing (WI Sub)	30	5	-83%
G53 - Negotiate Owner Billing	30	10	-67%
O52 - Negotiate Owner Billing	15	5	-67%
TOTAL Processing Effort	**105**	**25**	**-76%**

Table C-2-l. *Percentage decrease in processing effort per transaction due to an internet-based system.*

G64 & O61 - Prepare & Process Monthly Owner Billing:

C.1.2.2.9. Number of Activities per Transaction

How many activities are included in each transaction to prepare and process the Monthly Owner Billing with the paper-based system vs. with an internet-based system?

Paper-based process

- Transaction "G641 - Receive Approved Monthly Owner SOV" included 4 activities or 0.1% of the total activities.
- Transaction "G642 - Prepare Monthly Owner Billing" included 74 activities or 1% of the total activities.
- Transaction "G643 - Authorize Monthly Owner Billing" included 4 activities or 0.1% of the total activities.
- Transaction "G644 - Log Owner Billing in GC's Owner Accounting Log" included 221 activities or 4% of the total activities.
- Transaction "G645 - Copy Owner Billing" included 1 activity or 0.0% of the total activities.
- Transaction "G646 - Send Owner Billing to Owner (CM)" included 21 activities or 0.4% of the total activities.
- Transaction "G647 - Archive Owner Billing" included 10 activities or 0.2% of the total activities.
- Transaction "O611 - Receive Monthly Owner Billing" included 10 activities or 0.2% of the total activities.
- Transaction "O612 - Review Owner Billing" included 4 activities or 0.1% of the total activities.
- Transaction "O613 - Send Owner Billing to FA for Certification" included 5 activities or 0.1% of the total activities.

Internet-based process

- Most transactions would include the same number of activities as in the paper-based system.
- The main exceptions would be transactions "G645" and "G647" since the work to copy and archive billings would be eliminated with an internet-based system (Figure C-2-i).

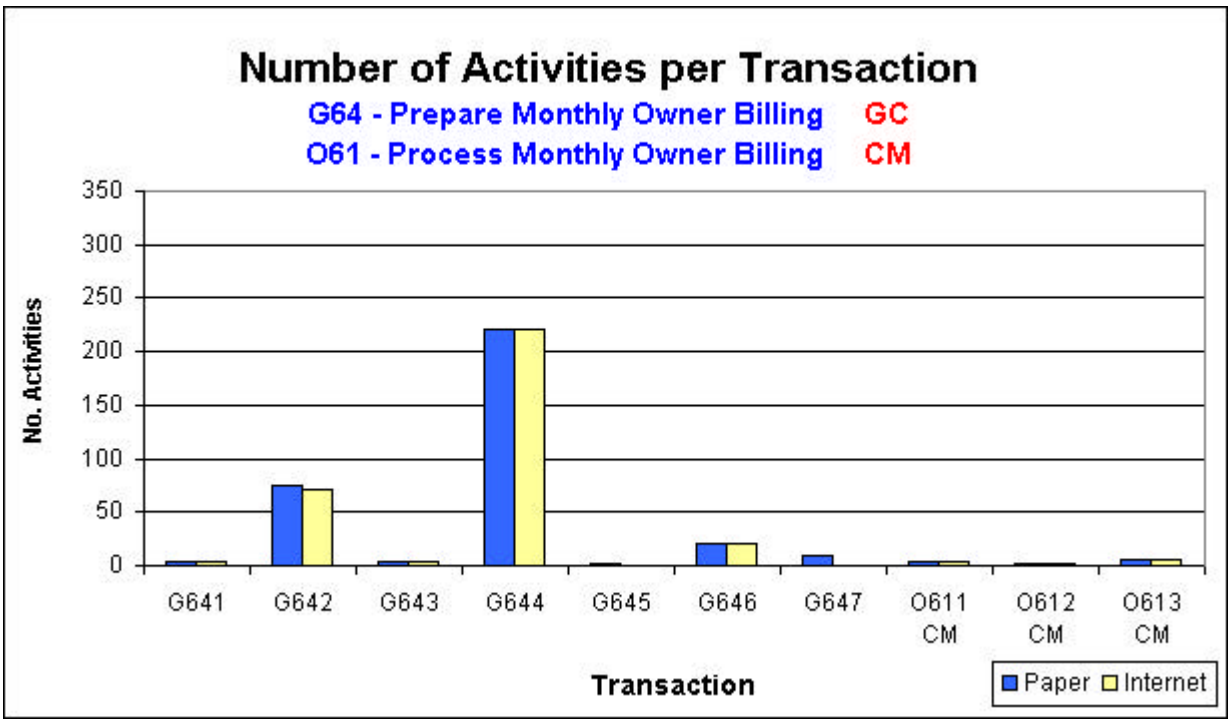


Figure C-2-i. *Comparison of activities per transaction to prepare & accept the Monthly Owner Billing with the paper-based system vs. an internet-based system.*

Transaction	Paper	% of Activities	Internet	% of Activities
G641 - Receive Approved Monthly Owner SOV	4	0.1%	4	0.1%
G642 - Prepare Monthly Owner Billing	74	1%	72	1%
G643 - Authorize Monthly Owner Billing	4	0.1%	4	0.1%
G644 - Log Owner Billing in GC's Owner Accounting Log	221	4%	221	4%
G645 - Copy Owner Billing	1	0.0%	0	0.0%
G646 - Send Owner Billing to Owner (CM)	21	0.4%	21	0.4%
G647 - Archive Owner Billing	10	0.2%	2	0.0%
O611 - Receive Monthly Owner Billing	4	0.1%	4	0.1%
O612 - Review Monthly Owner Billing	1	0.0%	1	0.0%
O613 - Send Monthly Owner Billing to FA for Certification	5	0.1%	5	0.1%
TOTAL Number of activities	**345**	**7%**	**334**	**7%**

Table C-2-m. *Distribution of activities per transaction for each type of system.*

C.1.2.2.10. Processing Effort per Transaction

How much effort would each transaction take to prepare & accept an Owner Billing with the paper-based system vs. with an internet-based system?

G64 & O61 - Prepare & Process Owner Billing:

Paper-based process

- Transaction "G641 - Receive Approved Monthly Owner SOV" took 1 minute or 0.1% of the total processing effort.
- Transaction "G642 - Prepare Monthly Owner Billing" took 5 minutes or 1% of the total processing effort.
- Transaction "G643 - Authorize Monthly Owner Billing" took 3 minutes or 0.5% of the total processing effort.

- Transaction "G644 - Log Owner Billing in GC's Owner Accounting Log" took 15 minutes or 3% of the total processing effort.
- Transaction "G645 - Copy Owner Billing" took 2 minutes or 0.4% of the total processing effort.
- Transaction "G646 - Send Owner Billing to Owner (CM)" took 3 minutes or 0.6% of the total processing effort.
- Transaction "G647 - Archive Owner Billing" took 1 minute or 0.2% of the total processing effort.
- Transaction "O611 - Receive Monthly Owner Billing" took 1 minute or 0.1% of the total processing effort.
- Transaction "O612 - Review Owner Billing" took 2 minutes or 0.4% of the total processing effort.
- Transaction "O613 - Send Owner Billing to FA for Certification" took 2 minutes or 0.3% of the total processing effort.

Internet-based process

- Transaction "G642 - Prepare Monthly Owner Billing" would take 0.3 minutes or 0.4% of the total processing effort since all the data is already in the system. This would be a reduction of 94% in processing effort.
- Transaction "G646 - Send Owner Billing to Owner (CM)" would take 1 minute or 1% of the total effort. This would be a reduction of 69% in processing effort.
- The rest of the activities would mostly be automated and only "G645" and "G647" would be eliminated. (Figure C-2-j).

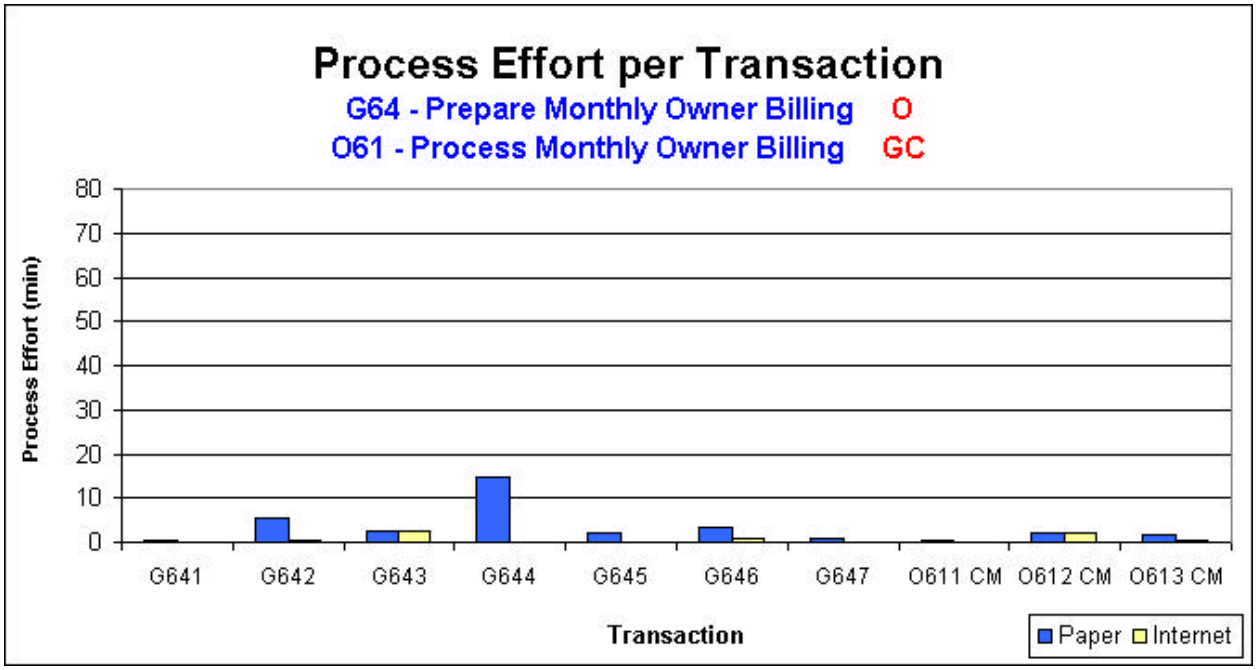


Figure C-2-n. *Comparison of processing effort per transaction to prepare & process the Monthly Owner Billing with the paper-based system vs. an internet-based system.*

Transaction	Paper	% of Effort	Internet	% of Effort
G641 - Receive Approved Monthly Owner SOV	1	0.1%	0	0.0%
G642 - Prepare Monthly Owner Billing	5	1.0%	0	0.4%
G643 - Authorize Monthly Owner Billing	3	0.5%	3	3%
G644 - Log Owner Billing in GC's Owner Accounting Log	15	3%	0	0.0%
G645 - Copy Owner Billing	2	0.4%	0	0.0%
G646 - Send Owner Billing to Owner (CM)	3	0.6%	1	1%
G647 - Archive Owner Billing	1	0.2%	0	0.0%
O611 - Receive Monthly Owner Billing	1	0.1%	0	0.0%
O612 - Review Monthly Owner Billing	2	0.4%	2	2%
O613 - Send Monthly Owner Billing to FA for Certification	2	0.3%	1	0.6%
TOTAL Processing Effort	34	6%	6	7%

Table C-2-b. *Distribution of processing effort per transaction for each type of system.*

Transaction	Paper (min)	Internet (min)	% Change
G641 - Receive Approved Monthly Owner SOV	1	0	-100%
G642 - Prepare Monthly Owner Billing	5	0	-94%
G643 - Authorize Monthly Owner Billing	3	3	-6%
G644 - Log Owner Billing in GC's Owner Accounting Log	15	0	-100%
G645 - Copy Owner Billing	2	0	-100%
G646 - Send Owner Billing to Owner (CM)	3	1	-69%
G647 - Archive Owner Billing	1	0	-100%
O611 - Receive Monthly Owner Billing	1	0	-100%
O612 - Review Monthly Owner Billing	2	2	0%
O613 - Send Monthly Owner Billing to FA for Certification	2	1	-73%
TOTAL Processing Effort	34	6	-81%

Table C-2-c. *Percentage decrease in processing effort per transaction due to an internet-based system.*

A63, O62 & G65 - Certify Monthly Owner Billing:

C.1.2.2.11. Number of Activities per Transaction

How many activities are included in each transaction to certify the Monthly Owner Billing with the paper-based system vs. with an internet-based system?

Paper-based process

- Transaction "A631 - Receive Monthly Owner Billing" included 4 activities or 0.1% of the total activities.
- Transaction "A632 - Review Owner Billing" included 2 activities or 0.0% of the total activities.
- Transaction "A633 - Certify Owner Billing" included 3 activities or 0.1% of the total activities.
- Transaction "A634 - Copy Certified Owner Billing" included 1 activity or 0.0% of the total activities.
- Transaction "A635 - Send Certified Owner Billing to Owner" included 23 activities or 0.5% of the total activities.
- Transaction "A636 - Archive Certified Owner Billing" included 10 activities or 0.2% of the total activities.
- Transaction "O621 - Receive Certified Monthly Owner Billing" included 4 activities or 0.1% of the total activities.
- Transaction "O622 - Copy Monthly Billing" included 2 activities or 0.0% of the total activities.

- Transaction "O623 - Send Monthly Billing to GC" included 5 activities or 0.1% of the total activities.
- Transaction "O624 - Archive Monthly Billing in O's Billing Folder" included 10 activities or 0.2% of the total activities.
- Transaction "G651- Receive Certified Owner Billing" included 4 activities or 0.1% of the total activities.
- Transaction "G652 - Review & Approve Certified Owner Billing" included 2 activities or 0.0% of the total activities.
- Transaction "G653 - Archive Monthly Owner Billing in GC's Owner Billing Folder" included 10 activities or 0.2% of the total activities.

Internet-based process

- Most transactions would include the same number of activities as in the paper-based system.
- The main exceptions would be transactions "A634", "A636", "O622", "O624", and "G653" since the work to copy and archive documents would be eliminated with an internet-based system (Figure C-2-k).

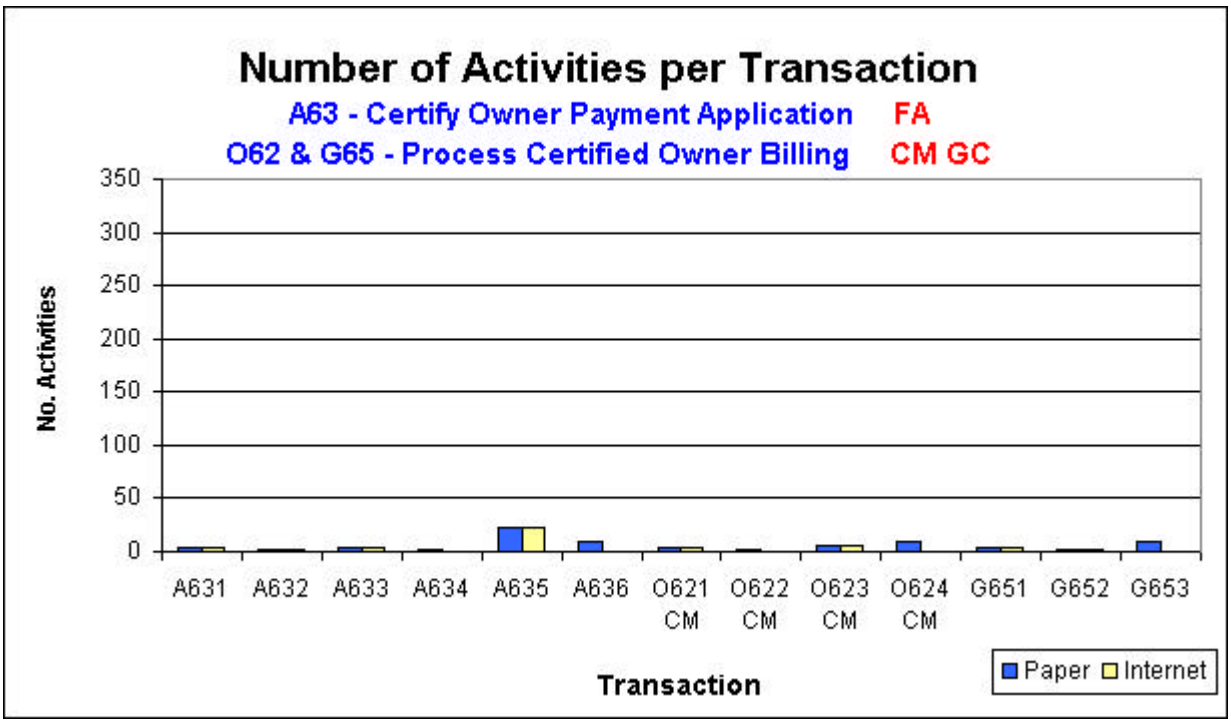


Figure C-2-o. *Comparison of activities per transaction to certify & process an Owner Billing with the paper-based system vs. an internet-based system.*

Transaction	Paper	% of Activities	Internet	% of Activities
A631 - Receive Monthly Owner Billing	4	0.1%	4	0.1%
A632 - Review Owner Billing	2	0.0%	2	0.0%
A633 - Certify Owner Billing	3	0.1%	3	0.1%
A634 - Copy Certified Owner Billing	1	0.0%	0	0.0%
A635 - Send Certified Owner Billing to Owner	23	0.5%	23	0.5%
A636 - Archive Certified Owner Billing	10	0.2%	0	0.0%
O621 - Receive Certified Monthly Owner Billing	4	0.1%	4	0.1%
O622 - Copy Monthly Billing	2	0.0%	0	0.0%
O623 - Send Monthly Billing to GC	5	0.1%	5	0.1%
O624 - Archive Monthly Billing in O's Billing Folder	10	0.2%	0	0.0%
G651 - Receive Certified Owner Billing	4	0.1%	4	0.1%
G652 - Review & Approve Certified Owner Billing	2	0.0%	2	0.0%
G653 - Archive Monthly Owner Billing in GC's Owner Billing Folder	10	0.2%	0	0.0%
TOTAL Number of activities	**80**	**2%**	**47**	**1%**

Table C-2-p. *Distribution of activities per transaction for each type of system.*

C.1.2.2.12. Processing Effort per Transaction

How much effort would each transaction take to certify & process a Monthly Owner Billing with the paper-based system vs. with an internet-based system?

A63, O62 & G65 - Certify & Process Monthly Owner Billing:

Paper-based process

- Transaction "A631 - Receive Monthly Owner Billing" took 1 minute or 0.1% of the total processing effort..
- Transaction "A632 - Review Owner Billing" took 10 minutes or 2% of the total processing effort.
- Transaction "A633 - Certify Owner Billing" took 0.3 minutes or 0.1% of the total processing effort.
- Transaction "A634 - Copy Certified Owner Billing" took 2 minutes or 0.4% of the total processing effort.
- Transaction "A635 - Send Certified Owner Billing to Owner" took 4 minutes or 0.7% of the total processing effort.
- Transaction "A636 - Archive Certified Owner Billing" took 1 minute or 0.2% of the total processing effort.
- Transaction "O621 - Receive Certified Monthly Owner Billing" took 1 minute or 0.1% of the total processing effort.
- Transaction "O622 - Copy Monthly Billing" took 1 minute or 0.2% of the total processing effort.
- Transaction "O623 - Send Monthly Billing to GC" took 2 minutes or 0.3% of the total processing effort.
- Transaction "O624 - Archive Monthly Billing in O's Billing Folder" took 1 minute or 0.2% of the total processing effort.
- Transaction "G651- Receive Certified Owner Billing" took 1 minute or 0.1% of the total processing effort.
- Transaction "G652 - Review & Approve Certified Owner Billing" took 2 minutes or 0.4% of the total processing effort.
- Transaction "G653 - Archive Monthly Owner Billing in GC's Owner Billing Folder" took 1 minute or 0.2% of the total processing effort.

Internet-based process

- Transaction "A635 - Send Certified Owner Billing to Owner" would take 0.5 minutes or 0.6% of the total processing effort. This would be a reduction of 86% in processing effort.
- Transaction "O623 - Send Monthly Billing to GC" would take 0.5 minutes or 0.6% of the total effort. This would be a reduction of 73% in processing effort.
- The rest of the activities would mostly be automated and only "A634", "A636", "O622", "O624", and "G653" would be eliminated. (Figure C-2-l).

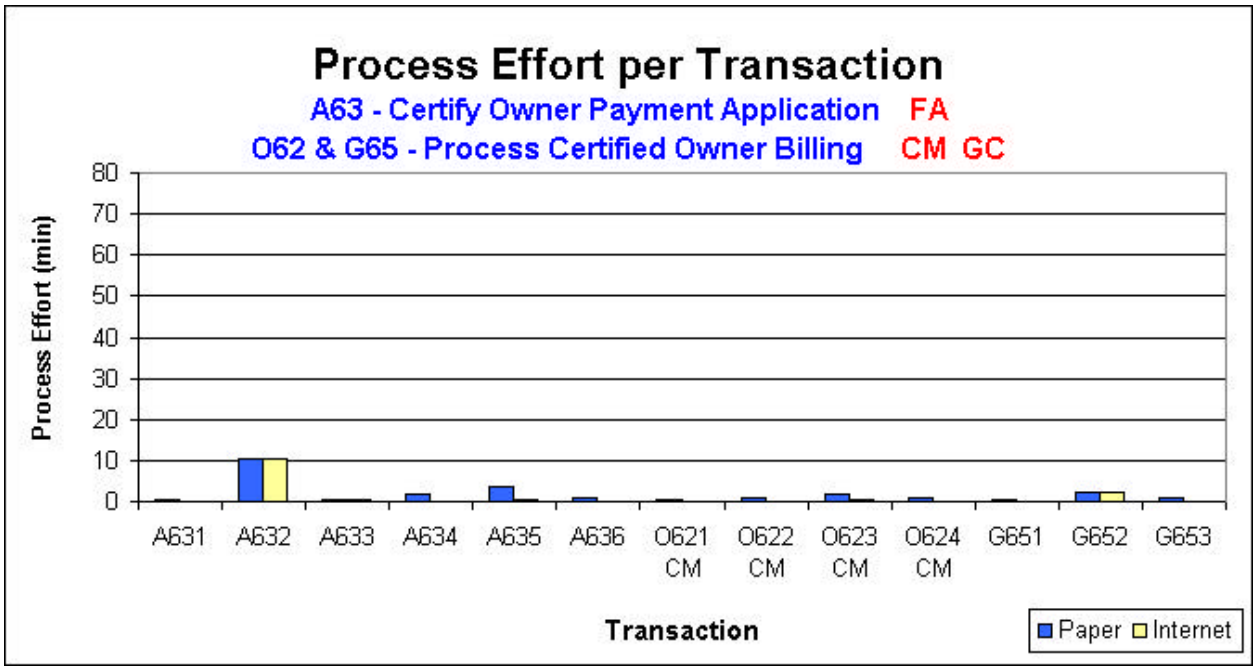


Figure C-2-l. *Comparison of processing effort per transaction to certify & process the Monthly Owner Billing with the paper-based system vs. an internet-based system.*

Transaction	Paper	% of Effort	Internet	% of Effort
A631 - Receive Monthly Owner Billing	1	0.1%	0.0	0.0%
A632 - Review Owner Billing	10	2%	10	12%
A633 - Certify Owner Billing	0.3	0.1%	0.3	0.3%
A634 - Copy Certified Owner Billing	2	0.4%	0.0	0.0%
A635 - Send Certified Owner Billing to Owner	4	0.7%	0.5	0.6%
A636 - Archive Certified Owner Billing	1	0.2%	0.0	0.0%
O621 - Receive Certified Monthly Owner Billing	1	0.1%	0.0	0.0%
O622 - Copy Monthly Billing	1	0.2%	0.0	0.0%
O623 - Send Monthly Billing to GC	2	0.3%	0.5	0.6%
O624 - Archive Monthly Billing in O's Billing Folder	1	0.2%	0.0	0.0%
G651 - Receive Certified Owner Billing	1	0.1%	0.0	0.0%
G652 - Review & Approve Certified Owner Billing	2	0.4%	2.3	3%
G653 - Archive Monthly Owner Billing in GC's Owner Billing Folder	1	0.2%	0.0	0.0%
TOTAL Number of activities	**26**	**5%**	**14**	**15%**

Table C-2-q. *Distribution of processing effort per transaction for each type of system.*

Transaction	Paper (min)	Internet (min)	% Change
A631 - Receive Monthly Owner Billing	1	0.0	-100%
A632 - Review Owner Billing	10	10	0%
A633 - Certify Owner Billing	0.3	0.3	-25%
A634 - Copy Certified Owner Billing	2	0.0	-100%
A635 - Send Certified Owner Billing to Owner	4	0.5	-86%
A636 - Archive Certified Owner Billing	1	0.0	-100%
O621 - Receive Certified Monthly Owner Billing	1	0.0	-100%
O622 - Copy Monthly Billing	1	0.0	-100%
O623 - Send Monthly Billing to GC	2	0.5	-73%
O624 - Archive Monthly Billing in O's Billing Folder	1	0.0	-100%
G651 - Receive Certified Owner Billing	1	0.0	-100%
G652 - Review & Approve Certified Owner Billing	2	2.3	0%
G653 - Archive Monthly Owner Billing in GC's Owner Billing Folder	1	0.0	-100%
TOTAL Number of activities	**26**	**14**	**-47%**

Table C-2-r. *Percentage decrease in processing effort per transaction due to an internet-based system.*

O63 & G64 – Prepare and Post Owner Payment Request:

C.1.2.2.13. Number of Activities per Transaction

How many activities are included in each transaction to prepare and post the Owner Payment Request with the paper-based system vs. with an internet-based system?

Paper-based process

- Transaction "O631 - Prepare Owner Payment Request" included 256 activities or 5.1% of the total activities.
- Transaction "O632 - Log Owner Payment Request in O's Owner Accounting Log" included 221 activities or 4.4% of the total activities.
- Transaction "O633 - Copy Owner Payment Request" included 2 activities or 0.0% of the total activities.
- Transaction "O634 - Send Owner Payment Request to Accounting (for posting)" included 10 activities or 0.2% of the total activities.
- Transaction "O635 - Archive Owner Payment Request in O's Payment Request folder" included 10 activities or 0.2% of the total activities.
- Transaction "O641 - Receive Owner Payment Request" included 1 activity or 0.0% of the total activities.
- Transaction "O642 - Post Owner Payment Request in Accounting Database" included 223 activities or 4.4% of the total activities.
- Transaction "O643- Archive Owner Payment Request in O's Payment Request Folder" included 10 activities or 0.2% of the total activities.

Internet-based process

- Most transactions would include the same number of activities as in the paper-based system.
- The main exceptions would be transactions "O633", "O635" and "O643" since the work to copy and archive billings would be eliminated with an internet-based system (Figure C-2-m).

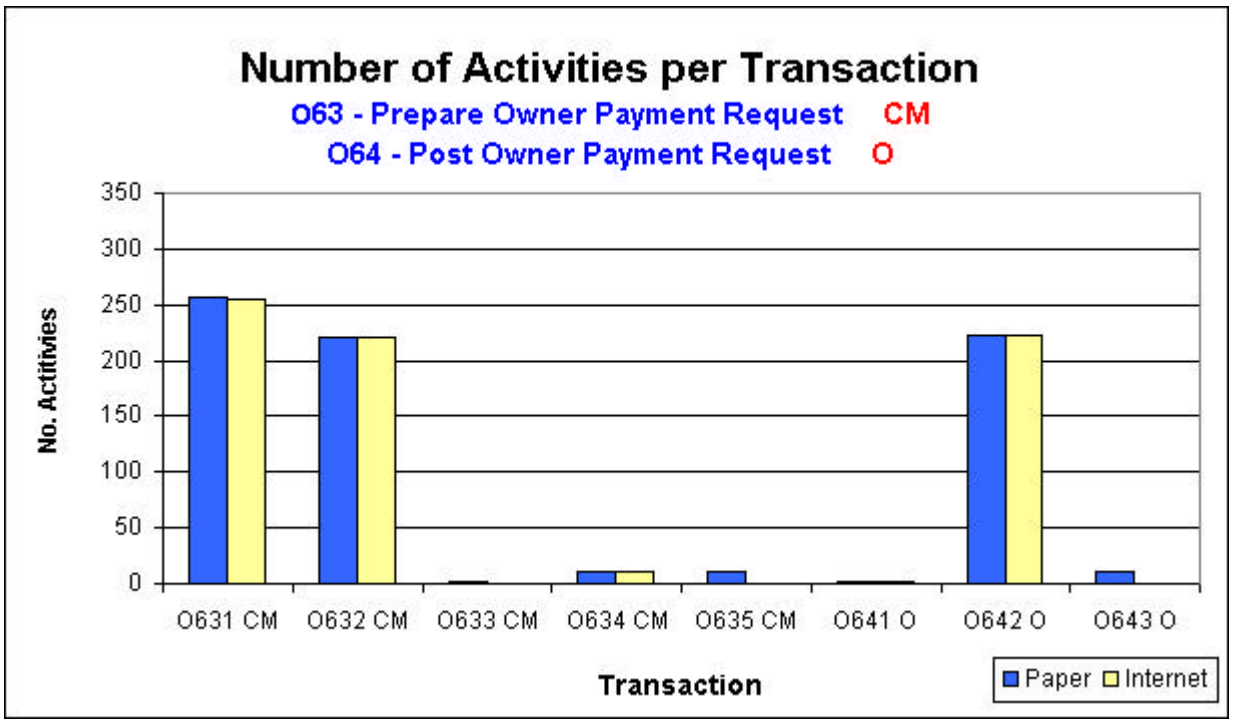


Figure C-2-m. *Comparison of activities per transaction to prepare & post the Owner Payment Request with the paper-based system vs. an internet-based system.*

Transaction	Paper	% of Activities	Internet	% of Activities
O631 - Prepare Owner Payment Request (for posting)	256	5.1%	255	5.2%
O632 - Log Owner Payment Request in O's Owner Accounting Log	221	4.4%	221	4.5%
O633 - Copy Owner Payment Request	2	0.0%	0	0.0%
O634 - Send Owner Payment Request to Accounting (for posting)	10	0.2%	10	0.2%
O635 - Archive Owner Payment Request in O's Payment Request Folder	10	0.2%	0	0.0%
O641 - Receive Owner Payment Request	1	0.0%	1	0.0%
O642 - Post Owner Payment Request in Accounting Database	223	4.4%	223	4.5%
O643 - Archive Owner Payment Request in O's Payment Request Folder	10	0.2%	0	0.0%
TOTAL Number of activities	**733**	**14%**	**710**	**14%**

Table C-2-s. *Distribution of activities per transaction for each type of system.*

C.1.2.2.14. Processing Effort per Transaction

How much effort would each transaction take to prepare & post the Owner Payment Request with the paper-based system vs. with an internet-based system?

O63 & G64 – Prepare and Post Owner Payment Request:

Paper-based process

- Transaction "O631 - Prepare Owner Payment Request (for posting)" took 19 minutes or 3.6% of the total processing effort.

- Transaction "O632 - Log Owner Payment Request in O's Owner Accounting Log" took 15 minutes or 2.7% of the total processing effort.
- Transaction "O633 - Copy Owner Payment Request" took 1 minute or 0.2% of the total processing effort.
- Transaction "O634 - Send Owner Payment Request to Accounting (for posting)" took 2 minutes or 0.4% of the total processing effort.
- Transaction "O635 - Archive Owner Payment Request in O's Payment Request folder" took 1 minute of 0.2% of the total processing effort.
- Transaction "O641 - Receive Owner Payment Request" took 1 minute or 0.2% of the total processing effort.
- Transaction "O642 - Post Owner Payment Request in Accounting Database" took 15 minutes or 2.8% of the total processing effort.
- Transaction "O643 - Archive Owner Payment Request in O's Payment Request folder" took 1 minute or 0.2% of the total processing effort.

Internet-based process

- Transaction "O632 - Log Owner Payment Request in O's Owner Accounting Log" would take 2 minutes or 2.6% of the total processing effort. This would be a reduction of 84% in processing effort.
- Transaction "O634 - Send Owner Payment Request to Accounting" would take 1 minute or 0.6% of the total effort. This would be a reduction of 79% in processing effort.
- The rest of the activities would be automated and only "O633", "O635" and "O643" would be eliminated. (Figure C-2-n).

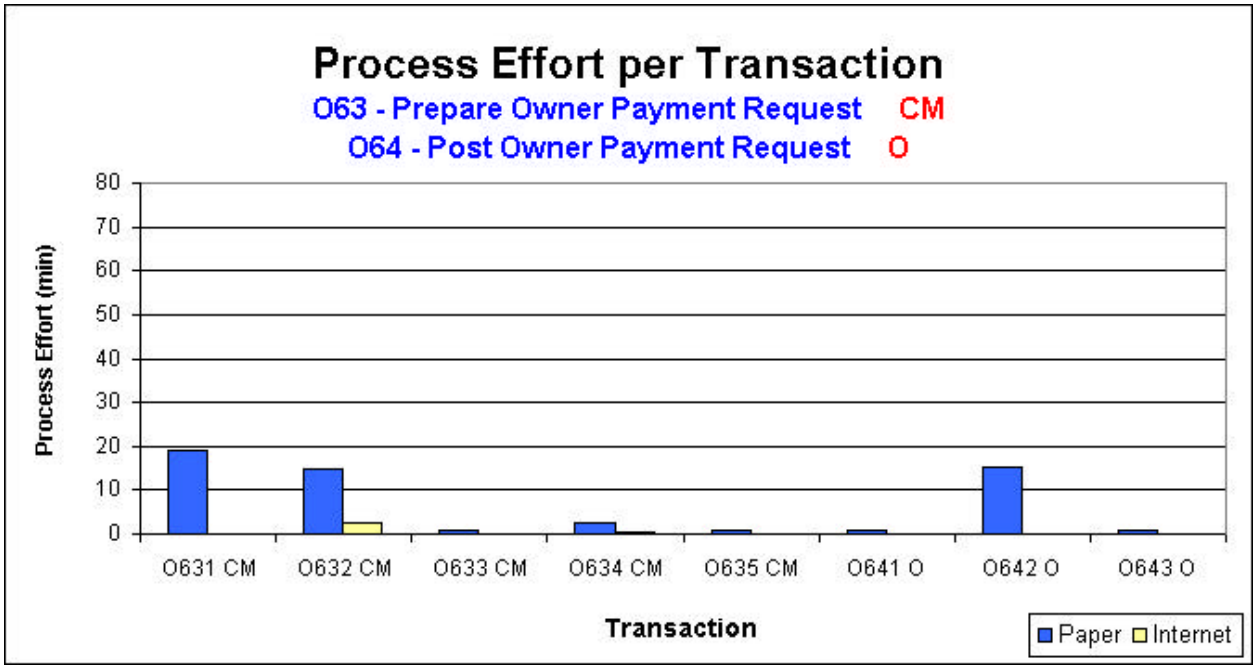


Figure C-2-n. *Comparison of processing effort per transaction to prepare & post the Owner Payment Request with the paper-based system vs. an internet-based system.*

Transaction	Paper	% of Effort	Internet	% of Effort
O631 - Prepare Owner Payment Request (for posting)	19	3.6%	0	0.0%
O632 - Log Owner Payment Request in O's Owner Accounting Log	15	2.7%	2	2.6%
O633 - Copy Owner Payment Request	1	0.2%	0	0.0%
O634 - Send Owner Payment Request to Accounting (for posting)	2	0.4%	1	0.6%
O635 - Archive Owner Payment Request in O's Payment Request Folder	1	0.2%	0	0.0%
O641 - Receive Owner Payment Request	1	0.2%	0	0.0%
O642 - Post Owner Payment Request in Accounting Database	15	2.8%	0	0.0%
O643 - Archive Owner Payment Request in O's Payment Request Folder	1	0.2%	0	0.0%
TOTAL Processing Effort	**56**	**10%**	**3**	**3%**

Table C-2-t. *Distribution of processing effort per transaction for each type of system.*

Transaction	Paper (min)	Internet (min)	% Change
O631 - Prepare Owner Payment Request (for posting)	19	0	-100%
O632 - Log Owner Payment Request in O's Owner Accounting Log	15	2	-84%
O633 - Copy Owner Payment Request	1	0	-100%
O634 - Send Owner Payment Request to Accounting (for posting)	2	1	-79%
O635 - Archive Owner Payment Request in O's Payment Request Folder	1	0	-100%
O641 - Receive Owner Payment Request	1	0	-100%
O642 - Post Owner Payment Request in Accounting Database	15	0	-100%
O643 - Archive Owner Payment Request in O's Payment Request Folder	1	0	-100%
TOTAL Processing Effort	**56**	**3**	**-95%**

Table C-2-u. *Percentage decrease in processing effort per transaction due to an internet-based system.*

G66 & G67 – Prepare and Post Sub Payment Request (MSD Sub):

C.1.2.2.15. Number of Activities per Transaction

How many activities are included in each transaction to prepare and post the MSD Sub Payment Request with the paper-based system vs. with an internet-based system?

Paper-based process

- Transaction "G661 - Prepare Sub Payment Request" included 156 activities or 3.1% of the total activities.
- Transaction "G662 - Update GC's Sub Accounting Log" included 138 activities or 2.7% of the total activities.
- Transaction "G663 - Send Sub Payment Request to Accounting (for posting)" included 10 activities or 0.2% of the total activities.
- Transaction "G671 - Receive Sub Payment Request (for posting)" included 4 activities or 0.1% of the total activities.

- Transaction "G672 - Review Sub Payment Request" included 1 activity or 0.0% of the total activities.
- Transaction "G673 - Post Sub Payment Request" included 84 activities or 1.7% of the total activities.
- Transaction "G674 - Archive Sub Payment Request" included 10 activities or 0.2% of the total activities.
- Transaction "G675 - Update GC's Sub Accounting Log (posted)" included 97 activities or 1.9% of the total activities.

Internet-based process

- Most transactions would include the same number of activities as in the paper-based system.
- The main exceptions would be transaction "G674" since the work to archive sub payment requests would be eliminated with an internet-based system (Figure C-2-o).

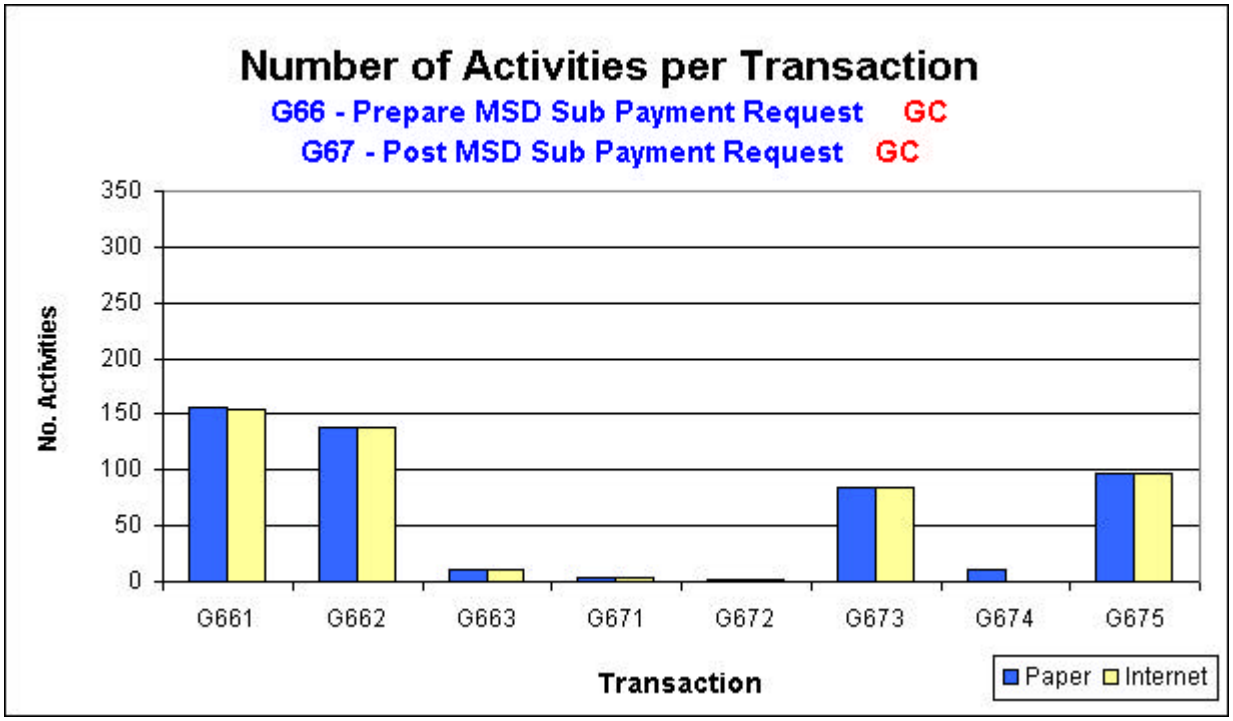


Figure C-2-o. *Comparison of activities per transaction to prepare & post the MSD Sub Payment Request with a paper-based system vs. an internet-based system.*

Transaction	Paper	% of Activities	Internet	% of Activities
G661 - Prepare Sub Payment Request	156	3.1%	155	3.1%
G662 - Update GC's Sub Accounting Log	138	2.7%	138	2.8%
G663 - Send Sub Payment Request to Accounting (for posting)	10	0.2%	10	0.2%
G671 - Receive Sub Payment Request (for posting)	4	0.1%	4	0.1%
G672 - Review Sub Payment Request	1	0.0%	1	0.0%
G673 - Post Sub Payment Request	84	1.7%	84	1.7%
G674 - Archive Sub Payment Request	10	0.2%	0	0.0%
G675 - Update GC's Sub Accounting Log (Posted)	97	1.9%	97	2.0%
TOTAL Number of activities	500	10%	489	10%

Table C-2-v. *Distribution of activities per transaction for each type of system.*

C.1.2.2.16. Processing Effort per Transaction

How much effort would each transaction take to execute & post a Sub Billing with the paper-based system vs. with an internet-based system?

G66 & G67 – Prepare and Post Sub Payment Request (MSD Sub):

Paper-based process

- Transaction "G661 - Prepare Sub Payment Request" took 12 minutes or 2.2% of the total processing effort.
- Transaction "G662 - Update GC's Sub Accounting Log" took 8 minutes or 1.5% of the total processing effort.
- Transaction "G663 - Send Sub Payment Request to Accounting (for posting)" took 1 minute or 0.2% of the total processing effort.
- Transaction "G671 - Receive Sub Payment Request (for posting)" took 0 minutes or 0.1% of the total processing effort.
- Transaction "G672 - Review Sub Payment Request" took 2 minutes or 0.4% of the total processing effort.
- Transaction "G673 - Post Sub Payment Request" took 6 minutes or 1.1% of the total processing effort.
- Transaction "G674 - Archive Sub Payment Request" took 1 minute or 0.2% of the total processing effort.
- Transaction "G675 - Update GC's Sub Accounting Log (posted)" took 2 minutes or 0.4% of the total processing effort.

Internet-based process

- Transaction "G661 - Prepare Sub Payment Request" would take 2 minutes or 2.6% of the total processing effort. This would be a reduction of 80% in processing effort.
- Transaction "G563 - Send Sub Payment Request to Accounting (for posting)" would take 1 minute or 0.6% of the total effort. This would be a reduction of 50% in processing effort.
- The rest of the activities would mostly be automated and only "G674" would be eliminated. (Figure C-2-p).

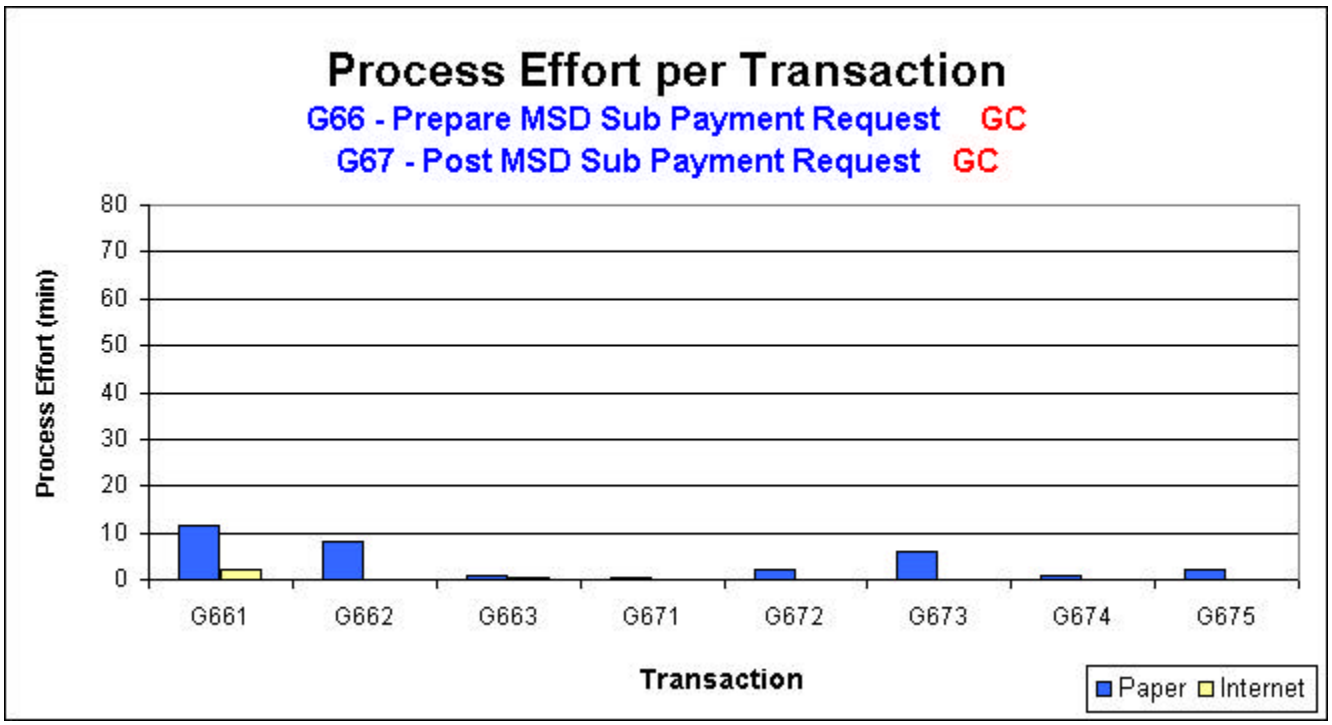


Figure C-2-p. *Comparison of processing effort per transaction to prepare & post the MSD Sub Payment Request in a paper-based system vs. an internet-based system.*

Transaction	Paper	% of Effort	Internet	% of Effort
G661 - Prepare Sub Payment Request	12	2.2%	2	2.6%
G662 - Update GC's Sub Accounting Log	8	1.5%	0	0.0%
G663 - Send Sub Payment Request to Accounting (for posting)	1	0.2%	1	0.6%
G671 - Receive Sub Payment Request (for posting)	0	0.1%	0	0.0%
G672 - Review Sub Payment Request	2	0.4%	0	0.0%
G673 - Post Sub Payment Request	6	1.1%	0	0.0%
G674 - Archive Sub Payment Request	1	0.2%	0	0.0%
G675 - Update GC's Sub Accounting Log (Posted)	2	0.4%	0	0.0%
TOTAL Number of activities	33	6%	3	3%

Table C-2-w. *Distribution of processing effort per transaction for each type of system.*

Transaction	Paper (min)	Internet (min)	% Change
G661 - Prepare Sub Payment Request	12	2	-80%
G662 - Update GC's Sub Accounting Log	8	0	-100%
G663 - Send Sub Payment Request to Accounting (for posting)	1	1	-50%
G671 - Receive Sub Payment Request (for posting)	0	0	-100%
G672 - Review Sub Payment Request	2	0	-100%
G673 - Post Sub Payment Request	6	0	-100%
G674 - Archive Sub Payment Request	1	0	-100%
G675 - Update GC's Sub Accounting Log (Posted)	2	0	-100%
TOTAL Processing Effort	33	3	-91%

Table C-2-x. *Percentage decrease in processing effort per transaction due to an internet-based system.*

G66 & G67 – Prepare and Post Sub Payment Request (WI Sub):

C.1.2.2.17. Number of Activities per Transaction

How many activities are included in each transaction to prepare and accept the WI Sub Billing with the paper-based system vs. with an internet-based system?

Paper-based process

- Transaction "G661 - Prepare Sub Payment Request" included 156 activities or 3.1% of the total activities.
- Transaction "G662 - Update GC's Sub Accounting Log" included 138 activities or 2.7% of the total activities.
- Transaction "G663 - Send Sub Payment Request to Accounting (for posting)" included 10 activities or 0.2% of the total activities.
- Transaction "G671 - Receive Sub Payment Request (for posting)" included 4 activities or 0.1% of the total activities.
- Transaction "G672 - Review Sub Payment Request" included 1 activity or 0.0% of the total activities.
- Transaction "G673 - Post Sub Payment Request" included 84 activities or 1.7% of the total activities.
- Transaction "G674 - Archive Sub Payment Request" included 10 activities or 0.2% of the total activities.
- Transaction "G675 - Update GC's Sub Accounting Log (posted)" included 97 activities or 1.9% of the total activities.

Internet-based process

- Most transactions would include the same number of activities as in the paper-based system.
- The main exceptions would be transaction "G674" since the work to archive billings would be eliminated with an internet-based system (Figure C-2-q).

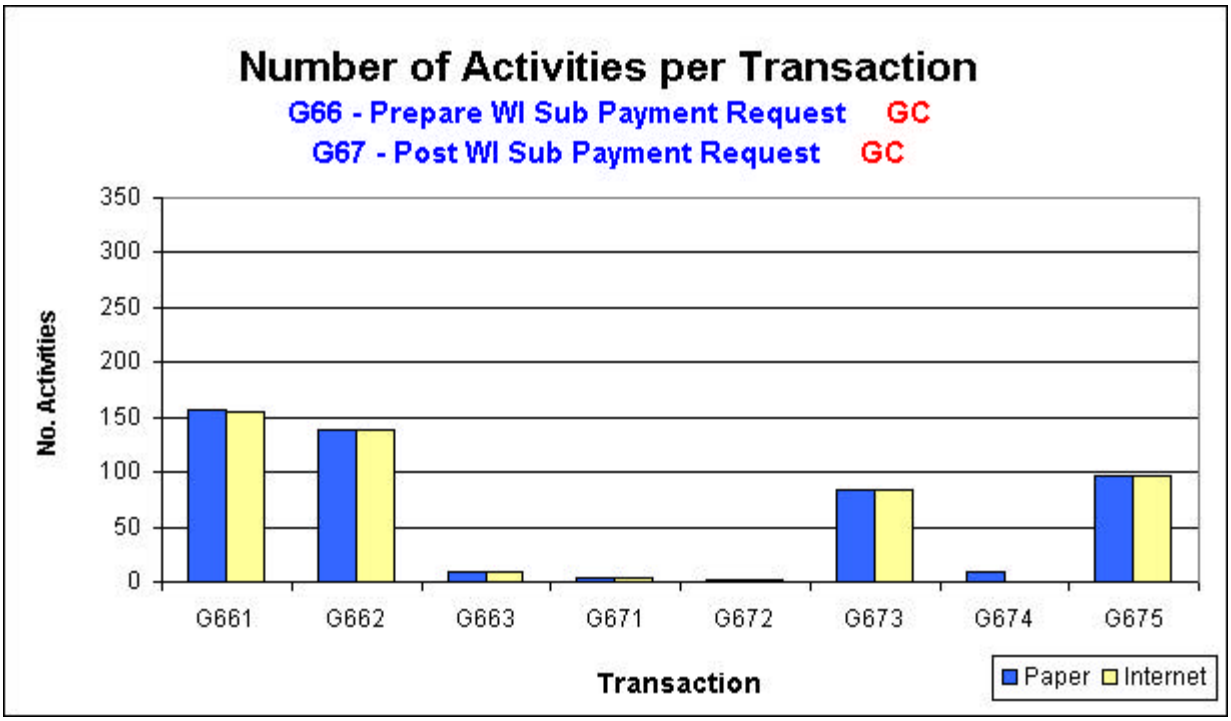


Figure C-2-q. *Comparison of activities per transaction to prepare & post the WI Sub Payment Request with a paper-based system vs. an internet-based system.*

Transaction	Paper	% of Activities	Internet	% of Activities
G661 - Prepare Sub Payment Request	156	3.1%	155	3.1%
G662 - Update GC's Sub Accounting Log	138	2.7%	138	2.8%
G663 - Send Sub Payment Request to Accounting (for posting)	10	0.2%	10	0.2%
G671 - Receive Sub Payment Request (for posting)	4	0.1%	4	0.1%
G672 - Review Sub Payment Request	1	0.0%	1	0.0%
G673 - Post Sub Payment Request	84	1.7%	84	1.7%
G674 - Archive Sub Payment Request	10	0.2%	0	0.0%
G675 - Update GC's Sub Accounting Log (Posted)	97	1.9%	97	2.0%
TOTAL Number of activities	500	10%	489	10%

Table C-2-y. *Distribution of activities per transaction for each type of system.*

C.1.2.2.18. Processing Effort per Transaction

How much effort would each transaction take to execute & post the WI Sub Billing with the paper-based system vs. with an internet-based system?

G66 & G67 – Prepare and Post Sub Payment Request (WI Sub):

Paper-based process

- Transaction "G661 - Prepare Sub Payment Request" took 12 minutes or 2.2% of the total processing effort.
- Transaction "G662 - Update GC's Sub Accounting Log" took 8 minutes or 1.5% of the total processing effort.
- Transaction "G663 - Send Sub Payment Request to Accounting (for posting)" took 2 minutes or 0.4% of the total processing effort.
- Transaction "G671 - Receive Sub Payment Request (for posting)" took 0 minutes or 0.1% of the total processing effort.
- Transaction "G672 - Review Sub Payment Request" took 2 minutes or 0.4% of the total processing effort.
- Transaction "G673 - Post Sub Payment Request" took 6 minutes or 1.1% of the total processing effort.
- Transaction "G674 - Archive Sub Payment Request" took 1 minute or 0.2% of the total processing effort.
- Transaction "G675 - Update GC's Sub Accounting Log (posted)" took 2 minutes or 0.4% of the total processing effort.

Internet-based process

- Transaction "G661 - Prepare Sub Payment Request" would take 2 minutes or 2.6% of the total processing effort. This would be a reduction of 80% in processing effort.
- Transaction "G663 - Send Sub Payment Request to Accounting" would take 2 minutes or 0.4% of the total effort. This would be a reduction of 79% in processing effort.
- The rest of the activities would mostly be automated and only "G674" would be eliminated. (Figure C-2-r).

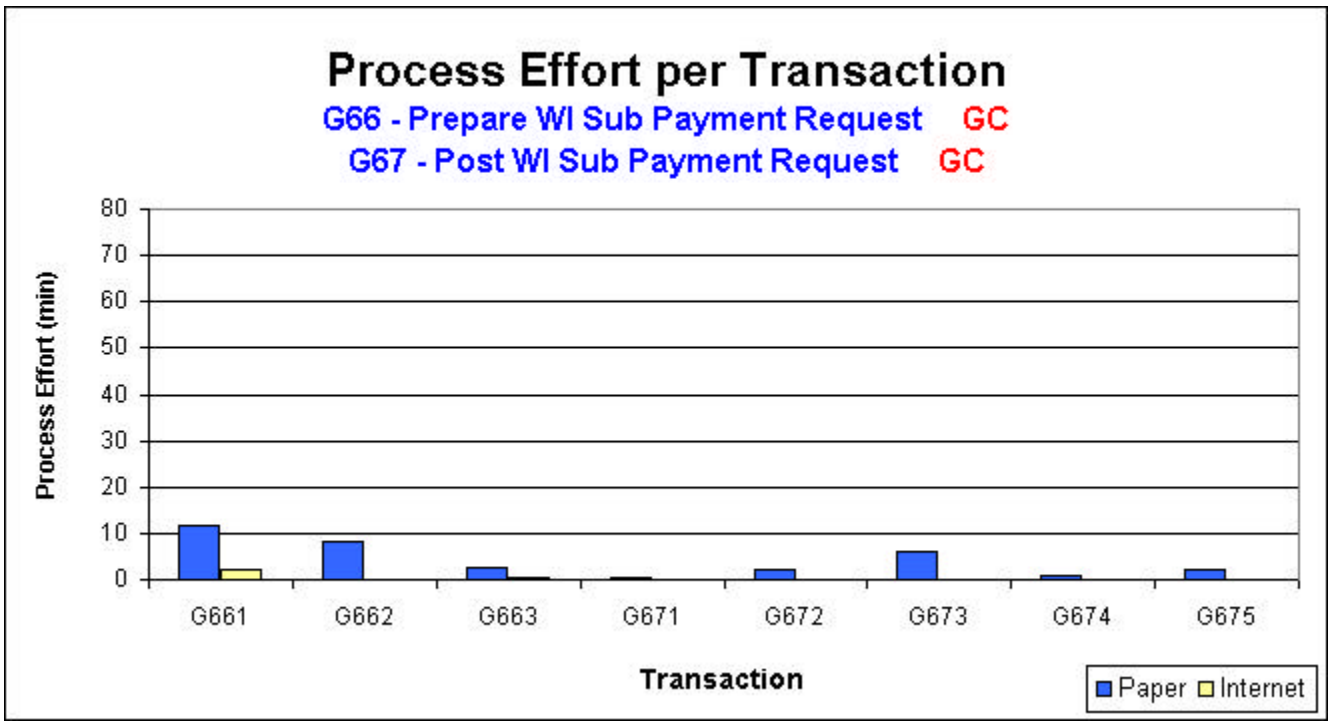


Figure C-2-r. *Comparison of processing effort per transaction to execute & post the WI Sub Billing with the paper-based system vs. an internet-based system.*

Transaction	Paper	% of Effort	Internet	% of Effort
G661 - Prepare Sub Payment Request	12	2.2%	2	2.6%
G662 - Update GC's Sub Accounting Log	8	1.5%	0	0.0%
G663 - Send Sub Payment Request to Accounting (for posting)	2	0.4%	1	0.6%
G671 - Receive Sub Payment Request (for posting)	0	0.1%	0	0.0%
G672 - Review Sub Payment Request	2	0.4%	0	0.0%
G673 - Post Sub Payment Request	6	1.1%	0	0.0%
G674 - Archive Sub Payment Request	1	0.2%	0	0.0%
G675 - Update GC's Sub Accounting Log (Posted)	2	0.4%	0	0.0%
TOTAL Processing Effort	34	6%	3	3%

Table C-2-z. *Distribution of processing effort per transaction for each type of system.*

Transaction	Paper (min)	Internet (min)	% Change
G661 - Prepare Sub Payment Request	12	2	-80%
G662 - Update GC's Sub Accounting Log	8	0	-100%
G663 - Send Sub Payment Request to Accounting (for posting)	2	1	-79%
G671 - Receive Sub Payment Request (for posting)	0	0	-100%
G672 - Review Sub Payment Request	2	0	-100%
G673 - Post Sub Payment Request	6	0	-100%
G674 - Archive Sub Payment Request	1	0	-100%
G675 - Update GC's Sub Accounting Log (Posted)	2	0	-100%
TOTAL Processing Effort	34	3	-92%

Table C-2-aa. *Percentage decrease in processing effort per transaction due to an internet-based system.*

C.1.3. Analysis Results per Organization

C.1.3.1. Total Number of Activities per Organization

How many activities did the project organizations perform to process billings with the paper-based system vs. with an internet-based system?

Paper-based process

- The Metal Stud & Drywall subcontractor (MSD) performed 1089 activities or 22% of the total activities.
- The Wood Installer subcontractor (WI) performed 649 activities or 13% of the total activities.
- The General Contractor (GC) performed 2504 activities or 49% of the total activities.
- The Construction Manager (CM) performed 530 activities or 10% of the total activities.
- The Owner (O) performed 234 activities or 5% of the total activities.
- The Field Architect (FA) performed 54 activities or 1% of the total activities.

Internet-based process

- The MSD would perform 1087 activities or 22% of the total activities.
- The WI would perform 647 activities or 13% of the total activities.
- The GC would perform 2452 activities or 49% of the total activities.
- The CM would perform 511 activities or 10% of the total activities.
- The O would perform 226 activities or 5% of the total activities.
- The FA would perform 45 activities or 1% of the total activities.

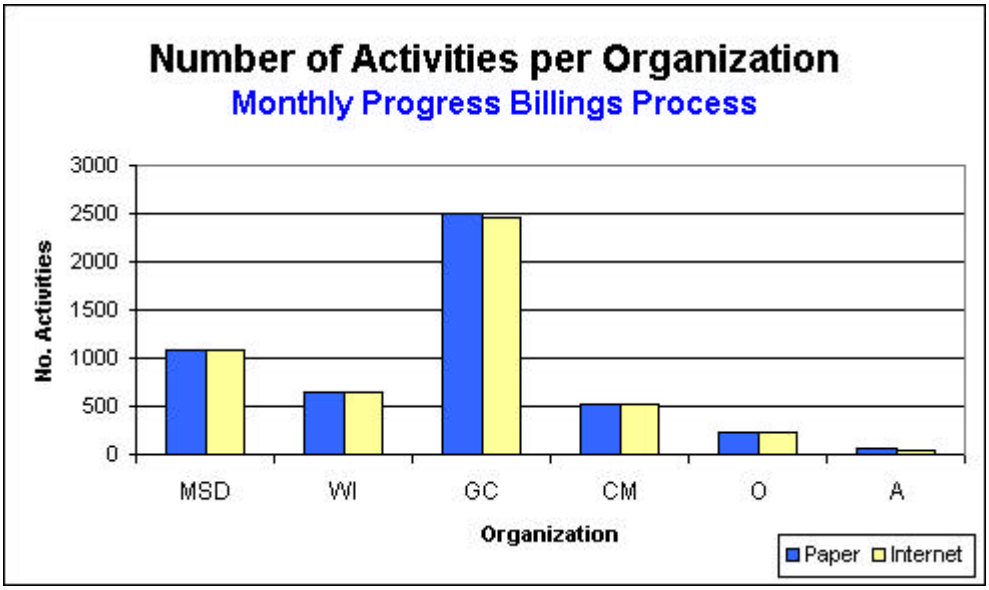


Figure C-3-a. *Comparison of number of activities per organization for the monthly billings process with the paper-based system vs. an internet-based system.*

Organization	Paper	% of Activities	Internet	% of Activities
MSD	1089	22%	1087	22%
WI	649	13%	647	13%
GC	2504	49%	2452	49%
CM	530	10%	511	10%
O	234	5%	226	5%
FA	54	1%	45	1%
TOTAL Number of activities	**5060**	**100%**	**4968**	**100%**

Table C-3-a. *Distribution of number of activities per organization for each type of system.*

C.1.3.2. Processing Effort per Organization

How much effort would the project organizations expend for the monthly billings process with the paper-based system vs. with an internet-based system?

What decrease in each organization's effort would an internet-based system imply?

Paper-based process

- The Metal Stud & Drywall subcontractor (MSD) took 98 minutes or 18% of the total processing effort.
- The Wood Installer subcontractor (WI) took 75 minutes or 14% of the total processing effort.
- The General Contractor (GC) took 233 minutes or 43% of the total processing effort.
- The Construction Manager (CM) took 47 minutes or 9% of the total processing effort.
- The Owner (O) took 17 minute or 3% of the total processing effort.
- The Field Architect (FA) took 71 minute or 13% of the total processing effort.

Internet-based process

- The MSD sub would take 9 minutes or 10% of the total processing effort. The difference is 91% less effort than the paper-based system. He could be over 10 times more productive (Figure C-3-b).
- The WI sub would take 9 minutes or 10% of the total processing effort. The difference is 89% less effort than the paper-based system. He could be almost 9 times more productive.
- The GC would take 33 minutes or 37% of the total processing effort. The difference is 86% less effort than the paper-based system. He could be over 7 times more productive.
- The CM would take 5 minutes or 6% of the total processing effort. The difference is 89% less effort than the paper-based system. He could be over 8 times more productive.
- The Owner would take 0 minutes or 0% of the total processing effort. The difference is 100% less effort than the paper-based system. His work would be automated.
- The FA would take 33 minutes or 38% of the total processing effort. The difference is 53% less effort than the paper-based system. He could be over 2 times more productive.

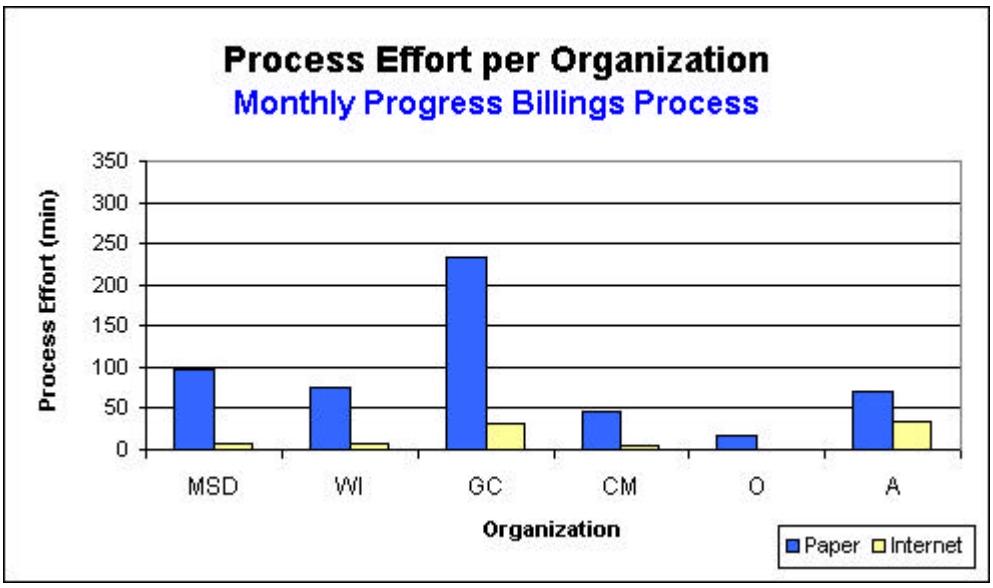


Figure C-3-b. *Comparison of processing effort per organization for the monthly billings process with the paper-based system vs. an internet-based system.*

Organization	Paper (min)	% of Time	Internet (min)	% of Time
MSD	98	18%	9	10%
WI	75	14%	9	10%
GC	233	43%	33	37%
CM	47	9%	5	6%
O	17	3%	0	0%
FA	71	13%	33	38%
TOTAL Processing Effort	**541**	**100%**	**89**	**100%**

Table C-3-b. *Distribution of processing effort per organization for each type of system.*

Organization	Paper (min)	Internet (min)	% Change
MSD	98	9	-91%
WI	75	9	-89%
GC	233	33	-86%
CM	47	5	-89%
O	17	0	-100%
FA	71	33	-53%
TOTAL Processing Effort	**541**	**89**	**-84%**

Table C-3-c. *Percentage decrease in processing effort per organization due to an internet-based system.*

C.1.4. Analysis Results per Activity Skill

C.1.4.1. Total Number of Activities per Activity Skill

How many activities are managerial (e.g., approve billing), technical (e.g., calculate total amount requested), or clerical (e.g., enter sub schedule of values item description) in the paper-based system and in the internet-based system?

How does the internet-based system affect each type of skill?

Paper-based process

- There are 48 managerial activities or 1% of the total activities.
- There are 1342 technical activities or 27% of the total activities.
- There are 3670 clerical activities or 72% of the total activities.

Internet-based process

- The number of managerial activities would remain the same.
- The number of technical activities would remain the same.
- The number of clerical activities would be decreased by 92 activities. This would be a reduction of 3% in the number of activities over the paper-based system (Figure C-4-a).

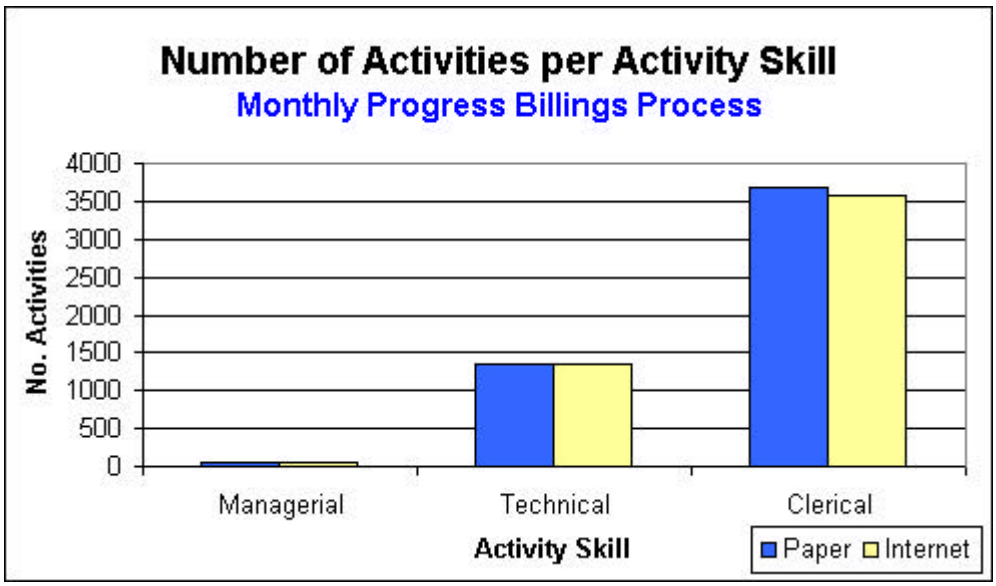


Figure C-4-a. *Comparison of activities per activity skill for the monthly billings process with the paper-based system vs. an internet-based system.*

Activity Skill	Paper	% of Activities	Internet	% of Activities
Managerial	48	1%	48	1%
Technical	1342	27%	1342	27%
Clerical	3670	72%	3578	72%
TOTAL Number of Activities	**5060**	**100%**	**4968**	**100%**

Table C-4-a. *Distribution of activities per activity skill for each type of system.*

Activity Skill	Paper	Internet	% Change
Managerial	48	48	0%
Technical	1342	1342	0%
Clerical	3670	3578	-3%
TOTAL Number of Activities	5060	4968	-2%

Table C-4- b. *Percentage decrease in activities due to an internet-based system.*

C.1.4.2. Processing Effort per Activity Skill

How much effort does each type of skill (managerial, technical, or clerical) take for the monthly billings process with the paper-based system vs. with an internet-based system?

How does the distribution of effort vary due to the internet-based system? (Ideally - the majority of the effort should be spent on managerial activities).

Paper-based process

- The managerial activities took 195 minutes or 36% of the total processing effort.
- The technical activities took 67 minutes or 12% of the total processing effort.
- The clerical activities took 279 minutes or 52% of the total processing effort.

Internet-based process

- The managerial activities would take 79 minutes. The difference is 59% less effort than with the paper-based system. This results because the detailed schedule of values integrated with the data collected from time cards minimizes the need to negotiate the "% complete" of each monthly billing. This would now be 89% of the total processing effort! This would be a much better use of talent and skill.
- The technical activities would take 0 minutes or 0% of the total processing effort. This is a reduction of 100% in effort meaning they would all be automated.
- The clerical activities would take only 10 minutes or 11% of the total processing effort. This would be a reduction of 97% in effort (Figure C-4-b)! This is very close to the ideal scenario where 100% of the clerical activities would be automated or eliminated.

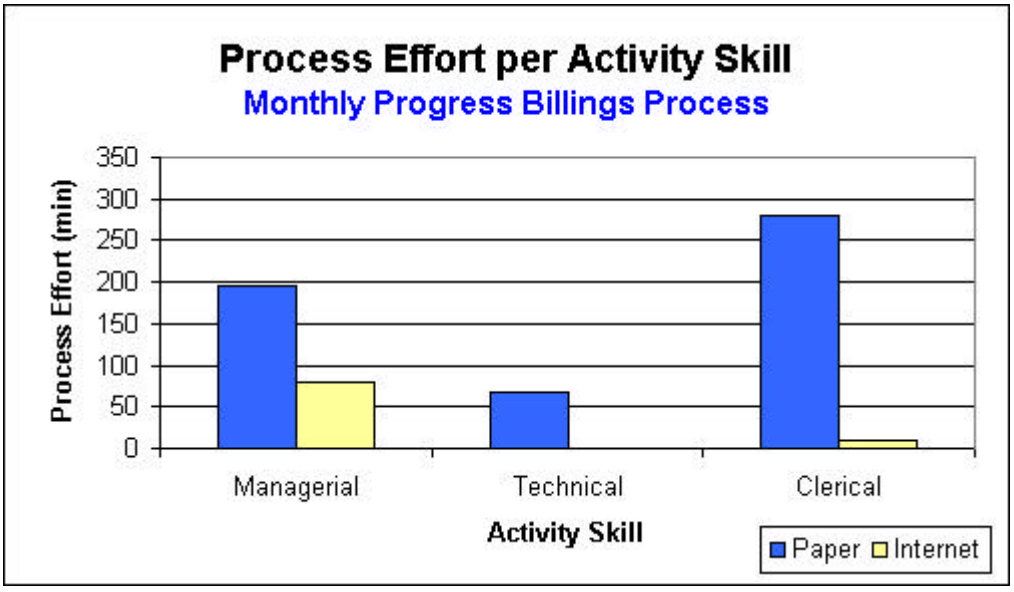


Figure C-4-b. *Comparison of processing effort per activity skill for the paper-based system vs. an internet-based system in the monthly billings process.*

Activity Skill	Paper (min)	% of Effort	Internet (min)	% of Effort
Managerial	195	36%	79	89%
Technical	67	12%	0	0%
Clerical	279	52%	10	11%
TOTAL Processing Effort	**541**	**100%**	**89**	**100%**

Table C-4-c. *Distribution of processing effort per activity skill for each type of system.*

Activity Skill	Paper (min)	Internet (min)	% Change
Managerial	195	79	-59%
Technical	67	0	-100%
Clerical	279	10	-97%
TOTAL Processing Effort	**541**	**89**	**-84%**

Table C-4-d. *Percentage decrease in processing effort per activity skill due to an internet-based system.*

C.1.5. Analysis Results per Effect of Integration on Activity

C.1.5.1. Total Number of Activities per Effect on Activity

An internet-based system would affect the activities in the paper-based system in terms of processing effort. How many of these activities would remain the same? How many would be reduced? How many would be automated? How many would be eliminated?

From the paper-based process to the internet-based process

- There are 33 activities or 1% of the total activities that would remain the same in terms of processing effort (Figure C-5-a).
- There are 25 activities or 0.5% of the total activities that would be reduced.
- There are 4910 activities or 97% of the total activities that would be automated.
- There are 92 activities or 2% of the total activities that would be eliminated.

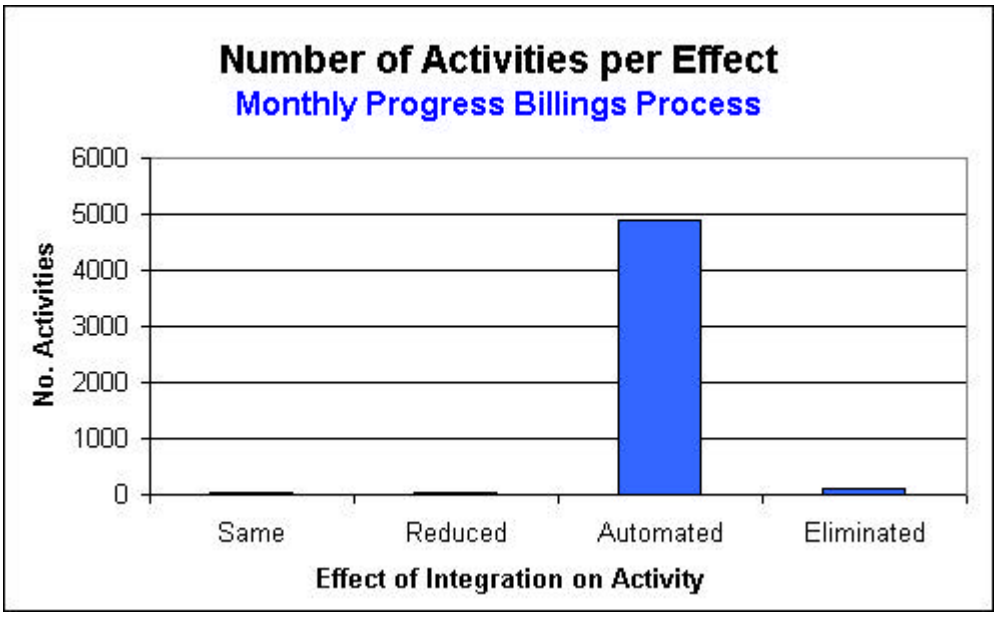


Figure C-5-a. *Distribution of activities per effect on activity for the monthly billings process going from the paper-based system to the internet-based system.*

Effect	Paper	% of Activities	Internet
Same	33	1%	33
Reduced	25	0.5%	25
Automated	4910	97%	4910
Eliminated	92	2%	-
TOTAL Number of Activities	**5060**	**100%**	**4968**

Table C-5-a. *Distribution of activities per effect on activities.*

C.1.5.2. Processing Effort per Effect on Activity

An internet-based system would affect the activities in the paper-based system in terms of processing effort. How much effort would remain the same? How much effort would be reduced? How much effort would be automated? How much effort would be eliminated?

From the paper-based process to the internet-based process

- The effort for activities that stay the same would be 36 minutes or 7% of the total paper-based processing effort.
- The effort for activities that are reduced would drop from 172 minutes to 52 minutes or 32% of the total paper-based processing effort.
- The effort for activities that are automated would be 318 minutes or 59% of the total paper-based effort (Figure C-5-b).
- The effort for activities that are eliminated would be 15 minutes or 3% of the processing effort.
- Altogether, 333 minutes or 62% of the total processing effort would be automated or eliminated.

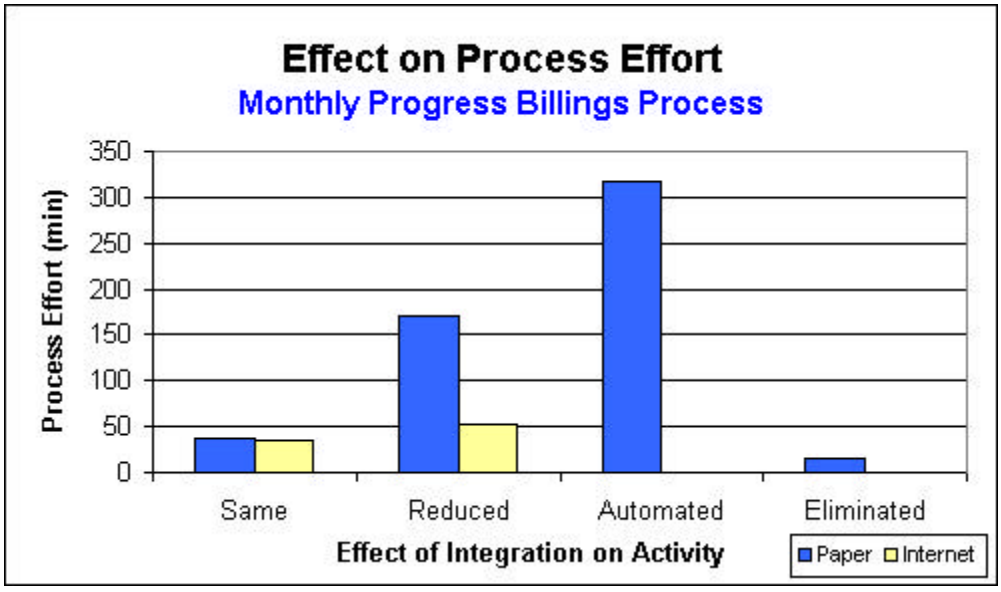


Figure C-5-b. *Distribution of processing effort per effect on activity for the monthly billings process going from the paper-based system to an internet-based system.*

Effect	Paper (min)	% of Effort	Internet (min)	% of Effort
Same	36	7%	36	41%
Reduced	172	32%	52	59%
Automated	318	59%	0	0%
Eliminated	15	3%	0	0%
TOTAL Processing Effort	**541**	**100%**	**89**	**100%**

Table C-5-b. *Distribution of processing effort per effect on activities.*

C.1.6. Analysis Results per Activity Classification

C.1.6.1. Total Number of Activities per Activity Classification

How many activities were or would be used to prepare documents (e.g., create schedule of values), to process documents (e.g., send billing), to authorize documents (e.g., certify payment application), to locate documents (e.g., archive billing), to update logs (e.g., enter amount billed), or to update the accounting database (e.g., enter cost code description) in the paper-based system and in an internet-based system?

How does an internet-based system affect each type of activity?

Paper-based process

- There are 3133 activities used to prepare documents or 62% of the total activities.
- There are 135 activities used to process documents or 3% of the total activities.
- There are 39 activities used to authorize documents or 1% of the total activities.
- There are 100 activities used to locate documents or 2% of the total activities.
- There are 391 activities used to update the accounting database or 8% of the total activities.
- There are 1262 activities used to update logs or 25% of the total activities.

Internet-based process

- The number of activities to prepare documents would decrease to 3128. The percentage would rise to 63%.
- The number of activities to process documents would decrease to 127 activities, yet the percentage would decrease to 3%.
- The number of activities to authorize documents would remain the same. The percentage would stay at 1%.
- The number of activities to locate documents would decrease to 21 or 0.4% of the total activities. (Figure C-6-a).
- The number of activities to update the accounting database would remain at 391, yet the percentage would increase to 8%.
- The number of activities to update the logs would remain at 1262, and the percentage would rise to 25%.

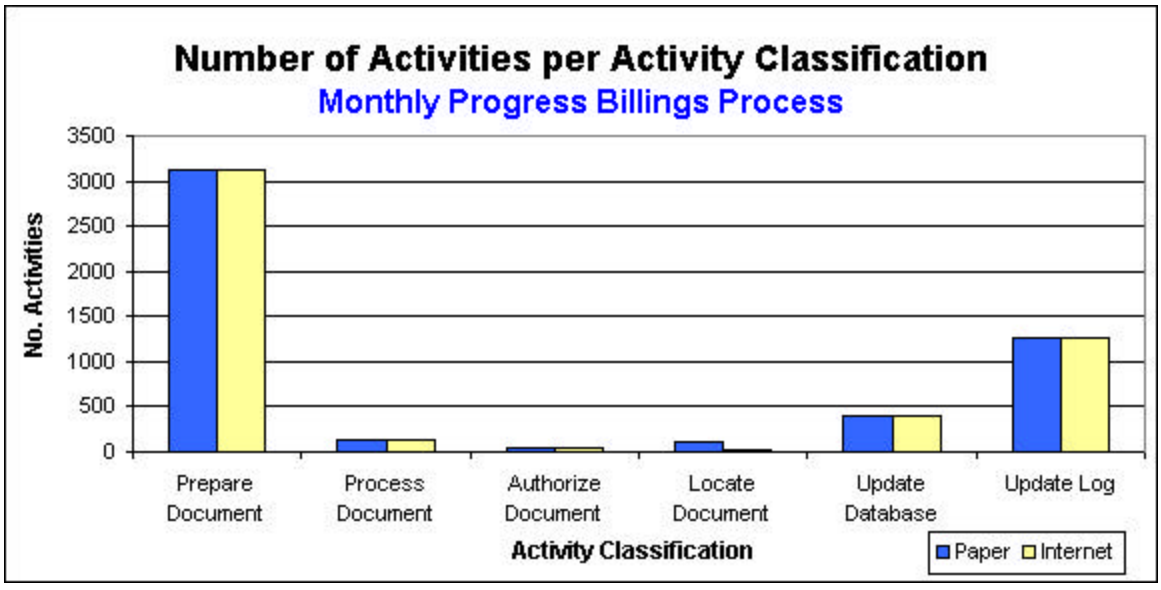


Figure C-6-a. *Comparison of activities per activity classification for the monthly billings process with the paper-based system vs. an internet-based system.*

Activity Classification	Paper	% of Activities	Internet	% of Activities
Prepare Document	3133	62%	3128	63%
Process Document	135	3%	127	3%
Authorize Document	39	1%	39	1%
Locate Document	100	2%	21	0.4%
Update Database	391	8%	391	8%
Update Log	1262	25%	1262	25%
TOTAL Number of Activities	**5060**	**100%**	**4968**	**100%**

Table C-6-a. *Distribution of activities per activity classification for each type of system.*

C.1.6.2. Processing Effort per Activity Classification

How much processing effort was or would be required to prepare documents (e.g., create billing), to process documents (e.g., send billing), to authorize documents (e.g., review billing), to locate documents (e.g., archive billing), to update logs (e.g., enter amount billed), or to update the accounting database (e.g., enter line item description) in the paper-based system and in an internet-based system?

How does the distribution of effort vary due to the internet-based system? (Ideally – the majority of the time should be on preparing documents). Where has the internet-based system the most impact?

Paper-based process

- The effort to prepare documents was 207 minutes or 38% of the total processing effort.
- The effort to process documents was 39 minutes or 7% of the total processing effort.
- The effort to authorize documents was 181 minutes or 34% of the total processing effort.
- The effort to locate documents was 10 minutes of or 2% of the total processing effort.
- The effort to update the accounting database was 27 minutes or 5% of the total processing effort.
- The effort to update the logs was 76 minutes of 14% of the total processing effort.

Internet-based process

- The effort to prepare documents would decrease by 96% to 9 minutes or 10% of the total processing effort.
- The effort to process documents would decrease to 76% to 9 minutes or 10% of the total processing effort.
- The effort to authorize documents would decrease by 61% to 71 minute or 80% of the total processing effort.
- The effort to locate documents would go to 0. All this effort would be eliminated.
- The effort to update the accounting database would go to 0. All this effort would be automated (Figure C-6-b).
- The effort to update logs would go to 0. All this effort would be automated.

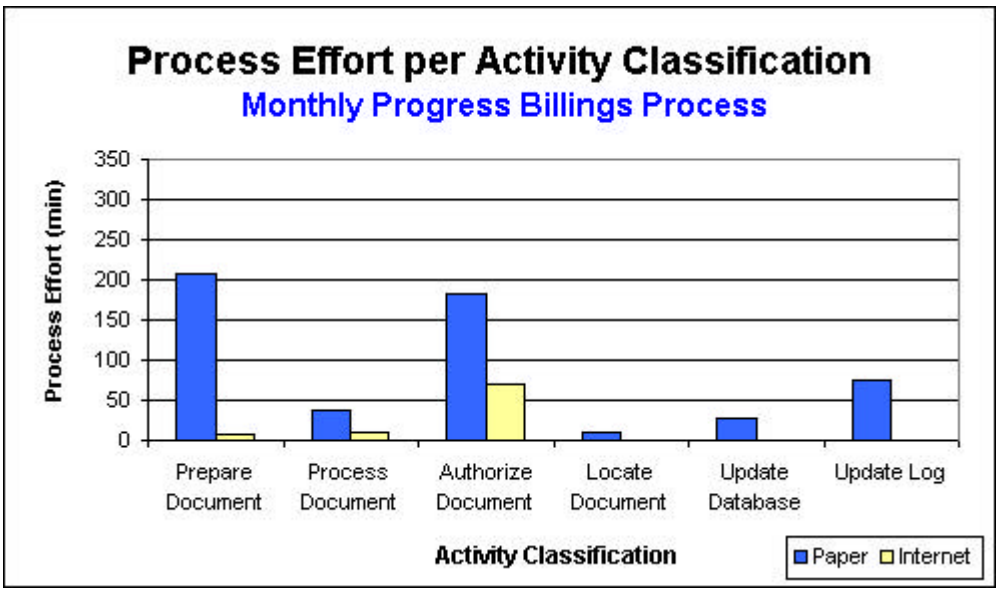


Figure C-6-b. *Comparison of processing effort per activity classification for the monthly billings process with the paper-based system vs. an internet-based system.*

Activity Classification	Paper (min)	% of Effort	Internet (min)	% of Effort
Prepare Document	207	38%	9	10%
Process Document	39	7%	9	10%
Authorize Document	181	34%	71	80%
Locate Document	10	2%	0	0%
Update Database	27	5%	0	0%
Update Logs	76	14%	0	0%
TOTAL Processing Effort	**541**	**100%**	**89**	**100%**

Table C-6-b. *Distribution of processing effort per activity classification for each type of system.*

Activity Classification	Paper (min)	Internet (min)	% Change
Prepare Document	207	9	-96%
Process Document	39	9	-76%
Authorize Document	181	71	-61%
Locate Document	10	0	-100%
Update Database	27	0	-100%
Update Logs	76	0	-100%
TOTAL Processing Effort	**541**	**89**	**-84%**

Table C-6-c. *Percentage decrease in processing effort per activity classification due to an internet-based system.*

C.1.7. Analysis Results per Activity Level

C.1.7.1. Total Number of Activities per Activity Level

How many activities were at the document level vs. the information element level in the paper-based system and in an internet-based system?

Paper-based process

- There were 249 activities at the document level or 5% of the total activities.
- There were 4811 activities at the information element level or 95% of the total activities (Figure C-7-a).

Internet-based process

- The number of activities at the document level would decrease by 36% to 159 activities or 3% of the total activities.
- The number of activities at the information element level would decrease by 0.04% to 4809 activities or 97% of the total activities.

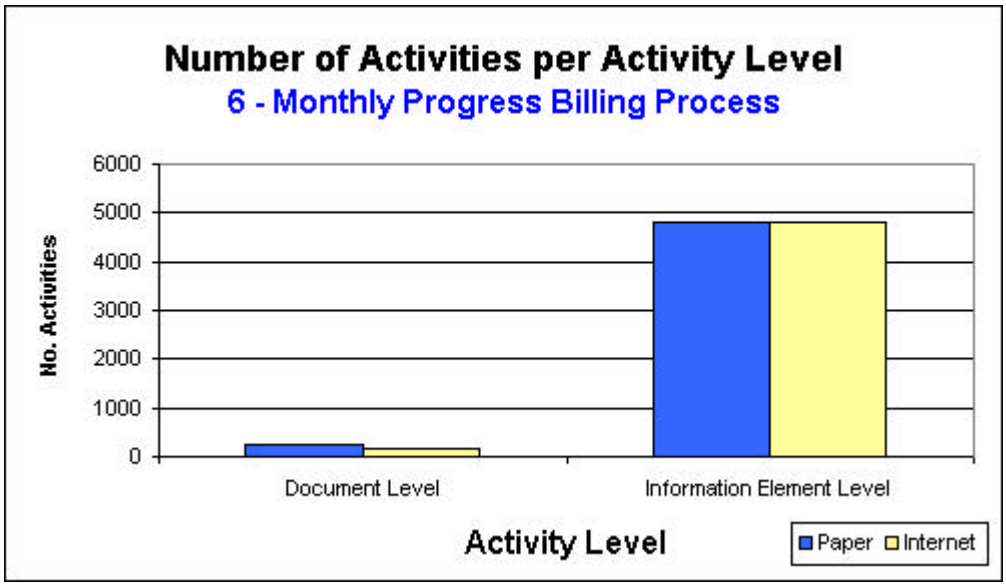


Figure C-7-a. *Comparison of activities per activity level for the monthly billings process with the paper-based system vs. an internet-based system.*

Activity Level	Paper	% of Activities	Internet	% of Activities
Document Level	249	5%	159	3%
Information Element Level	4811	95%	4809	97%
TOTAL Number of Activities	**5060**	**100%**	**4968**	**100%**

Table C-7-a. *Distribution of activities per activity level for each type of system.*

Activity Level	Paper	Internet	% Change
Document Level	249	159	-36%
Information Element Level	4811	4809	-0.04%
TOTAL Number of Activities	**5060**	**4968**	**-2%**

Table C-7-b. *Percentage decrease in activities per activity level due to an internet-based system.*

C.1.7.2. Total Processing effort per Activity Level

How much processing effort is used at the document level vs. the information element level in the paper-based system and in an internet-based system?

Paper-based process

- The processing effort was 241 minutes or 4.1 hours at the document level or 45% of the total processing effort.
- The processing effort was 300 minutes or 5.0 hours at the information element level or 55% of the total processing effort.

Internet-based process

- The processing effort at the document level would decrease by 66% to 84 minutes or 1.5 hours or 95% of the total processing effort (Figure C-7-b).
- The processing effort at the information element level would decrease by 98% to 5 minutes or 5% of the total processing effort.

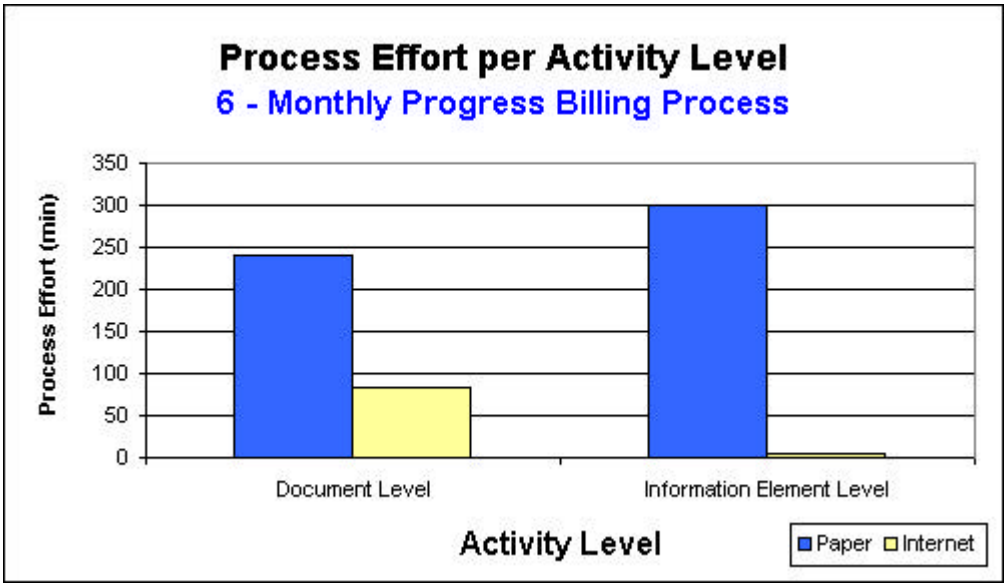


Figure C-7-b. *Comparison of processing effort per activity level for the monthly billings process with the paper-based system vs. an internet-based system.*

Activity Level	Paper (min)	% of Activities	Internet (min)	% of Activities
Document Level	241	45%	84	95%
Information Element Level	300	55%	5	5%
TOTAL Processing Effort	541	100%	89	100%

Table C-7-c. *Distribution of processing effort per activity level for each type of system.*

Activity Level	Paper (min)	Internet (min)	% Change
Document Level	241	84	-66%
Information Element Level	300	5	-98%
TOTAL Processing Effort	541	89	-84%

Table C-7-d. *Percentage decrease in processing effort decreased per activity level due to internet-based system.*

C.1.8. Analysis Results per Source of Information Elements

C.1.8.1. Number of Activities per Source of Information Elements

How many activities at the information element level in the paper-based system require new information entry (DATA!) vs. activities whose information can be automatically generated (AUTO!), calculated (CALC!), or obtained from another process and in an internet-based system?

If the information can be obtained from another process, what is its source?

Paper-based process

- Of the 4811 activities at the information element level:
  - 10 activities or 0.2% required new information entry.
  - 162 activities or 3% used information an internet-based system could generate automatically (e.g., enter document date).
  - 1386 activities or 29% used information an internet-based system could calculate automatically (e.g., calculate total $Amount Billed).
  - 360 activities or 7% used information an internet-based system could obtain automatically from function categories S1, G1, O1 and A1 "Setup Project" (e.g., enter project name).
  - 650 activities or 14% used information an internet-based system could obtain automatically from function categories S2 and G2 "Scope Management" (e.g., enter cost code description).
  - 6 activities or 0.1% used information an internet-based system could obtain automatically from function categories S5 and G5 "Manage Billings" (e.g., enter Billing Item No).
  - 2065 activities or 43% used information an internet-based system could obtain automatically from within the function categories S6, G6, O6 and A6 "Manage Billings" (e.g., enter Payment Application No).
  - 172 activities or 4% used information an internet-based system could obtain automatically from function categories S8 and G8 "Manage Reports" (e.g., find Material Vendor ID).

Internet-based process

- Of the 4809 activities at the information element level:
  - The number of activities whose source would be S6, G6, O6 or A6 would decrease by 2 activities to 2063 activities or 43% of the activities at the information level (Figure C-8-a).
  - All other activities remain the same as in the paper-based system.

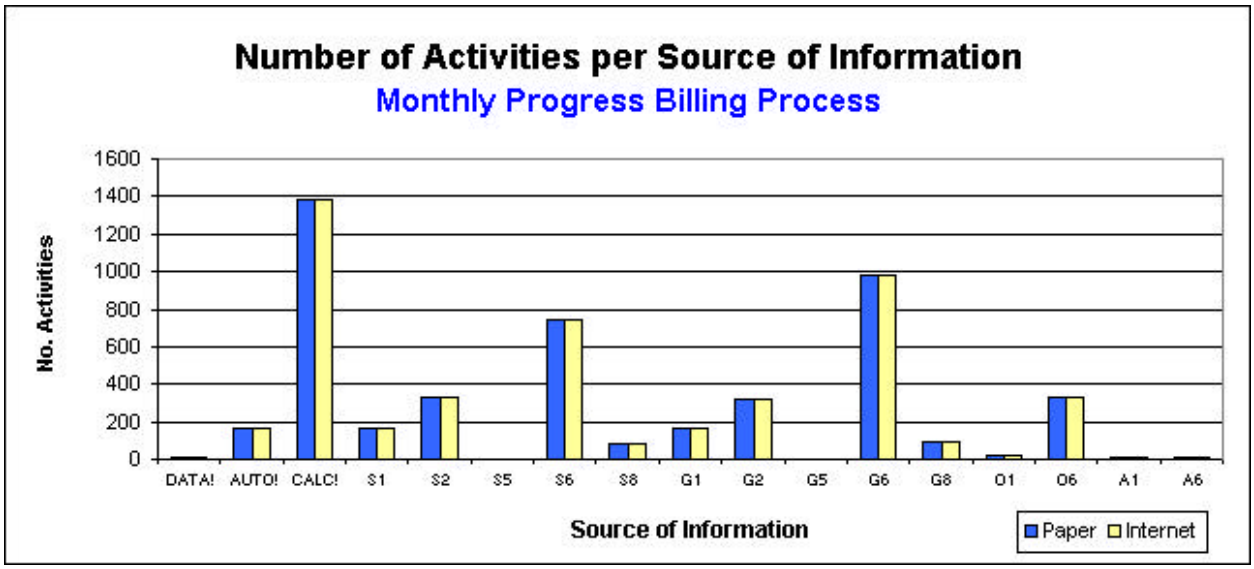


Figure C-8-a. *Comparison of activities per source of information for the monthly billings process for activities at the information element level in the paper-based system vs. an internet-based system.*

Source of Information	Paper	% of Activities	Internet	% of Activities
DATA!	10	0.2%	10	0%
AUTO!	162	3%	162	3%
CALC!	1386	29%	1386	29%
S1	166	3%	166	3%
S2	326	7%	326	7%
S5	4	0.1%	4	0%
S6	744	15%	742	15%
S8	80	2%	80	2%
G1	163	3%	163	3%
G2	324	7%	324	7%
G5	2	0.0%	2	0%
G6	985	20%	985	20%
G8	92	2%	92	2%
O1	17	0%	17	0%
O6	330	7%	330	7%
A1	14	0%	14	0%
A6	6	0%	6	0%
TOTAL Number of Activities	**4811**	**100%**	**4809**	**100%**

Table C-8-a. *Distribution of activities per source of information for each type of system.*

Source of Information	Paper	Internet	% Change
DATA!	10	10	0%
AUTO!	162	162	0%
CALC!	1386	1386	0%
S1	166	166	0%
S2	326	326	0%
S5	4	4	0%
S6	744	742	0%
S8	80	80	0%
G1	163	163	0%
G2	324	324	0%
G5	2	2	0%
G6	985	985	0%
G8	92	92	0%
O1	17	17	0%
O6	330	330	0%
A1	14	14	0%
A6	6	6	0%
TOTAL Number of Activities	**4811**	**4809**	**0%**

Table C-8-b. *Percentage decrease in activities per source of information due to an internet-based system.*

C.1.8.2. Processing Effort per Source of Information Elements

How much processing effort was used at the information element level in the paper-based system to enter new information (DATA!) and in the internet-based system?

How much processing effort is used for activities whose information could be automatically generated (AUTO!), calculated (CALC!), or obtained from another process (i.e., S1, S5, G5, etc.)?

Paper-based process

- The processing effort was 300 minutes for activities at the information element level. Of this amount:
  - 5 minutes or 2% was for activities that required new information entry.
  - 14 minutes or 5% was for activities that could automatically generate the information (e.g., enter document date).
  - 68 minutes or 23% was for activities that calculate information (e.g., calculate total RT labor hours).
  - 3 minutes or 1% was for activities whose information comes from function categories S1, G1, O1 and A1 "Setup Project" (e.g., project name).
  - 23 minutes or 8% was for activities whose information comes from function categories S2 and G2 "Scope Management" (e.g., cost codes).
  - 1 minute or 0% was for activities whose information comes from function categories S5 and G5 "Manage Billings" (e.g., enter Billing No.).
  - 154 minutes or 51% was for activities whose information comes from within the function categories S6, G6, O6 and A6 "Manage Billings" (e.g., Enter $Amount Billed).
  - 33 minutes or 11% was for activities whose information comes from within the function categories S8 and G8 "Manage Reports" (e.g., get Cost Code ID).

Internet-based process

- The processing effort would be 5 minutes for activities at the information element level. Of this amount:
  - 5 minutes or 100% would be for activities that require new information entry. This is the ideal scenario where time is spent only on value-added activities that require new information.
- All other activities would be automated or eliminated, thus their time would be reduced to 0 (Figure C-8-b).

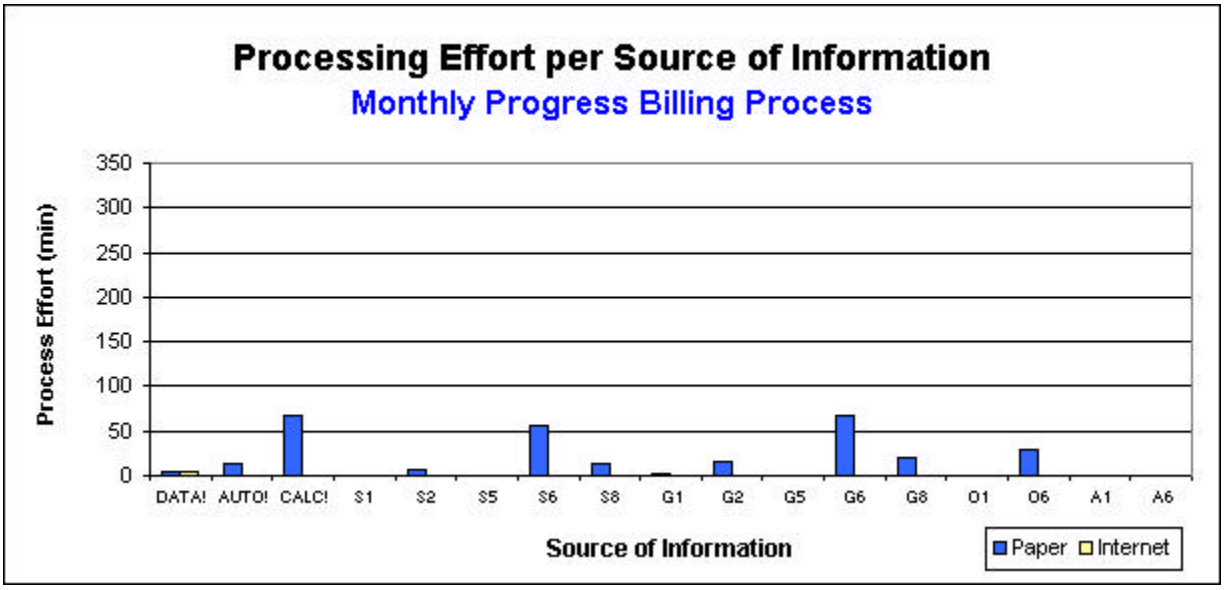


Figure C-8-b. *Comparison of processing effort per source of information for activities at the information element level for the monthly billings process with the paper-based system vs. an internet-based system.*

Source of Information	Paper (min)	% of Effort	Internet (min)	% of Effort
DATA!	5	2%	5	100%
AUTO!	14	5%	0	0%
CALC!	68	23%	0	0%
S1	0	0%	0	0%
S2	7	2%	0	0%
S5	1	0%	0	0%
S6	56	19%	0	0%
S8	13	4%	0	0%
G1	1	0%	0	0%
G2	16	5%	0	0%
G5	0	0%	0	0%
G6	67	22%	0	0%
G8	20	7%	0	0%
O1	0	0%	0	0%
O6	30	10%	0	0%
A1	1	0%	0	0%
A6	1	0%	0	0%
TOTAL Processing Effort	**300**	**100%**	**5**	**100%**

Table C-8-c. *Distribution of processing effort per source of information for each type of system.*

Source of Information	Paper (min)	Internet (min)	% Change
DATA!	5	5	0%
AUTO!	14	0	-100%
CALC!	68	0	-100%
S1	0	0	-100%
S2	7	0	-100%
S5	1	0	-100%
S6	56	0	-100%
S8	13	0	-100%
G1	1	0	-100%
G2	16	0	-100%
G5	0	0	-100%
G6	67	0	-100%
G8	20	0	-100%
O1	0	0	-100%
O6	30	0	-100%
A1	1	0	-100%
A6	1	0	-100%
TOTAL Processing Effort	**300**	**5**	**-98%**

Table C-8-d. *Percentage decrease in processing effort per source of information due to an internet-based system.*

The ideal scenario would be that 100% of the activities either require new information or that the system would prompt the user to select from a list of values so that information would not be re-entered, but only selected. The billings process appears to be ideal for automation since all the necessary information could be obtained from previous processes.

C.1.9. Analysis Results per Data Type of Information Elements

C.1.9.1. Number of Activities per Data Type of Information Elements

How many information elements were of each data type - $ Amount, Date, Hyperlink, ID, Number, Signature, Text, or Time in the paper-based system and in the internet-based system?

Paper-based process

- Of the 4811 information elements:
  - 2473 or 51% were "$ Amounts".
  - 222 or 5% were "Dates".
  - 74 or 2% were alphanumeric "IDs".
  - 855 or 18% were "Numbers".
  - 8 or 0.2% were "Signatures".
  - 538 or 11% were "Text" elements.
  - 7 or 0.1% were "Time" elements.
  - 634 or 13% were "Percent" elements.

Internet-based process

- Of the 4809 information elements:
  - The number of "Dates" would decrease by 2 to 220 "Dates" or 5% of the information elements.
  - All other data types would remain the same as in the paper-based system (Figure C-9-a).

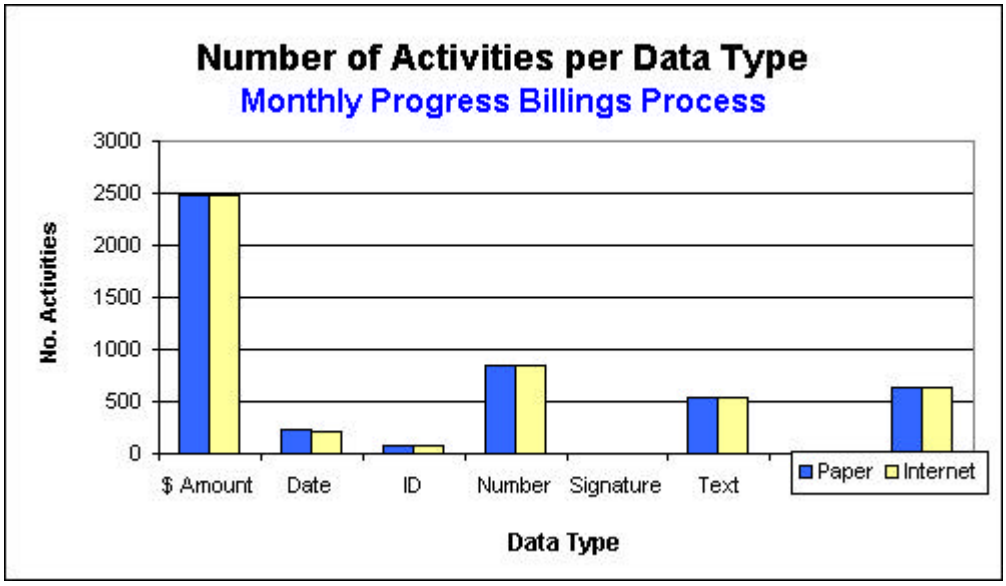


Figure C-9-a. *Comparison of activities per data type for activities at the information element level for the monthly billings process with the paper-based system vs. an internet-based system.*

Data Type	Paper	% of Activities	Internet	% of Activities
$ Amount	2473	51%	2473	51%
Date	222	5%	220	5%
ID (alphanumeric)	74	2%	74	2%
Number	855	18%	855	18%
Signature (encrypted text)	8	0.2%	8	0%
Text	538	11%	538	11%
Time	7	0.1%	7	0%
% (Percent)	634	13%	634	13%
TOTAL Number of Activities	4811	100%	4809	100%

Table C-9-a. *Distribution of activities per data type for each type of system.*

Data Type	Paper	Internet	% Change
$ Amount	2473	2473	0%
Date	222	220	-1%
ID (alphanumeric)	74	74	0%
Number	855	855	0%
Signature (encrypted text)	8	8	0%
Text	538	538	0%
Time	7	7	0%
% (Percent)	634	634	0%
TOTAL Number of Activities	4811	4809	-0%

Table C-9-b. *Percentage decrease in activities per data type due to an internet-based system.*

C.1.9.2. Processing Effort per Data Type of Information Elements

How much processing effort was used per data type in the paper-based system and in an internet-based system?

What data types are most or least affected by the internet-based process in terms of processing effort?

Please note: The results given here are in terms of the processing effort for information elements only. It is not the total processing effort which includes activities at the document level also.

Paper-based process

- The processing effort for "$ Amounts" was 167 minutes or 56% of the processing effort.
- The processing effort for "Dates" was 17 minutes or 6% of the processing effort.
- The processing effort for "IDs" was 10 minutes or 3% of the processing effort.
- The processing effort for "Numbers" was 52 minutes or 17% of the processing effort.
- The processing effort for "Signatures" was 1 minute or 0.4% of the processing effort.
- The processing effort for "Text" elements was 23 minutes or 8% of the processing effort.
- The processing effort for "Time" elements was 1 minute or 0.2% of the processing effort.
- The processing effort for "Percent" elements was 30 minutes or 10% of the processing effort.

Internet-based process

- The processing effort for "$ Amounts" would decrease by 100% to 0.2 minutes or 4% of the processing effort (Figure C-9-b).
- The processing effort for "Signatures" would remain the same but it would now be 23% of the processing effort.
- The processing effort for "Text" elements would decrease by 84% to 3 minutes or 74% of the processing effort.
- The processing effort for all other elements would be completely automated or eliminated.

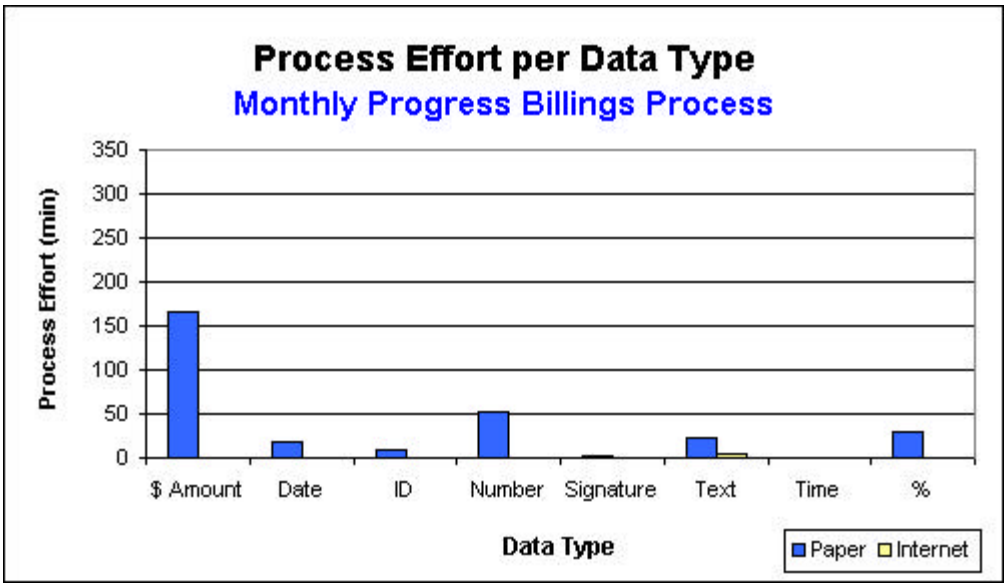


Figure C-9-b. *Comparison of processing effort per data type for activities at the information element level for the monthly billings process with the paper-based system vs. an internet-based system.*

Data Type	Paper (min)	% of Effort	Internet (min)	% of Effort
$ Amount	167	56%	0.2	4%
Date	17	6%	0.0	0.0%
ID (alphanumeric)	10	3%	0.0	0%
Number	52	17%	0.0	0%
Signature (encrypted text)	1	0.4%	1.1	23%
Text	23	8%	3.5	74%
Time	1	0.2%	0.0	0%
% (Percent)	30	10%	0.0	0%
TOTAL Processing Effort	300	100%	5	100%

Table C-9-c. *Distribution of processing effort per data type for each type of system.*

Data Type	Paper (min)	Internet (min)	% Change
$ Amount	167	0.2	-100%
Date	17	0.0	-100%
ID (alphanumeric)	10	0.0	-100%
Number	52	0.0	-100%
Signature (encrypted text)	1	1.1	-7%
Text	23	3.5	-84%
Time	1	0.0	-100%
% (Percent)	30	0.0	-100%
TOTAL Processing Effort	300	5	-98%

Table C-9-d. *Percentage decrease in processing effort per data type due to an internet-based system.*

C.2. Results of Monthly Billings Process Analysis - Multi-Parameter

We now compare two parameters at a time from four different parameters to analyze the impact of an internet-based system: organization, activity skill, effect on activity, and activity classification. This is useful to understand the relationships between these different parameters modeled and how they would be affected by an internet-based system.

C.2.1. Distribution per Organization

The following sections discuss the distribution of activities and processing effort per organization in terms of the three other parameters: activity skill, effect on activity, and activity classification.

C.2.1.1. Distribution by Activity Skill per Organization

C.2.1.1.1. Distribution of Number of Activities by Activity Skill per Organization

How does the number of activities by type of skill (managerial, technical, or clerical) vary for each organization in the monthly billings process with the paper-based system vs. an internet-based system?

When the total number of activities is distributed by activity skill for each organization, we observe the following:

Paper-based process

- The distribution of activities for the MSD sub is as follows: 1% managerial, 41% technical, and 58% clerical activities (Figure C-10-a).
- The distribution of activities for the WI sub is as follows: 1% managerial, 36% technical, and 63% clerical activities.
- The distribution of activities for the GC is as follows: 1% managerial, 24% technical, and 75% clerical activities.
- The distribution of activities for the CM is as follows: 1% managerial, 13% technical, and 86% clerical activities.
- The distribution of activities for the O is as follows: 0% managerial, 0% technical, and 100% clerical activities.
- The distribution of activities for the FA is as follows: 19% managerial, 0% technical, and 81% clerical activities.

Internet-based process

- The distribution of activities for the MSD sub would now be as follows: 1% managerial, 41% technical, and 58% clerical activities (Figure C-10-a).
- The distribution of activities for the WI sub would now be as follows: 1% managerial, 36% technical, and 63% clerical activities.
- The distribution of activities for the GC would now be as follows: 1% managerial, 24% technical, and 75% clerical activities.
- The distribution of activities for the CM would now be as follows: 1% managerial, 13% technical, and 86% clerical activities.
- The distribution of activities for the O would now be as follows: 0% managerial, 0% technical, and 100% clerical activities.
- The distribution of activities for the FA would now be as follows: 22% managerial, 0% technical, and 78% clerical activities.

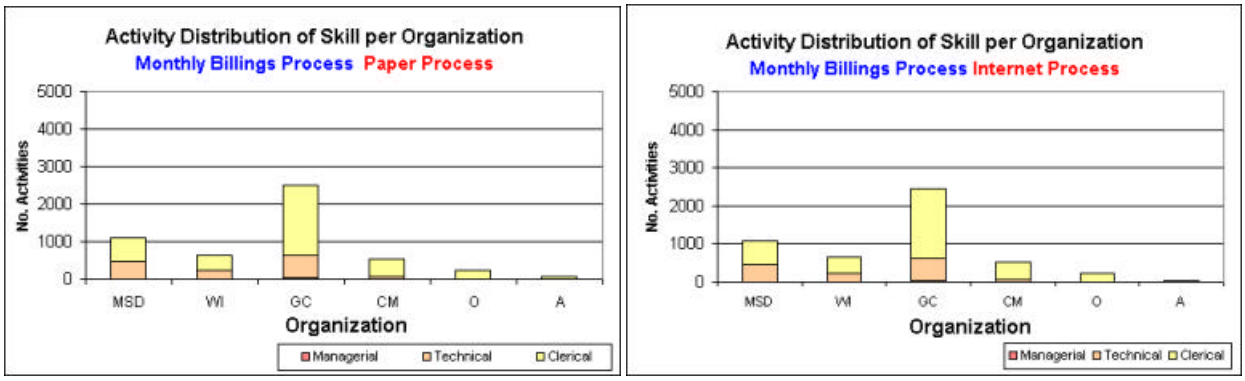


Figure C-10-a, b. *Distribution of activities by activity skill per organization for the monthly billings process with the paper-based system vs. an internet-based system.*

WI	Activity Skill - Number of Activities							
	Paper				Internet			
Organization	Managerial	Technical	Clerical	TOTAL	Managerial	Technical	Clerical	TOTAL
MSD	5	447	637	**1089**	5	447	635	**1087**
WI	5	232	412	**649**	5	232	410	**647**
GC	23	594	1887	**2504**	23	594	1835	**2452**
CM	5	69	456	**530**	5	69	437	**511**
O	0	0	234	**234**	0	0	226	**226**
FA	10	0	44	**54**	10	0	35	**45**
TOTAL	**48**	**1342**	**3670**	**5060**	**48**	**1342**	**3578**	**4968**

Table C-10-a. *Number of activities by activity skill per organization for each type of system.*

WI	Activity Skill - Number of Activities (%)							
	Paper				Internet			
Organization	Managerial	Technical	Clerical	TOTAL	Managerial	Technical	Clerical	TOTAL
MSD	1%	41%	58%	**100%**	0%	41%	58%	**100%**
WI	1%	36%	63%	**100%**	1%	36%	63%	**100%**
GC	1%	24%	75%	**100%**	1%	24%	75%	**100%**
CM	1%	13%	86%	**100%**	1%	13%	86%	**100%**
O	0%	0%	100%	**100%**	0%	0%	100%	**100%**
FA	19%	0%	81%	**100%**	22%	0%	78%	**100%**

Table C-10-b. *Distribution of activities by activity skill per organization for each type of system.*

C.2.1.1.2. Distribution of Processing Effort by Activity Skill per Organization

How does the processing effort by type of skill (managerial, technical, or clerical) vary for each organization for the monthly billings process with the paper-based system vs. an internet-based system?

When the processing effort is distributed by activity skill for each organization, we observe the following:

Paper-based process

- The distribution of processing effort for the MSD sub is as follows: 33% managerial, 28% technical, and 39% clerical.
- The distribution of processing effort for the WI sub is as follows: 44% managerial, 17% technical, 39% clerical.
- The distribution of processing effort for the GC is as follows: 27% managerial, 11% technical, and 62% clerical.
- The distribution of processing effort for the CM is as follows: 7% managerial, 4% technical, and 89% clerical.
- The distribution of processing effort for the O is as follows: 0% managerial, 0% technical, and 100% clerical.
- The distribution of processing effort for the FA is as follows: 89% managerial, 0% technical, and 11% clerical.

Internet-based process

- The distribution of processing effort for the MSD sub would be as follows: 88% managerial, 0% technical, and 12% clerical.
- The distribution of processing effort for the WI sub would be as follows: 88% managerial, 0% technical, 12% clerical.
- The distribution of processing effort for the GC would be as follows: 85% managerial, 0% technical, and 15% clerical.
- The distribution of processing effort for the CM would be as follows: 62% managerial, 0% technical, and 38% clerical.
- The distribution of processing effort for the Owner would be as follows: 0% managerial, 0% technical, and 0% clerical. All his work is automated.
- The distribution of processing effort for the FA would be as follows: 98% managerial, 0% technical, and 2% clerical.

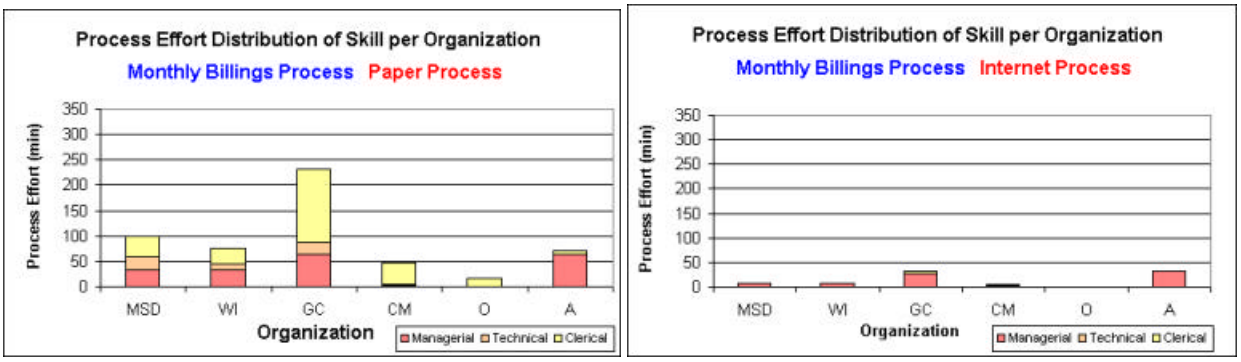


Figure C-10-c, d. *Distribution of processing effort by activity skill per organization for the monthly billings process with the paper-based system vs. an internet-based system.*

WI	Activity Skill - Processing Effort (min)							
	Paper				Internet			
Organization	Managerial	Technical	Clerical	TOTAL	Managerial	Technical	Clerical	TOTAL
MSD	33	27	38	**98**	8	0	1	**9**
WI	33	13	29	**75**	8	0	1	**9**
GC	63	25	144	**233**	28	0	5	**33**
CM	3	2	42	**47**	3	0	2	**5**
O	0	0	17	**17**	0	0	0	**0**
FA	63	0	8	**71**	33	0	1	**33**
TOTAL	**195**	**67**	**279**	**541**	**79**	**0**	**10**	**89**

Table C-10-c. *Processing effort by activity skill per organization for each type of system.*

WI	Activity Skill - Processing Effort (%)							
	Paper				Internet			
Organization	Managerial	Technical	Clerical	TOTAL	Managerial	Technical	Clerical	TOTAL
MSD	33%	28%	39%	**100%**	88%	0%	12%	**100%**
WI	44%	17%	39%	**100%**	88%	0%	12%	**100%**
GC	27%	11%	62%	**100%**	85%	0%	15%	**100%**
CM	7%	4%	89%	**100%**	62%	0%	38%	**100%**
O	0%	0%	100%	**100%**	-	-	-	**-**
FA	89%	0%	11%	**100%**	98%	0%	2%	**100%**

Table C-10-d. *Distribution of processing effort by activity skill per organization for each type of system.*

WI	Activity Skill - Processing Effort (min)								
	Managerial			Technical			Clerical		
Organization	Paper	Internet	% Change	Paper	Internet	% Change	Paper	Internet	% Change
MSD	33	8	-77%	27	0	-100%	38	1	-97%
WI	33	8	-77%	13	0	-100%	29	1	-97%
GC	63	28	-56%	25	0	-100%	144	5	-97%
CM	3	3	-2%	2	0	-100%	42	2	-95%
O	0	0	-	0	0	-	17	0	-100%
FA	63	33	-48%	0	0	-100%	8	1	-91%
TOTAL	**195**	**79**	**-59%**	**67**	**0**	**-100%**	**279**	**10**	**-97%**

Table C-10-e. *Percentage of processing effort by activity skill per organization decreased due to internet-based system.*

C.2.1.2. Distribution by Effect on Activity per Organization

C.2.1.2.1. Distribution of Number of Activities by Effect per Organization

An internet-based system would affect the processing effort of activities with the paper-based system. For each organization, how many activities would remain the same? How many activities would be reduced? How many activities would be automated? How many activities would be eliminated?

When the total number of activities is distributed by effect on activity for each organization, we observe the following:

From the paper-based process to the internet-based process

- Of The MSD sub's number of activities, 0.3% would remain the same, 0.4% would be reduced, 99% would be automated, and 0.2% would be eliminated.
- Of The WI sub's number of activities, 0.5% would remain the same, 0.6% would be reduced, 99% would be automated, and 0.3% would be eliminated.
- Of the GC's number of activities, 1% would remain the same, 0.4% reduced, 97% would be automated, and 2% would be eliminated.
- Of the CM's number of activities, 0.8% would remain the same, 0.9% reduced, 95% would be automated, and 3% would be eliminated.
- Of the O's number of activities, 0% would remain the same, 0% reduced, 97% would be automated, and 3% would be eliminated.
- Of the FA's number of activities, 15% would remain the same, 6% reduced, 63% would be automated, and 17% would be eliminated.

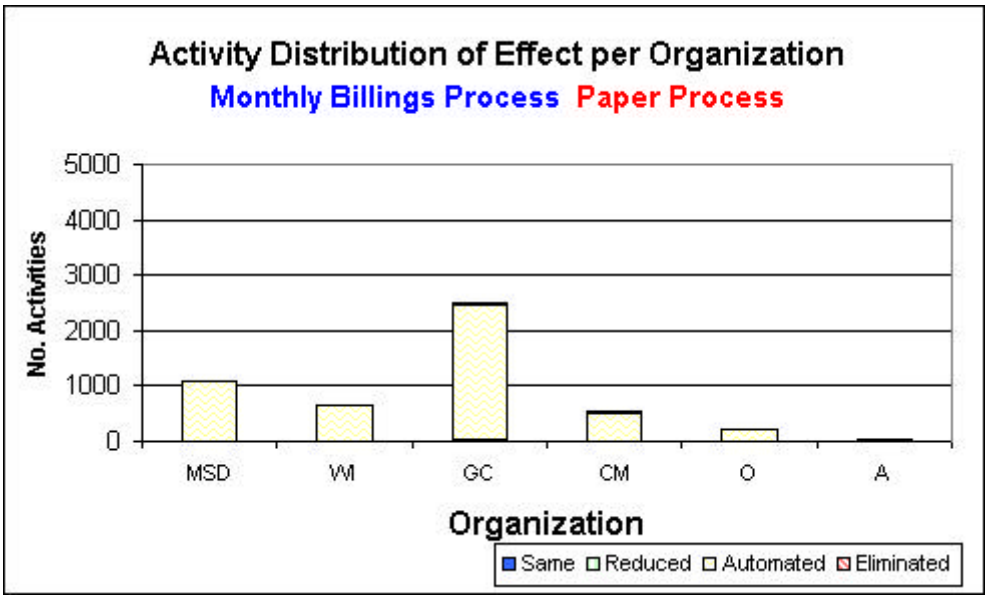


Figure C-11-a. *Distribution of activities by effect on activity per organization for the monthly billings process with the paper-based system vs. an internet-based system.*

WI	Effect - Number of Activities				
Organization	Same	Reduced	Automated	Eliminated	TOTAL
MSD	3	4	1080	2	**1089**
WI	3	4	640	2	**649**
GC	15	9	2428	52	**2504**
CM	4	5	502	19	**530**
O	0	0	226	8	**234**
FA	8	3	34	9	**54**
TOTAL	**33**	**25**	**4910**	**92**	**5060**

Table C-11-a. *Number of activities by effect on activity per organization.*

WI	Effect - Number of Activities (%)				
Organization	Same	Reduced	Automated	Eliminated	TOTAL
MSD	0.3%	0.4%	99%	0.2%	**100%**
WI	0.5%	0.6%	99%	0.3%	**100%**
GC	1%	0.4%	97%	2%	**100%**
CM	0.8%	0.9%	95%	3%	**100%**
O	0%	0%	97%	3%	**100%**
FA	15%	6%	63%	17%	**100%**

Table C-11-b. *Distribution of activities by effect on activity per organization.*

C.2.1.2.2. Distribution of Processing Effort of Effect per Organization

An internet-based system would affect the processing effort of activities with the paper-based system. What would be the effect on each organization's processing effort? How much effort would remain the same? How much effort would be reduced? How much effort would be automated? How much effort would be eliminated?

When the total processing effort is distributed by effect on activity for each organization, we observe the following:

From the paper-based process to the internet-based process

- Of The MSD sub's processing effort, 3% would remain the same, 34% would be reduced, 63% would be automated, and 1% would be eliminated.
- Of The WI sub's processing effort, 3% would remain the same, 44% would be reduced, 52% would be automated, and 1% would be eliminated.
- Of the GC's processing effort, 4% would remain the same, 24% would be reduced, 69% would be automated, and 3% would be eliminated.
- Of the CM's processing effort, 7% would remain the same, 9% would be reduced, 78% would be automated, and 6% would be eliminated.
- Of the O's processing effort, 0% would remain the same, 0% would be reduced, 95% would be automated, and 5% would be eliminated.
- Of the FA's processing effort, 25% would remain the same, 65% would be reduced, 6% would be automated, and 4% would be eliminated.

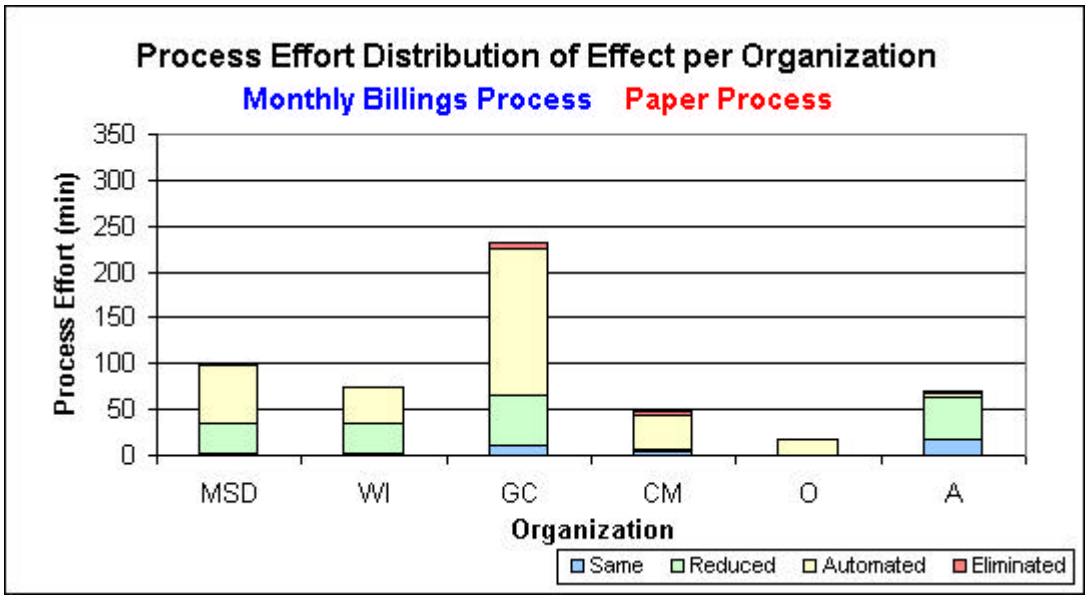


Figure C-11-b. *Distribution of processing effort by effect on activity per organization for the monthly billings process due to the paper-based system vs. an internet-based system.*

WI	Effect - Processing Effort (min)				
Organization	Same	Reduced	Automated	Eliminated	TOTAL
MSD	3	33	62	1	**98**
WI	3	33	39	1	**75**
GC	10	55	160	8	**233**
CM	3	4	37	3	**47**
O	0	0	16	1	**17**
FA	18	46	4	3	**71**
TOTAL	**36**	**172**	**318**	**15**	**541**

Table C-11-c. *Processing effort by effect on activity per organization.*

WI	Effect - Processing Effort (%)				
Organization	Same	Reduced	Automated	Eliminated	TOTAL
MSD	3%	34%	63%	1%	**100%**
WI	3%	44%	52%	1%	**100%**
GC	4%	24%	69%	3%	**100%**
CM	7%	9%	78%	6%	**100%**
O	0%	0%	95%	5%	**100%**
FA	25%	65%	6%	4%	**100%**

Table C-11-d. *Distribution of processing effort by effect on activity per organization.*

C.2.1.3. Distribution by Activity Classification per Organization

C.2.1.3.1. Distribution of Number of Activities by Activity Classification per Organization

How many activities would each organization use to prepare documents (e.g., create SOV), to process documents (e.g., send billing), to authorize documents (e.g., negotiate billing), to locate documents (e.g., archive billing), or to update the accounting database (e.g., enter $ amount paid) in the paper-based system vs. in an internet-based system?

When the total number of activities is distributed by organization for each type of effect on activity, we observe the following:

Paper-based process

- The MSD sub used 84% of his activities to prepare documents, 1% to process documents, 0% to authorize documents, 0% to locate (archive) documents, 0% to update the accounting database, and 14% to update logs.
- The WI sub used 74% of his activities to process the documents, 2%to process documents, 1% to authorize documents, 0% to locate (archive) documents, 0% to update the database, and 24% to update logs.
- The GC used 59% of his activities to process documents, 3% to process documents, 1% to authorize documents, 2% to locate (archive) documents, 7% to update the database, and 29% to update logs.
- The CM used 47% of his activities to process documents, 5% to process documents, 1% to authorize documents, 4% to locate (archive) documents, 0% to update the database, 43% to update logs.
- The O used 0% of his activities to process documents, 0% to process documents, 0% to authorize documents, 4% to locate (archive) documents, 96% to update the database, 0% to update logs.
- The FA used 9% of his activities to process documents, 35% to process documents, 13% to authorize documents, 19% to locate (archive) documents, 0% to update the database, 24% to update logs.

Internet-based process

- The MSD sub would use 84% of his activities to prepare documents, 1% to process documents, 0% to authorize documents, 0% to locate (archive) documents, 0% to update the accounting database, and 14% to update logs.
- The WI sub would use 74% of his activities to prepare documents, 2%to process documents, 1% to authorize documents, 0% to locate (archive) documents, 0% to update the database, and 24% to update logs.
- The GC would use 60% of his activities to prepare documents, 2% to process documents, 1% to authorize documents, 1% to locate (archive) documents, 7% to update the database, and 29% to update logs.
- The CM would use 49% of his activities to prepare documents, 5% to process documents, 1% to authorize documents, 1% to locate (archive) documents, 0% to update the database, 45% to update logs.
- The O would use 0% of his activities to prepare documents, 0% to process documents, 0% to authorize documents, 1% to locate (archive) documents, 99% to update the database, 0% to update logs.
- The FA would use 11% of his activities to prepare documents, 40% to process documents, 16% to authorize documents, 4% to locate (archive) documents, 0% to update the database, 29% to update logs.

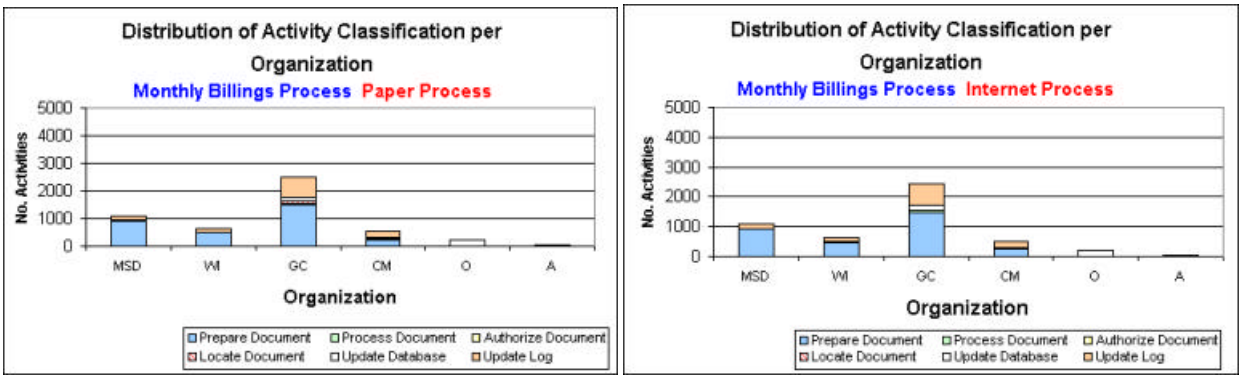


Figure C-12-a, b. *Distribution of activities by activity classification per organization for the monthly billings process for the paper-based system vs. an internet-based system.*

WI - PAPER	Activity Classification - Number of Activities						
Organization	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	Update Log	TOTAL
MSD	920	11	5	0	0	153	**1089**
WI	479	12	5	0	0	153	**649**
GC	1479	65	17	60	168	715	**2504**
CM	250	27	5	20	0	228	**530**
O	0	1	0	10	223	0	**234**
FA	5	19	7	10	0	13	**54**
TOTAL	**3133**	**135**	**39**	**100**	**391**	**1262**	**5060**

Table C-12-a. *Number of activities by activity classification per organization for the paper-based system.*

WI - PAPER	Activity Classification - Number of Activities (%)						
Organization	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	Update Log	TOTAL
MSD	84%	1%	0%	0%	0%	14%	**100%**
WI	74%	2%	1%	0%	0%	24%	**100%**
GC	59%	3%	1%	2%	7%	29%	**100%**
CM	47%	5%	1%	4%	0%	43%	**100%**
O	0%	0%	0%	4%	96%	0%	**100%**
FA	9%	35%	13%	19%	0%	24%	**100%**

Table C-12-b. *Distribution of activities by activity classification per organization for the paper-based system.*

WI - INTERNET	Activity Classification - Number of Activities						
Organization	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	Update Log	TOTAL
MSD	918	11	5	0	0	153	**1087**
WI	477	12	5	0	0	153	**647**
GC	1478	61	17	13	168	715	**2452**
CM	250	24	5	4	0	228	**511**
O	0	1	0	2	223	0	**226**
FA	5	18	7	2	0	13	**45**
TOTAL	**3128**	**127**	**39**	**21**	**391**	**1262**	**4968**

Table C-12-c. *Number of activities by activity classification per organization for an internet-based system.*

WI - INTERNET	Activity Classification - Number of Activities (%)						
Organization	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	Update Log	TOTAL
MSD	84%	1%	0%	0%	0%	14%	100%
WI	74%	2%	1%	0%	0%	24%	100%
GC	60%	2%	1%	1%	7%	29%	100%
CM	49%	5%	1%	1%	0%	45%	100%
O	0%	0%	0%	1%	99%	0%	100%
FA	11%	40%	16%	4%	0%	29%	100%

Table C-12-d. *Distribution of activities by activity classification per organization for an internet-based system.*

C.2.1.3.2. Distribution of Processing Effort of Activity Classification per Organization

How much processing effort was required per organization to prepare documents (e.g., create SOV), to process documents (e.g., send billing), to authorize documents (e.g., review billing), to locate documents (e.g., retrieve a time card), or to update the accounting database (e.g., enter $ amount paid) in the paper-based system vs. in an internet-based system?

How does the distribution of effort vary due to the internet-based system? (Ideally – the majority of the time should be on preparing documents).

Where does each organization feel the impact of the internet-based system most?

When the total processing effort is distributed by organization for each type of effect on activity, we observe the following:

Paper-based process

- The MSD sub spent 55% of his effort preparing documents, 2% processing documents, 33% authorizing documents, 0% locating (archiving) documents, 0% updating the accounting database, and 10% updating logs.
- The WI sub spent 41% of his effort preparing documents, 2% processing documents, 44% authorizing documents, 0% locating documents, 0% updating the accounting database, and 13% updating logs.
- The GC spent 43% of his effort preparing documents, 9% processing documents, 25% authorizing documents, 3% locating (archiving) documents, 5% updating the accounting database, and 16% updating the logs.
- The CM spent 35% of his effort preparing documents, 19% processing documents, 7% authorizing documents, 4% locating (archiving) documents, 0% updating the accounting database, and 34% updating the logs.
- The O spent 0% of his effort preparing documents, 6% processing documents, 0% authorizing documents, 6% locating (archiving) documents, 88% updating the accounting database, and 0% updating the logs.
- The FA spent 11% of his effort preparing documents, 7% processing documents, 79% authorizing documents, 1% locating (archiving) documents, 0% updating the accounting database, and 3% updating the logs.

Internet-based process

- The MSD sub would spend 6% of his effort preparing documents, 6% processing documents, 88% authorizing documents, 0% locating (archiving) documents, 0% updating the accounting database, and 0% updating logs.
- The WI sub would spend 6% of his effort preparing documents, 6% processing documents, 88% authorizing documents, 0% locating documents, 0% updating the accounting database, and 0% updating logs.
- The GC would spend 1% of his effort preparing documents, 18% processing documents, 81% authorizing documents, 0% locating (archiving) documents, 0% updating the accounting database, and 0% updating the logs.
- The CM would spend 2% of his effort preparing documents, 37% processing documents, 62% authorizing documents, 0% locating (archiving) documents, 0% updating the accounting database, and 0% updating the logs.
- The O would spend 0% of his effort preparing documents, 0% processing documents, 0% authorizing documents, 0% locating (archiving) documents, 0% updating the accounting database, and 0% updating the logs.
- The FA would spend 22% of his effort preparing documents, 1% processing documents, 77% authorizing

documents, 0% locating (archiving) documents, 0% updating the accounting database, and 0% updating the logs.

- The effort spent updating the accounting database and updating the logs would be automated and is assumed to be 0.

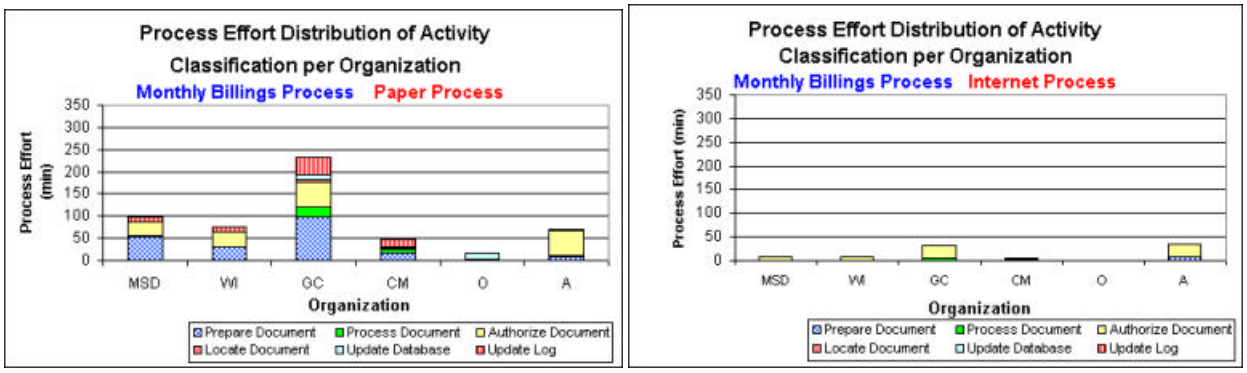


Figure C-12-c, d. *Distribution of processing effort by activity classification per organization for the monthly billings process with the paper-based system vs. an internet-based system.*

WI - PAPER	Activity Classification - Processing Effort (min)						
Organization	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	Update Log	TOTAL
MSD	54	2	33	0	0	10	**98**
WI	30	2	33	0	0	10	**75**
GC	99	20	57	6	12	38	**233**
CM	17	9	3	2	0	16	**47**
O	0	1	0	1	15	0	**17**
FA	8	5	56	1	0	2	**71**
TOTAL	**207**	**39**	**181**	**10**	**27**	**76**	**541**

Table C-12-e. *Processing effort by activity classification per organization for the paper-based system.*

WI - PAPER	Activity Classification - Processing Effort (%)						
Organization	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	Update Log	TOTAL
MSD	55%	2%	33%	0%	0%	10%	**100%**
WI	41%	2%	44%	0%	0%	13%	**100%**
GC	43%	9%	25%	3%	5%	16%	**100%**
CM	35%	19%	7%	4%	0%	34%	**100%**
O	0%	6%	0%	6%	88%	0%	**100%**
FA	11%	7%	79%	1%	0%	3%	**100%**

Table C-12-f. *Distribution of processing effort by activity classification per organization for the paper-based system.*

WI - INTERNET	Activity Classification - Processing Effort (min)						
Organization	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	Update Log	TOTAL
MSD	1	1	8	0	0	0	**9**
WI	1	1	8	0	0	0	**9**
GC	0	6	27	0	0	0	**33**
CM	0	2	3	0	0	0	**5**
O	0	0	0	0	0	0	**0**
FA	7	1	26	0	0	0	**33**
TOTAL	**9**	**9**	**71**	**0**	**0**	**0**	**89**

Table C-12-g. *Processing effort by activity classification per organization for an internet-based system.*

WI - INTERNET	Activity Classification - Processing Effort (%)						
Organization	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	Update Log	TOTAL
MSD	6%	6%	88%	0%	0%	0%	**100%**
WI	6%	6%	88%	0%	0%	0%	**100%**
GC	1%	18%	81%	0%	0%	0%	**100%**
CM	2%	37%	62%	0%	0%	0%	**100%**
O	-	-	-	-	-	-	**-**
FA	22%	1%	77%	0%	0%	0%	**100%**

Table C-12-h. *Distribution of processing effort by activity classification per organization for an internet-based system.*

WI	Activity Classification - Processing Effort (% Change)						
Organization	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	Update Log	TOTAL
MSD	-99%	-71%	-77%			-100%	**-91%**
WI	-98%	-71%	-77%			-100%	**-89%**
GC	-100%	-72%	-53%	-100%		-100%	**-86%**
CM	-99%	-78%	-2%	-100%		-100%	**-89%**
O		-100%		-100%	-100%		**-100%**
FA	-2%	-89%	-54%	-100%		-100%	**-53%**

Table C-12-i. *Percentage decrease in processing effort due to an internet-based system.*

C.2.2. Distribution per Activity Skill

The following sections discuss the distribution of activities and processing effort per activity skill in terms of the three other parameters: organization, effect on activity, and activity classification.

C.2.2.1. Distribution by Organization per Activity Skill

How does the number of activities by organization vary for each activity skill for the monthly billings process with the paper-based system vs. with an internet-based system?

C.2.2.1.1. Distribution of Activities by Organization per Activity Skill

When the total number of activities is distributed by organization for each skill, we observe the following:

Paper-based process

- Of the managerial activities: The MSD sub performed 10%, The WI sub 10%, the GC 48%, the CM 10%, the O 0%, and the FA 21%.
- Of the technical activities: The MSD sub performed 33%, The WI sub 17%, the GC 44%, the CM 5%, the O 0%, and the FA 0%.
- Of the clerical activities: The MSD sub performed 17%, The WI sub 11%, the GC 51%, the CM 12%, the O 6%, and the FA 1%.

Internet-based process

- Of the managerial activities: The MSD sub would perform 10%, The WI sub 10%, the GC 48%, the CM 10%, the O 0%, and the FA 21%.
- Of the technical activities: The MSD sub would perform 33%, The WI sub 17%, the GC 44%, the CM 5%, the O 0%, and the FA 0%.
- Of the clerical activities: The MSD sub would perform 18%, The WI sub 11%, the GC 51%, the CM 12%, the O 6%, and the FA 1%.

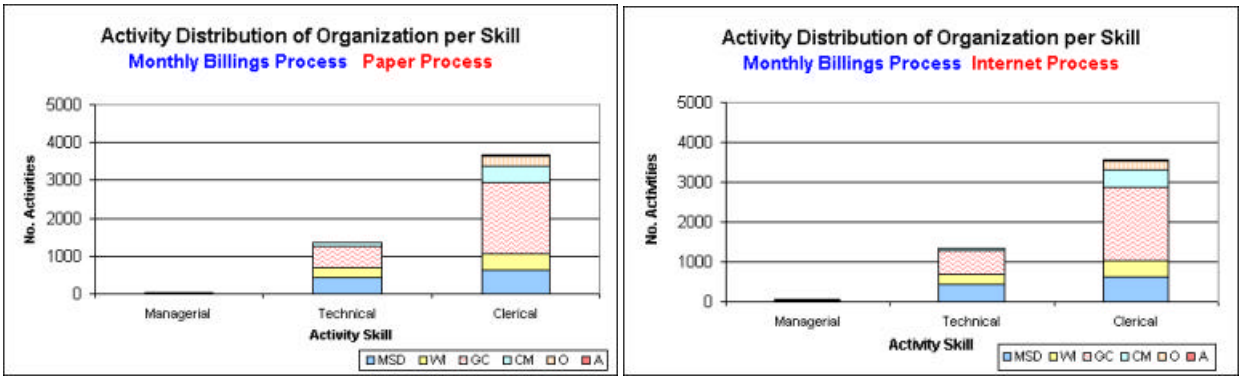


Figure C-13-a, b. *Distribution of activities by organization per activity skill for the monthly billings process with the paper-based system vs. an internet-based system.*

WI	Organization - Number of Activities													
	Paper							Internet						
Skill	MSD	WI	GC	CM	O	FA	TOTAL	MSD	WI	GC	CM	O	FA	TOTAL
Managerial	5	5	23	5	0	10	**48**	5	5	23	5	0	10	**48**
Technical	447	232	594	69	0	0	**1342**	447	232	594	69	0	0	**1342**
Clerical	637	412	1887	456	234	44	**3670**	635	410	1835	437	226	35	**3578**
TOTAL	**1089**	**649**	**2504**	**530**	**234**	**54**	5060	**1087**	**647**	**2452**	**511**	**226**	**45**	4968

Table C-13-a. *Number of activities by organization per activity skill for the paper-based system vs. an internet-based system.*

WI	Organization - Number of Activities (%)													
	Paper							Internet						
Skill	MSD	WI	GC	CM	O	FA	TOTAL	MSD	WI	GC	CM	O	FA	TOTAL
Managerial	10%	10%	48%	10%	0%	21%	**100%**	10%	10%	48%	10%	0%	21%	**100%**
Technical	33%	17%	44%	5%	0%	0%	**100%**	33%	17%	44%	5%	0%	0%	**100%**
Clerical	17%	11%	51%	12%	6%	1%	**100%**	18%	11%	51%	12%	6%	1%	**100%**

Table C-13-b. *Distribution of activities by organization per activity skill for each type of system.*

C.2.2.1.2. Distribution of Processing Effort by Effect on Activity per Activity Skill

How does the processing effort by organization vary for each activity skill for the monthly billings process with the paper-based system vs. with an internet-based system?

When the processing effort is distributed by organization for each skill, we observe the following:

Paper-based process

- For managerial activities: 17% of the effort was by the MSD sub, 17% by the WI sub, 31% by the GC, 2% by the CM, 0% by the O, and 33% by the FA.
- For technical activities: 38% of the effort was by the MSD sub, 22% by the WI sub, 38% by the GC, 3% by the CM, 0% by the O, and 0% by the FA.
- For clerical activities: 15% of the effort was by the MSD sub, 11% by the WI sub, 48% by the GC, 16% by the CM, 7% by the O, and 3% by the FA.

Internet-based process

- For managerial activities: 10% of the effort would be by the MSD sub, 10% by the WI sub, 35% by the GC, 4% by the CM, 0% by the O, and 41% by the FA.
- For technical activities: 100% of the effort would be automated.
- For clerical activities: 10% of the effort would be by the MSD sub, 10% by the WI sub, 52% by the GC, 21% by the CM, 0% by the O, and 7% by the FA.

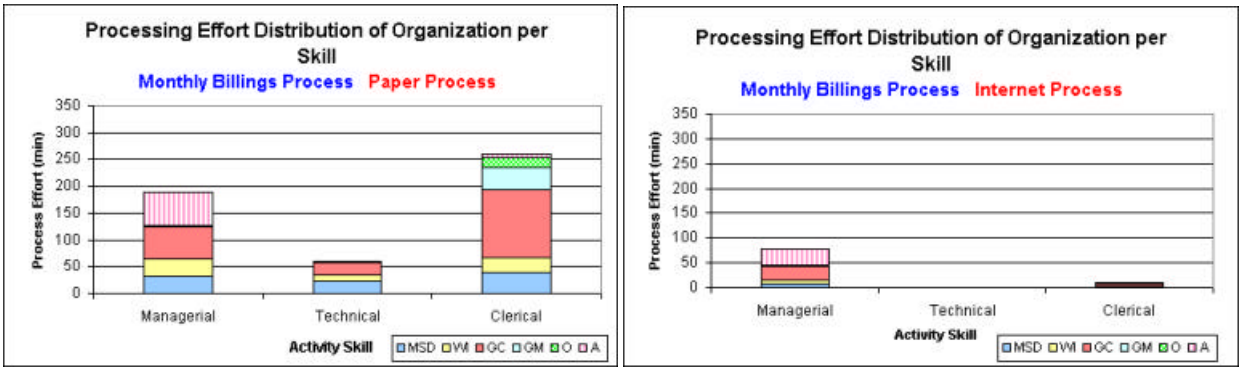


Figure C-13-c, d. *Distribution of processing effort by organization per activity skill for the monthly billings process with the paper-based system vs. an internet-based system.*

WI	Organization - Processing Effort (min)													
	Paper							Internet						
Skill	MSD	WI	GC	CM	O	FA	TOTAL	MSD	WI	GC	CM	O	FA	TOTAL
Managerial	33	33	58	3	0	63	**190**	8	8	28	3	0	33	**79**
Technical	22	13	22	2	0	0	**59**	0	0	0	0	0	0	**0**
Clerical	38	29	125	42	17	8	**260**	1	1	5	2	0	1	**10**
TOTAL	**93**	**75**	**206**	**47**	**17**	**71**	509	**9**	**9**	**33**	**5**	**0**	**33**	89

Table C-13-c. *Processing effort by organization per activity skill for the paper-based system vs. an internet-based system.*

WI	Organization													
	Paper							Internet						
Skill	MSD	WI	GC	CM	O	FA	TOTAL	MSD	WI	GC	CM	O	FA	TOTAL
Managerial	17%	17%	31%	2%	0%	33%	**100%**	10%	10%	35%	4%	0%	41%	**100%**
Technical	38%	22%	38%	3%	0%	0%	**100%**	-	-	-	-	-	-	**-**
Clerical	15%	11%	48%	16%	7%	3%	**100%**	10%	10%	52%	21%	0%	7%	**100%**

Table C-13-d. *Distribution of processing effort by organization per activity skill for each type of system.*

WI	Activity Classification - Processing Effort (% Change)						
Organization	MSD	WI	GC	CM	O	FA	TOTAL
Managerial	-77%	-77%	-52%	-2%	-	-48%	**-58%**
Technical	-100%	-100%	-100%	-100%	-	-	**-100%**
Clerical	-97%	-97%	-96%	-95%	-100%	-91%	**-96%**

Table C-13-e. *Percentage decrease in processing effort due to an internet-based system.*

C.2.2.2. Distribution by Effect on Activity per Activity Skill

C.2.2.2.1. Distribution of Activities by Effect on Activity per Activity Skill

An internet-based system would affect activities in terms of processing effort. For each organization, how many activities would remain the same? How many activities would be reduced? How many activities would be automated? How many activities would be eliminated?

When the total number of activities is distributed by effect on activity for each skill, we observe the following:

From the paper-based process to the internet-based process

- Of the managerial activities: 63% would remain the same, 15% would be reduced and 23% would be automated.
- Of the technical activities: 100% would be automated.
- Of the clerical activities: 97% would be automated, and 3% would be eliminated.

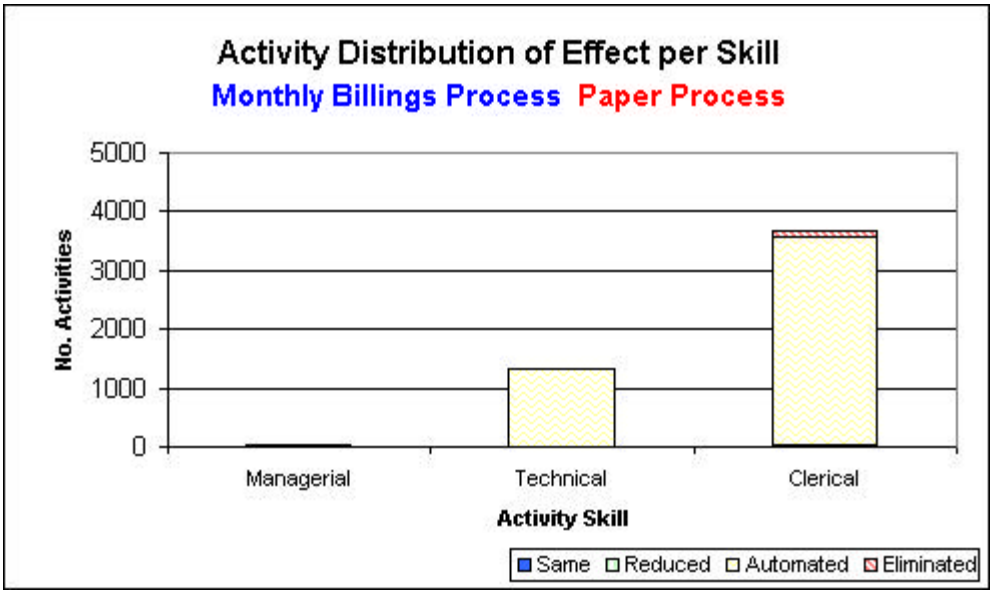


Figure C-14-a. *Distribution of activities by effect on activity per activity skill for the monthly billings process due to the paper-based system vs. an internet-based system.*

WI	Effect - Number of Activities				
Activity Skill	Same	Reduced	Automated	Eliminated	TOTAL
Managerial	30	7	11	0	**48**
Technical	0	0	1342	0	**1342**
Clerical	3	18	3557	92	**3670**
TOTAL	**33**	**25**	**4910**	**92**	**5060**

Table C-14-a. *Number of activities by effect on activity per activity skill.*

WI	Effect - Number of Activities (%)				
Activity Skill	Same	Reduced	Automated	Eliminated	TOTAL
Managerial	63%	15%	23%	0%	**100%**
Technical	0%	0%	100%	0%	**100%**
Clerical	0%	0%	97%	3%	**100%**

Table C-14-b. *Distribution of activities by effect on activity per activity skill.*

C.2.2.2.2. Distribution of Processing Effort by Effect on Activity per Activity Skill

An internet-based system would affect activities in terms of processing effort. For each activity skill, how many activities would remain the same? How many would be reduced? How many would be automated? How many would be eliminated?

When the total processing effort is distributed by effect on activity for each skill, we observe the following:

From the paper-based process to the internet-based process

- Of the effort for managerial activities: 17% would remain the same, 80% would be reduced, and 3% would be automated.
- Of the effort for technical activities: 100% would be automated.
- Of the effort for clerical activities: only 1% would remain the same, 6% would be reduced, 88% would be automated, and 5% would be eliminated.

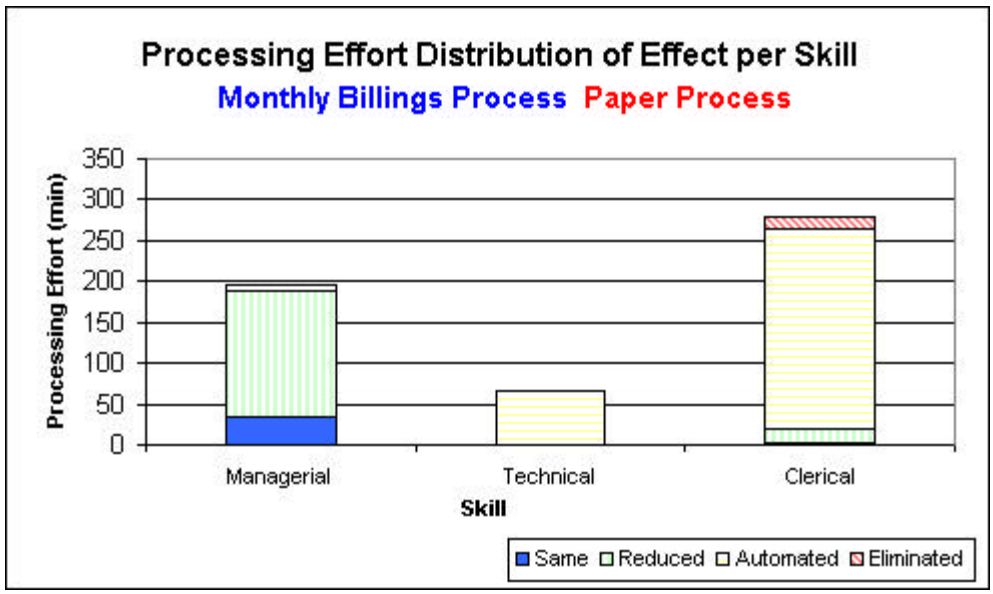


Figure C-14-b. *Distribution of processing effort by effect on activity per activity skill for the monthly billings process due to the paper-based system vs. an internet-based system.*

WI	Effect - Processing Effort (min)				
Activity Skill	Same	Reduced	Automated	Eliminated	TOTAL
Managerial	34	155	6	0	**195**
Technical	0	0	67	0	**67**
Clerical	2	17	245	15	**279**
TOTAL	**36**	**172**	**318**	**15**	**541**

Table C-14-c. *Processing effort by effect on activity per activity skill.*

WI	Effect - Processing Effort (%)				
Activity Skill	Same	Reduced	Automated	Eliminated	TOTAL
Managerial	17%	80%	3%	0%	**100%**
Technical	0%	0%	100%	0%	**100%**
Clerical	1%	6%	88%	5%	**100%**

Table C-14-d. *Distribution of processing effort by effect on activity per activity skill.*

C.2.2.3. Distribution by Activity Classification per Activity Skill

C.2.2.3.1. Distribution of Activities by Activity Classification per Activity Skill

How does the number of activities by activity classification (prepare document, process document, authorize document, locate document, update the accounting database, or update the logs) vary for each activity skill for the monthly billings process with the paper-based system vs. with an internet-based system?

When the total number of activities is distributed by activity classification for each skill, we observe the following:

Paper-based process

- Of the managerial activities: 6% were to prepare documents, 8% to process documents, 81% to authorize documents, 0% to locate documents, 4% to update the accounting database, and 0% to update logs.
- Of the technical activities: 85% were to prepare documents, and 15% to update logs.
- Of the clerical activities: 54% were to prepare documents, 4% to process documents, 3% to locate documents, 11% to update the accounting database, and 29% to update logs.

Internet-based process

- Of the managerial activities: 6% would be to prepare documents, 8% to process documents, 81% to authorize documents, 0% to locate documents, 4% to update the accounting database, and 0% to update logs.
- Of the technical activities: 85% would be to prepare documents, and 15% to update logs.
- Of the clerical activities: 56% would be to prepare the documents, 3% to process documents, 1% to locate documents, 11% to update the accounting database, and 29% update logs.

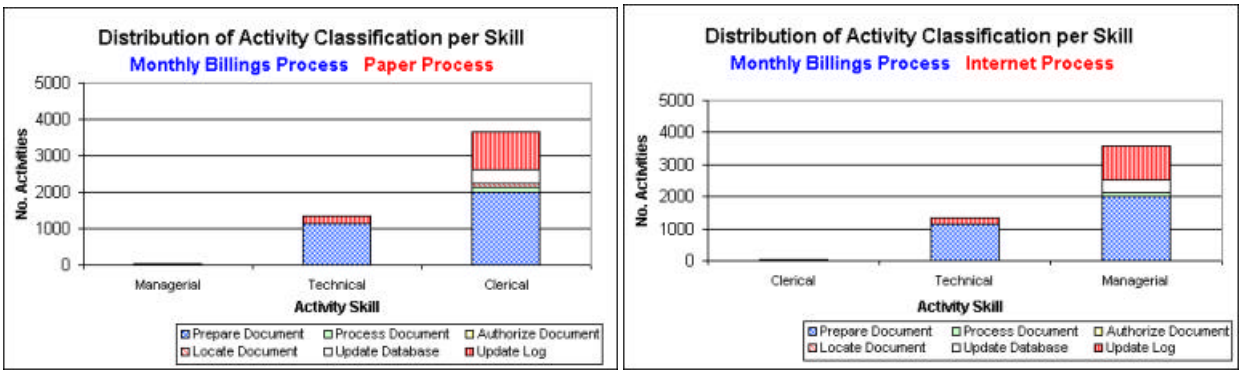


Figure C-15-a, b. *Distribution of activities by activity classification per activity skill for the monthly billings process with the paper-based system vs. an internet-based system.*

WI - PAPER	Activity Classification - Number of Activities						
Activity Skill	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	Update Log	TOTAL
Managerial	3	4	39	0	2	0	**48**
Technical	1135	0	0	0	0	207	**1342**
Clerical	1995	131	0	100	389	1055	**3670**
TOTAL	**3133**	**135**	**39**	**100**	**391**	**1262**	**5060**

Table C-15-a. *Number of activities by activity classification per activity skill for the paper-based system.*

WI - PAPER	Activity Classification - Number of Activities						
Activity Skill	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	Update Log	TOTAL
Managerial	6%	8%	81%	0%	4%	0%	100%
Technical	85%	0%	0%	0%	0%	15%	100%
Clerical	54%	4%	0%	3%	11%	29%	100%

Table C-15-b. *Distribution of activities by activity classification per activity skill for the paper-based system.*

WI - INTERNET	Activity Classification - Number of Activities						
Activity Skill	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	Update Log	TOTAL
Managerial	3	4	39	0	2	0	**48**
Technical	1135	0	0	0	0	207	**1342**
Clerical	1990	123	0	21	389	1055	**3578**
TOTAL	**3128**	**127**	**39**	**21**	**391**	**1262**	**4968**

Table C-15-c. *Number of activities by activity classification per activity skill for an internet-based system.*

WI - INTERNET	Activity Classification - Number of Activities						
Activity Skill	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	Update Log	TOTAL
Managerial	6%	8%	81%	0%	4%	0%	100%
Technical	85%	0%	0%	0%	0%	15%	100%
Clerical	56%	3%	0%	1%	11%	29%	100%

Table C-15-d. *Distribution of activities by activity classification per activity skill for an internet-based system.*

C.2.2.3.2. Distribution of Processing Effort by Activity Classification per Activity Skill

How does the processing effort by activity classification (prepare document, process document, authorize document, locate document, update the accounting database, or update logs) vary for each activity skill for the monthly billings process with the paper-based system vs. with an internet-based system?

When the processing effort is distributed by activity classification for each skill, we observe the following:

Paper-based process

- Of the effort spent on managerial activities: 4% was to prepare documents, 3% to process documents, and 93% to authorize documents.
- Of the effort spent on technical activities: 100% was to prepare documents.
- Of the effort spent on clerical activities: 48% was to prepare documents, 12% to process documents, 4% to locate documents, 10% to update the database, and 27% to update the logs.

Internet-based process

- Of the effort spent on managerial activities: 9% would be to prepare documents, 2% to process the document, and 89% to authorize documents.
- Of the effort spent on technical activities: 100% would be automated.
- Of the effort spent on clerical activities: 19% would be to prepare documents, and 81% to process documents. The activities to update the database and the logs would be automated.

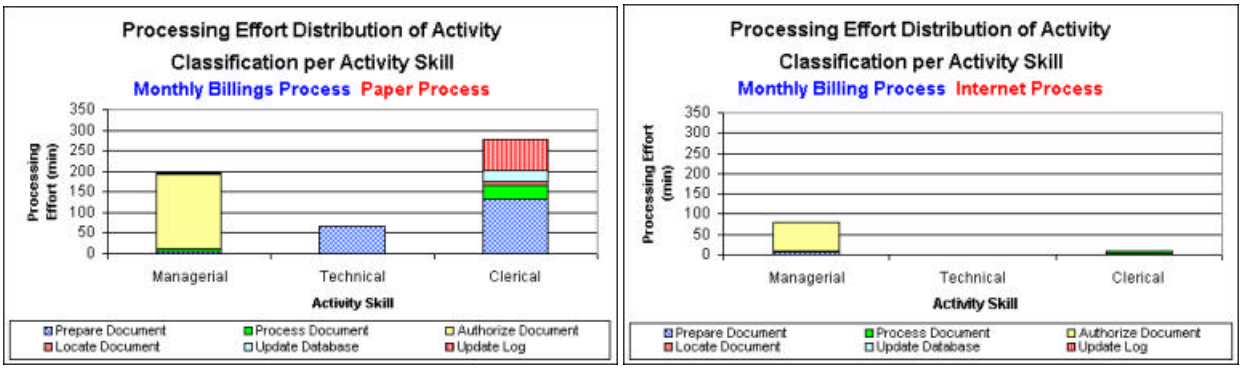


Figure C-15-c, d. *Distribution of processing effort by activity classification per activity skill for the monthly billings process with the paper-based system vs. an internet-based system.*

WI - PAPER	Activity Classification - Processing Effort (min)						
Activity Skill	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	Update Log	TOTAL
Managerial	7	6	181	0	0	0	**195**
Technical	67	0	0	0	0	0	**67**
Clerical	133	33	0	10	27	76	**279**
TOTAL	**207**	**39**	**181**	**10**	**27**	**76**	**541**

Table C-15-e. *Processing effort by activity classification per activity skill for the paper-based system.*

WI - PAPER	Activity Classification - Processing Effort (%)						
Activity Skill	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	Update Log	TOTAL
Managerial	4%	3%	93%	0%	0%	0%	**100%**
Technical	100%	0%	0%	0%	0%	0%	**100%**
Clerical	48%	12%	0%	4%	10%	27%	**100%**

Table C-15-f. *Distribution of processing effort by activity classification per activity skill for the paper-based system.*

WI - INTERNET	Activity Classification - Processing Effort (min)						
Activity Skill	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	Update Log	TOTAL
Managerial	7	1	71	0	0	0	**79**
Technical	0	0	0	0	0	0	**0**
Clerical	2	8	0	0	0	0	**10**
TOTAL	**9**	**9**	**71**	**0**	**0**	**0**	**89**

Table C-15-g. *Processing effort by activity classification per activity skill for an internet-based system.*

WI - INTERNET	Activity Classification - Processing Effort (%)						
Activity Skill	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	Update Log	TOTAL
Managerial	9%	2%	89%	0%	0%	0%	**100%**
Technical	-	-	-	-	-	-	**-**
Clerical	19%	81%	0%	0%	0%	0%	**100%**

Table C-15-h. *Distribution of processing effort by activity classification per activity skill for an internet-based system.*

WI	Activity Classification - Processing Effort (% Change)						
Activity Skill	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	Update Log	TOTAL
Managerial	-10%	0%	-1%	0%		0%	**-4%**
Technical	-100%						**-100%**
Clerical	-96%	-89%	-100%	-91%	-100%	-100%	**-94%**

Table C-15-i. *Percentage decrease in processing effort due to internet-based system.*

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C.2.3. Distribution per Effect of Integration on Activity

The following sections discuss the distribution of activities and processing effort per effect of integration on activity in terms of the three other parameters: organization, activity skill, and activity classification.

C.2.3.1. Distribution by Organization per Effect on Activity

C.2.3.1.1. Distribution of Activities by Organization per Effect on Activity

How would the number of activities be distributed by organization for each effect on activity for the monthly billings process going from the paper-based system to an internet-based system?

When the total number of activities is distributed by organization for each effect on activity, we observe the following:

From the paper-based process to the internet-based process

- Of the activities that would remain the same: The MSD sub would perform 9%, the WI sub 9%, the GC 45%, the CM 12%, the O 0%, and the FA 24%.
- Of the activities that an internet-based system would reduce in processing effort: The MSD sub would perform 16%, the WI sub 16%, the GC 36% the CM 20%, the O 0%, and the FA 12%.
- Of the activities that an internet-based system would automate: The MSD sub would perform 22%, the WI sub 13%, the GC 49%, the CM 10%, the O 5%, and the FA 1%.
- Of the activities that an internet-based system would eliminate: The MSD sub would perform 2%, the WI sub 2%, the GC 57%, the CM 21%, the O 9%, and the FA 10%.

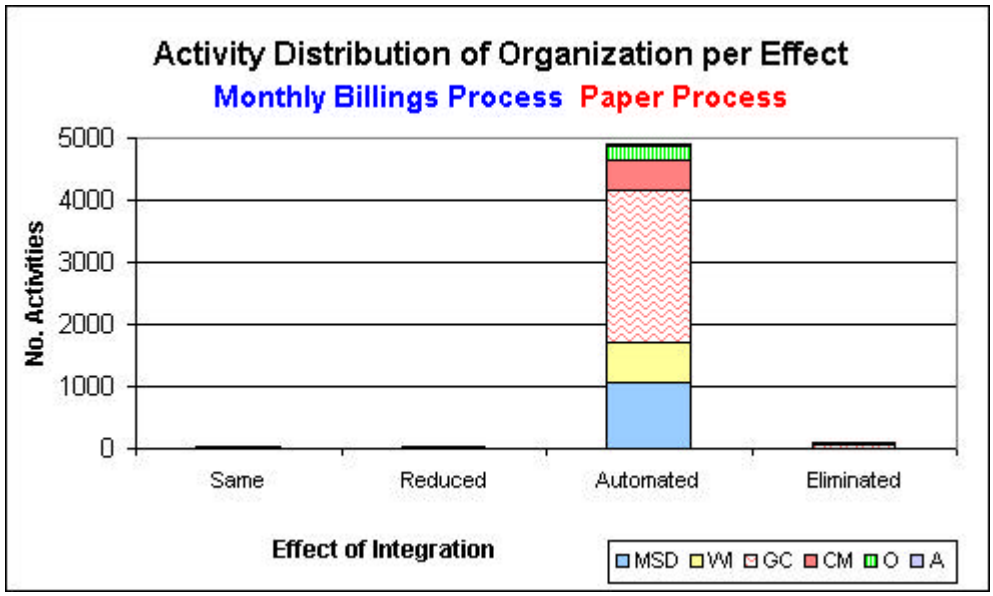

Figure C-16-a. *Distribution of activities by organization per effect on activity for the monthly billings process due to the paper-based system vs. an internet-based system.*

WI	Organization - Number of Activities						
Effect on Activity	MSD	WI	GC	CM	O	FA	TOTAL
Same	3	3	15	4	0	8	**33**
Reduced	4	4	9	5	0	3	**25**
Automated	1080	640	2428	502	226	34	**4910**
Eliminated	2	2	52	19	8	9	**92**
TOTAL	**1089**	**649**	**2504**	**530**	**234**	**54**	**5060**

Table C-16-a. *Number of activities by organization per effect on activity.*

WI	Organization - Relative % of Total Number of activities						
Effect on Activity	**MSD**	**WI**	**GC**	**CM**	**O**	**FA**	**TOTAL**
Same	9%	9%	45%	12%	0%	24%	**100%**
Reduced	16%	16%	36%	20%	0%	12%	**100%**
Automated	22%	13%	49%	10%	5%	1%	**100%**
Eliminated	2%	2%	57%	21%	9%	10%	**100%**

Table C-16-b. *Distribution of activities by organization per effect on activity.*

C.2.3.1.2. Distribution of Processing Effort by Organization per Effect on Activity

How would the processing effort be distributed by organization for each effect on activity for the monthly billings process going from the paper-based system to an internet-based system?

When the total processing effort is distributed by organization for each effect on activity, we observe the following:

From the paper-based process to the internet-based process

- Of the processing effort for activities that would remain the same: 7% would be for the MSD sub, 7% for the WI sub, 27% for the GC, 9% for the CM, 0% for the O, and 50% for the FA.
- Of the processing effort for activities that an internet-based system would reduce: 19% would be for the MSD sub, 19% for the WI sub, 32% for the GC, 2% for the CM, 0% for the O, and 27% for the FA.
- Of the processing effort for activities that an internet-based system would automate: 20% would be due to the MSD sub, 12% to the WI sub, 50% to the GC, 12% to the CM, 5% to the O, and 1% to the FA.
- Of the processing effort for activities that an internet-based system would eliminate: 3% would be due to the MSD sub, 3% to the WI sub, 51% to the GC, 19% to the CM, 5% to the O, and 18% to the FA.

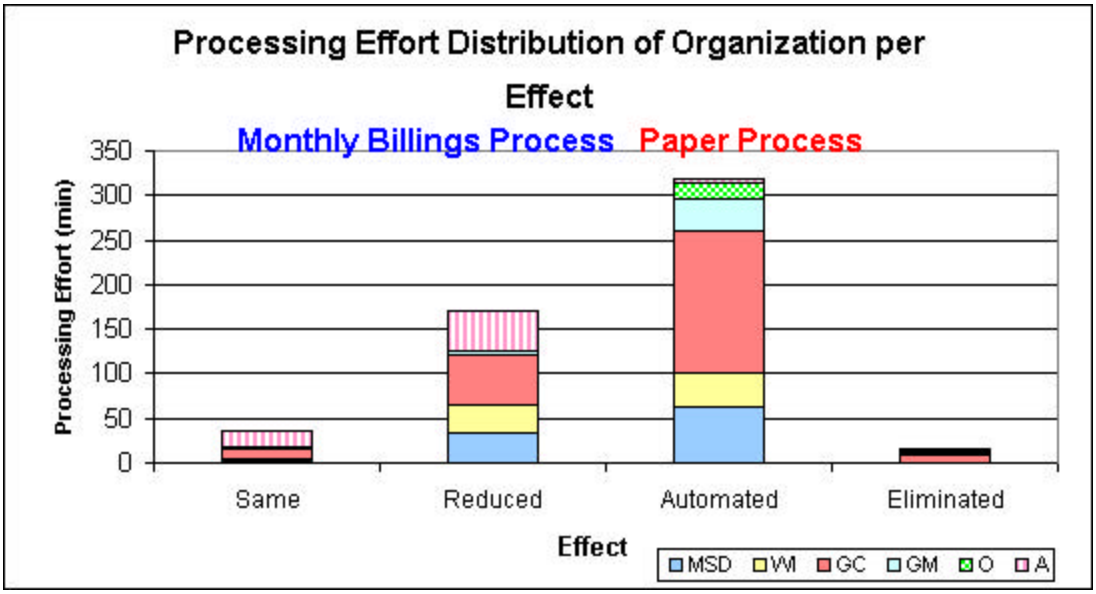

Figure C-16-b. *Distribution of processing effort by organization per effect on activity for the monthly billings process due to the paper-based system vs. an internet-based system.*

WI	Organization - Processing Effort (min)						
Effect on Activity	MSD	WI	GC	CM	O	FA	TOTAL
Same	3	3	10	3	0	18	**36**
Reduced	33	33	55	4	0	46	**172**
Automated	62	39	160	37	16	4	**318**
Eliminated	1	1	8	3	1	3	**15**
TOTAL	**98**	**75**	**233**	**47**	**17**	**71**	**541**

Table C-16-c. *Processing effort by organization per effect on activity.*

WI	Organization - Processing Effort (%)						
Effect on Activity	MSD	WI	GC	CM	O	FA	TOTAL
Same	7%	7%	27%	9%	0%	50%	**100%**
Reduced	19%	19%	32%	2%	0%	27%	**100%**
Automated	20%	12%	50%	12%	5%	1%	**100%**
Eliminated	3%	3%	51%	19%	5%	18%	**100%**

Table C-16-d. *Distribution of processing effort by organization per effect on activity.*

C.2.3.2. Distribution by Activity Skill per Effect on Activity

C.2.3.2.1. Distribution of Activities by Activity Skill per Effect on Activity

How would the number of activities be distributed by activity skill (managerial, technical, or clerical) for each effect on activity for the monthly billings process going from the paper-based system to an internet-based system?

When the total number of activities is distributed by activity skill for each effect on activity, we observe the following:

From the paper-based process to the internet-based process

- Of the activities that would remain the same: 91% would be managerial activities and only 9% clerical activities.
- Of the activities that an internet-based system would reduce in processing effort: 28% would be managerial activities and 72% would be clerical activities.
- Of the activities that an internet-based system would automate: 27% would be technical activities, and 72% would be clerical activities.
- Of the activities that an internet-based system would eliminate: 100% would be clerical activities.

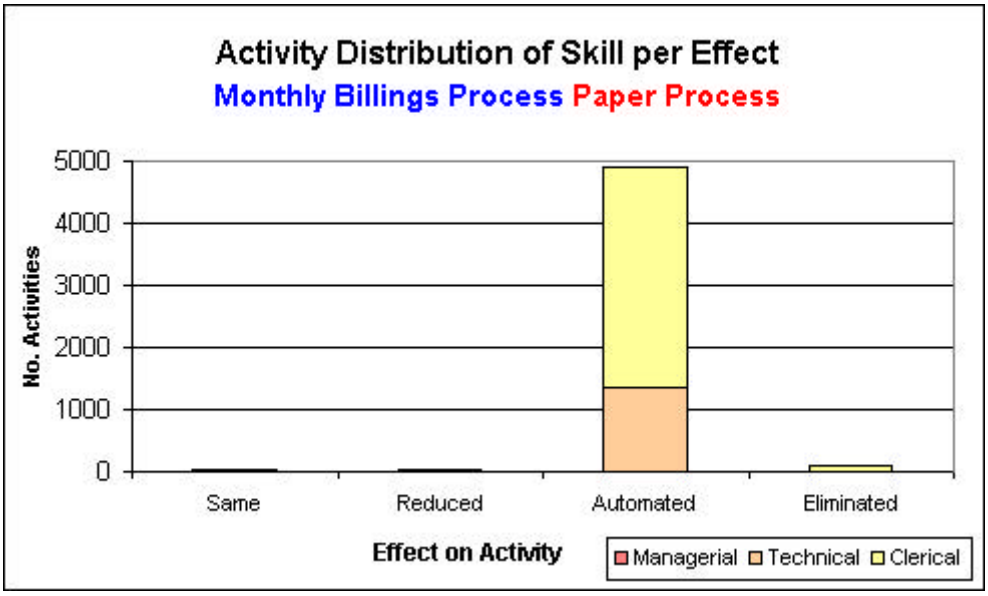

Figure C-17-a. *Distribution of activities by activity skill per effect on activity for the monthly billings process from the paper-based system to an internet-based system.*

WI	Activity Skill - Number of Activities			
Effect on Activity	**Managerial**	**Technical**	**Clerical**	**TOTAL**
Same	30	0	3	**33**
Reduced	7	0	18	**25**
Automated	11	1342	3557	**4910**
Eliminated	0	0	92	**92**
TOTAL	**48**	**1342**	**3670**	**5060**

Table C-17-a. *Number of activities by activity skill per effect on activity.*

WI	Activity Skill - Number of activities (%)			
Effect on Activity	**Managerial**	**Technical**	**Clerical**	**TOTAL**
Same	91%	0%	9%	**100%**
Reduced	28%	0%	72%	**100%**
Automated	0%	27%	72%	**100%**
Eliminated	0%	0%	100%	**100%**

Table C-17-b. *Distribution of activities by activity skill per effect on activity.*

C.2.3.2.2. Distribution of Processing Effort by Activity Skill per Effect on Activity

How would the processing effort be distributed by activity skill (managerial, technical, or clerical) for each effect on activity for the monthly billings process going from the paper-based system to an internet-based system?

When the total processing effort is distributed by activity skill for each effect on activity, we observe the following:

From the paper-based process to the internet-based process

- Of the processing effort for activities that would remain the same: 94% would be for managerial activities and 6% for clerical activities.
- Of the processing effort for activities that an internet-based system would reduce: 90% would be for managerial activities and 10% would be for clerical activities.
- Of the processing effort for activities that an internet-based system would automate: 2% would be for managerial activities, 21% for technical activities, and 77% for clerical activities.
- Of the processing effort for activities that an internet-based system would eliminate: 100% would be for clerical activities.

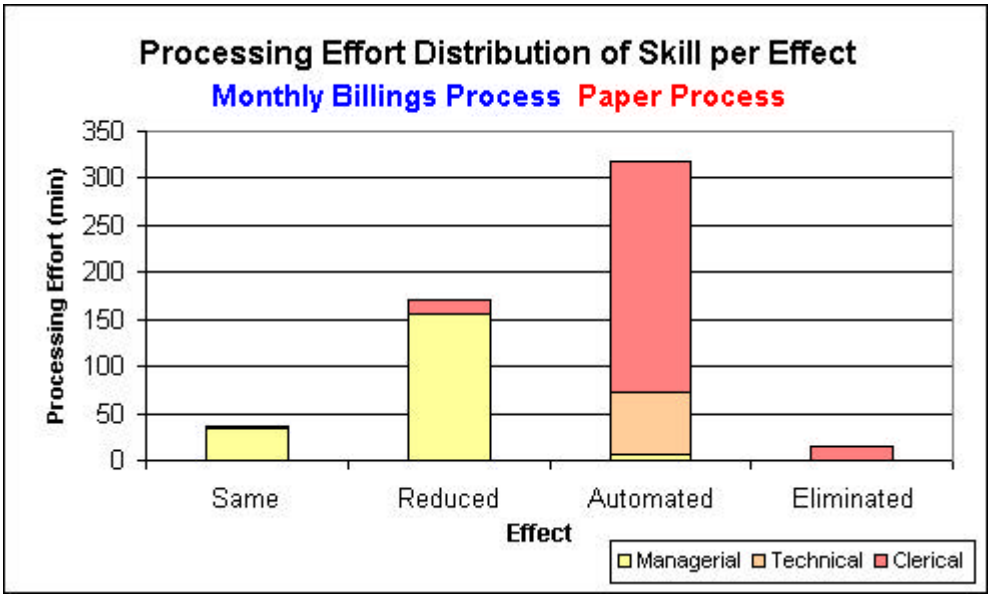

Figure C-17-b. *Distribution of processing effort by activity skill per effect on activity for the monthly billings process due to the paper-based system vs. an internet-based system.*

WI	Activity Skill - Processing Effort (min)			
Effect on Activity	Managerial	Technical	Clerical	TOTAL
Same	34	0	2	**36**
Reduced	155	0	17	**172**
Automated	6	67	245	**318**
Eliminated	0	0	15	**15**
TOTAL	**195**	**67**	**279**	**541**

Table C-17-c. *Processing effort by activity skill per effect on activity.*

WI	Activity Skill - Processing Effort (%)			
Effect on Activity	**Managerial**	**Technical**	**Clerical**	**TOTAL**
Same	94%	0%	6%	**100%**
Reduced	90%	0%	10%	**100%**
Automated	2%	21%	77%	**100%**
Eliminated	0%	0%	100%	**100%**

Table C-17-d. *Distribution of processing effort by activity skill per effect on activity.*

C.2.3.3. Distribution by Activity Classification per Effect on Activity

C.2.3.3.1. Distribution of Activities by Activity Classification per Effect on Activity

What would be the distribution in the number of activities by activity classification (prepare document, process document, authorize document, locate document, or update database) for each effect on activity for the monthly billings process going from the paper-based system to an internet-based system?

When the total number of activities is distributed by activity classification for each effect on activity, we observe the following:

From the paper-based process to the internet-based process

- Of the activities that would remain the same: 12% would be to prepare documents, 12% to process the documents, and 76% to authorize documents.
- Of the activities that an internet-based system would reduce in processing effort: 28% would be to process documents, 44% to process documents, and 28% to authorize documents.
- Of the activities that an internet-based system would automate: 63% would be to prepare documents, 2% to process documents, 8% to update the accounting database, and 26% to update logs.
- Of the activities that an internet-based system would eliminate: 5% would be to prepare documents, 9% would be to process documents, and 86% would be to locate (archive) documents.

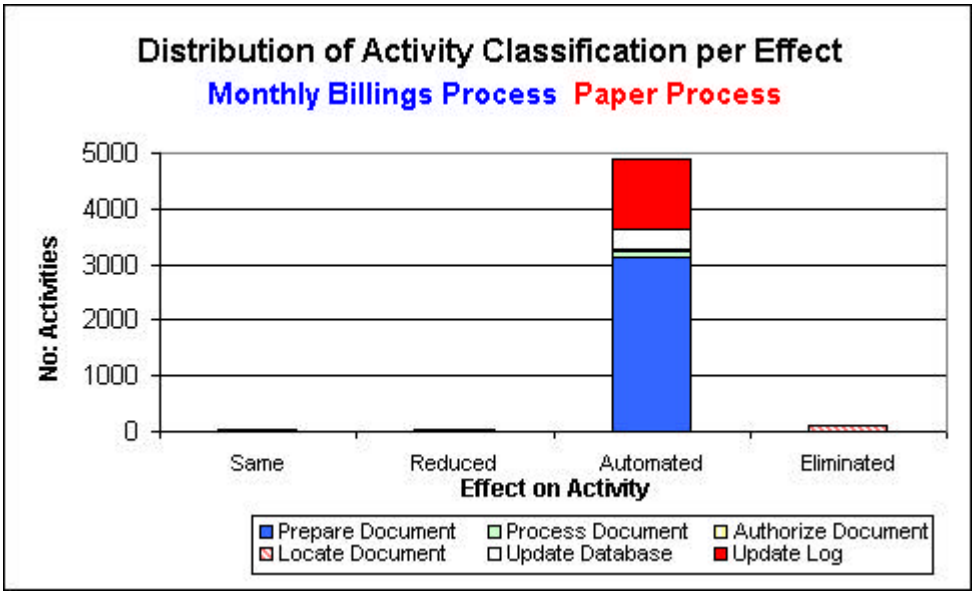

Figure C-18-a. *Distribution of activities by activity classification per effect on activity for the monthly billings process from the paper-based system to an internet-based system.*

WI	Activity Classification - Number of Activities						
Effect on Activity	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	Update Log	TOTAL
Same	4	4	25	0	0	0	**33**
Reduced	7	11	7	0	0	0	**25**
Automated	3117	112	7	21	391	1262	**4910**
Eliminated	5	8	0	79	0	0	**92**
TOTAL	**3133**	**135**	**39**	**100**	**391**	**1262**	**5060**

Table C-18-a. *Number of activities by activity classification per effect on activity.*

WI	Activity Classification - Number of Activities (%)						
Effect on Activity	**Prepare Document**	**Process Document**	**Authorize Document**	**Locate Document**	**Update Database**	**Update Log**	**TOTAL**
Same	12%	12%	76%	0%	0%	0%	**100%**
Reduced	28%	44%	28%	0%	0%	0%	**100%**
Automated	63%	2%	0%	0%	8%	26%	**100%**
Eliminated	5%	9%	0%	86%	0%	0%	**100%**

Table C-18-b. *Distribution of activities by activity classification per effect on activity.*

C.2.3.3.2. Distribution of Processing Effort by Activity Classification per Effect on Activity

What would be the distribution in the processing effort by activity classification (prepare document, process document, authorize document, locate document, or update database) for each effect on activity for the monthly billings process going from the paper-based system to an internet-based system?

When the total processing effort is distributed by activity classification for each effect on activity, we observe the following:

From the paper-based process to the internet-based process

- Of the processing effort for activities that would remain the same: 21% would be to prepare documents, 9% to process documents, and 71% to authorize documents.
- Of the processing effort for activities that an internet-based system would reduce: 3% would be to prepare the documents, 7% to process documents, and 90% to authorize documents.
- Of the activities that an internet-based system would automate: 61% would be to prepare documents, 6% to process documents, 1% to locate documents, 9% to update the accounting database, and 24% to update logs.
- Of the activities that an internet-based system would eliminate: 8% would be to prepare documents 39% to process documents, and 53% to locate (archive) documents.

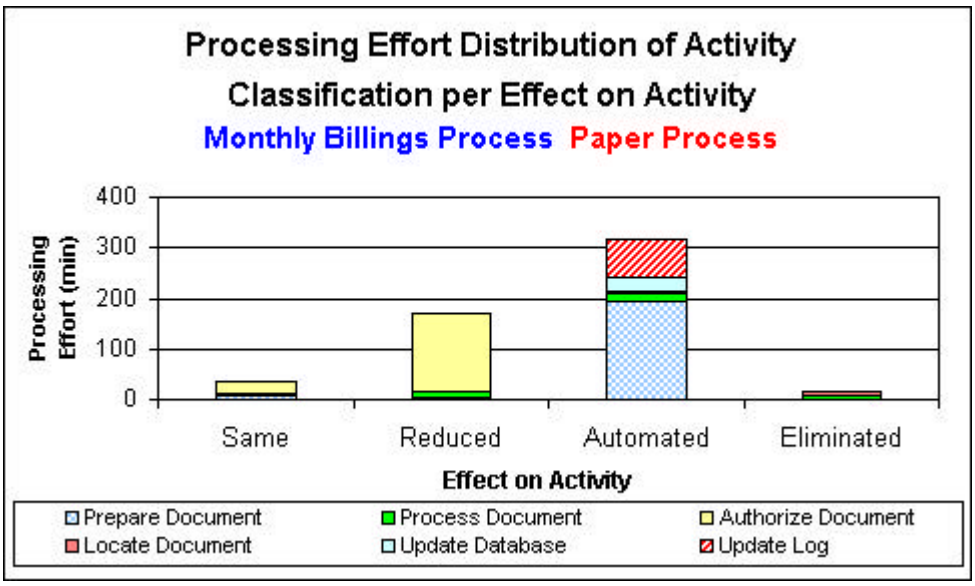

Figure C-18-b. *Distribution of processing effort by activity classification per effect on activity for the monthly billings process with the paper-based system vs. an internet-based system.*

WI	Activity Classification - Processing Effort (min)						
Effect on Activity	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	Update Log	TOTAL
Same	7	3	26	0	0	0	**36**
Reduced	6	11	155	0	0	0	**172**
Automated	193	18	1	2	27	76	**318**
Eliminated	1	6	0	8	0	0	**15**
TOTAL	**207**	**39**	**181**	**10**	**27**	**76**	**541**

Table C-18-c. *Processing effort by activity classification per effect on activity.*

WI	Activity Classification - Processing Effort (%)						
Effect on Activity	**Prepare Document**	**Process Document**	**Authorize Document**	**Locate Document**	**Update Database**	**Update Log**	**TOTAL**
Same	21%	9%	71%	0%	0%	0%	**100%**
Reduced	3%	7%	90%	0%	0%	0%	**100%**
Automated	61%	6%	0%	1%	9%	24%	**100%**
Eliminated	8%	39%	0%	53%	0%	0%	**100%**

Table C-18-d. *Distribution of processing effort by activity classification per effect on activity.*

C.2.4. Distribution per Activity Classification

The following sections discuss the distribution of activities and processing effort per effect on activity in terms of the three other parameters: organization, activity skill, and effect on activity.

C.2.4.1. Distribution by Organization per Activity Classification

C.2.4.1.1. Distribution of Activities by Organization per Activity Classification

How does the number of activities by organization (MSD, WI, GC, CM, O or FA) vary for each activity classification for the monthly billings process with the paper-based system vs. with an internet-based system?

When the total number of activities is distributed by organization for each type of activity classification, we observe the following:

Paper-based process

- 3133 activities were used to prepare documents: 29% were performed by the MSD, 15% by the WI, 47% by the GC, and 8% by the CM.
- 135 activities were used to process documents: 8% were performed by the MSD, 9% by the WI, 48% by the GC, 20% by the CM, 1% by the O, and 14% by the FA.
- 39 activities were used to authorize documents: 13% were performed by the MSD, 13% by the WI, 44% by the GC, 13% by the CM, and 18% by the FA.
- 100 activities were used to locate documents: 60% by the GC, 20% by the CM, 10% by the O, and 10% by the FA.
- 391 activities were used to update the accounting databases: 43% by the GC, and 57% by the O.
- 1262 activities were used to update logs: 12% were performed by the MSD, 12% by the WI, 57% by the GC, 18% by the CM, and 1% by the FA.

Internet-based process

- 3128 activities would be used to prepare documents: 29% would be performed by the MSD, 15% by the WI, 47% by the GC, and 8% by the CM.
- 127 activities would be used to process documents: 9% would be performed by the MSD, 9% by the WI, 48% by the GC, 19% by the CM, 1% by the O, and 14% by the FA.
- 39 activities would be used to authorize documents: 13% would be performed by the MSD, 13% by the WI, 44% by the GC, 13% by the CM, and 18% by the FA.
- 21 activities would be used to locate documents: 62% by the GC, 18% by the CM%, 10% by the O, and 10% by the FA.
- 391 activities would be used to update the accounting databases: 43% by the GC, and 57% by the O.
- 1262 activities would be used to update logs: 12% would be performed by the MSD, 12% by the WI, 57% by the GC, 18% by the CM, and 1% by the FA.

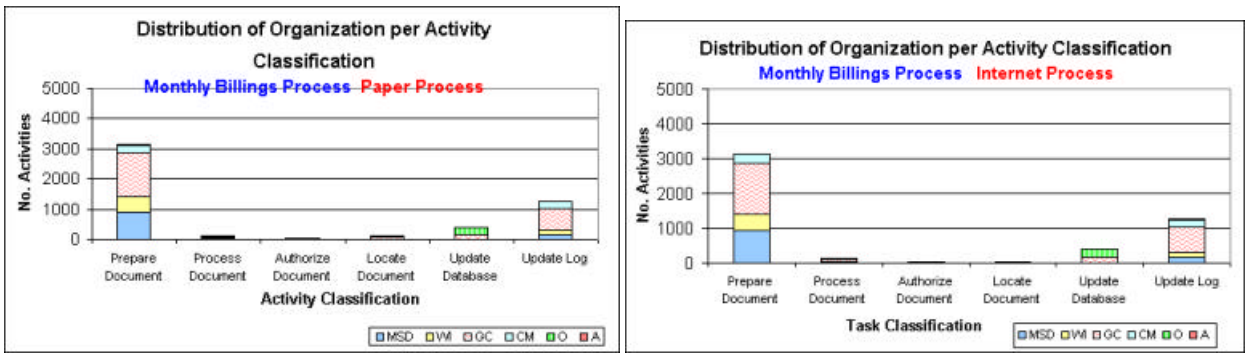

Figure C-19-a, b. *Distribution of activities by organization per activity classification for the monthly billings process with the paper-based system vs. an internet-based system.*

WI	Organization - Number of Activities													
	Paper							Internet						
Activity Classification	MSD	WI	GC	CM	O	FA	TOTAL	MSD	WI	GC	CM	O	FA	TOTAL
Prepare Document	920	479	1479	250	0	5	**3133**	918	477	1478	250	0	5	**3128**
Process Document	11	12	65	27	1	19	**135**	11	12	61	24	1	18	**127**
Authorize Document	5	5	17	5	0	7	**39**	5	5	17	5	0	7	**39**
Locate Document	0	0	60	20	10	10	**100**	0	0	13	4	2	2	**21**
Update Database	0	0	168	0	223	0	**391**	0	0	168	0	223	0	**391**
Update Log	153	153	715	228	0	13	**1262**	153	153	715	228	0	13	**1262**
TOTAL	**1089**	**649**	**2504**	**530**	**234**	**54**	5060	**1087**	**647**	**2452**	**511**	**226**	**45**	4968

Table C-19-a. *Number of activities by organization per activity classification for the paper-based system vs. an internet-based system.*

WI	Organization - Number of Activities													
	Paper							Internet						
Activity Classification	MSD	WI	GC	CM	O	FA	TOTAL	MSD	WI	GC	CM	O	FA	TOTAL
Prepare Document	29%	15%	47%	8%	0%	0%	**100%**	29%	15%	47%	8%	0%	0%	**100%**
Process Document	8%	9%	48%	20%	1%	14%	**100%**	9%	9%	48%	19%	1%	14%	**100%**
Authorize Document	13%	13%	44%	13%	0%	18%	**100%**	13%	13%	44%	13%	0%	18%	**100%**
Locate Document	0%	0%	60%	20%	10%	10%	**100%**	0%	0%	62%	18%	10%	10%	**100%**
Update Database	0%	0%	43%	0%	57%	0%	**100%**	0%	0%	43%	0%	57%	0%	**100%**
Update Log	12%	12%	57%	18%	0%	1%	**100%**	12%	12%	57%	18%	0%	1%	**100%**

Table C-19-b. *Distribution of activities by organization per activity classification for each type of system.*

C.2.4.1.2. Distribution of Processing Effort by Organization per Activity Classification

How does the processing effort by organization (MSD, WI, GC, CM ,or O) vary for each activity classification for the monthly billings process with the paper-based system vs. with an internet-based system?

When the processing effort is distributed by organization for each type of activity classification, we observe the following:

Paper-based process

- The processing effort to prepare documents was 207 minutes: 26% was consumed by MSD, 15% by WI, 48% by GC, 8% by CM, and 4% by FA.
- The processing effort to process documents was 39 minutes: 5% was consumed by MSD, 5% by WI, 52% by GC, 24% by CM, 3% by O, and 12% by FA.
- The processing effort to authorize documents was 181 minutes: 18% was consumed by MSD, 18% by WI, 31% by GC, 2% by CM, and 31% by FA.
- The processing effort to locate documents was 10 minutes: 60% was consumed GC, 20% by CM, 10% by O, and 10% by FA.
- The processing effort to update the accounting database was 27 minutes: 44% was consumed by GC, and 56% by O.
- The processing effort to update the log was 76 minutes: 13% was consumed by MSD, 13% by WI, 50% by GC, 21% by CM, and 2% by FA.

Internet-based process

- The processing effort to prepare documents would be 9 minutes: 6% would be consumed by MSD, 6% by WI, 4% by GC, 1% by CM, and 84% by FA.
- The processing effort to process documents would be 9 minutes: 5% would be consumed by MSD, 5% by WI, 62% by GC, 22% by CM, and 5% by FA.
- The processing effort to authorize documents would be 71 minutes: 11% would be consumed by MSD, 11% by WI, 38% by GC, 5% by CM, and 36% by FA.
- The processing effort to locate documents would be 0 minutes.
- The processing effort to update the accounting database would be 0 minutes.
- The processing effort to update logs would be 0 minutes.

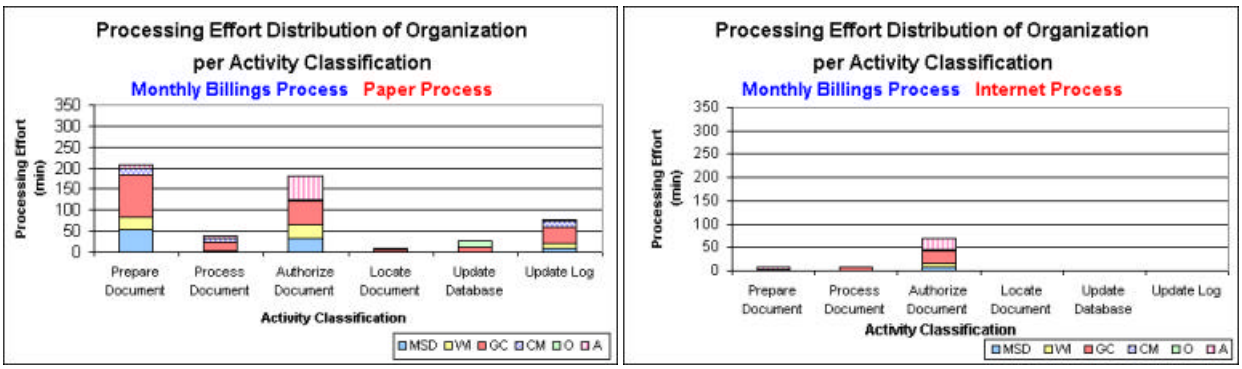

Figure C-19-c, d. *Distribution of processing effort by organization per activity classification for the monthly billings process with the paper-based system vs. an internet-based system.*

WI	Organization - Processing Effort (min)													
	Paper							Internet						
Activity Classification	MSD	WI	GC	CM	O	FA	TOTAL	MSD	WI	GC	CM	O	FA	TOTAL
Prepare Document	54	30	99	17	0	8	**207**	1	1	0	0	0	7	**9**
Process Document	2	2	20	9	1	5	**39**	1	1	6	2	0	1	**9**
Authorize Document	33	33	57	3	0	56	**181**	8	8	27	3	0	26	**71**
Locate Document	0	0	6	2	1	1	**10**	0	0	0	0	0	0	**0**
Update Database	0	0	12	0	15	0	**27**	0	0	0	0	0	0	**0**
Update Log	10	10	38	16	0	2	**76**	0	0	0	0	0	0	**0**
TOTAL	**98**	**75**	**233**	**47**	**17**	**71**	**541**	**9**	**9**	**33**	**5**	**0**	**33**	**89**

Table C-19-c. *Processing effort by organization per activity classification for the paper-based system vs. an internet-based system.*

WI	Organization - Processing Effort (%)													
	Paper							Internet						
Activity Classification	MSD	WI	GC	CM	O	FA	TOTAL	MSD	WI	GC	CM	O	FA	TOTAL
Prepare Document	26%	15%	48%	8%	0%	4%	**100%**	6%	6%	4%	1%	0%	84%	**100%**
Process Document	5%	5%	52%	24%	3%	12%	**100%**	5%	5%	62%	22%	0%	5%	**100%**
Authorize Document	18%	18%	31%	2%	0%	31%	**100%**	11%	11%	38%	5%	0%	36%	**100%**
Locate Document	0%	0%	60%	20%	10%	10%	**100%**	-	-	-	-	-	-	**-**
Update Database	0%	0%	44%	0%	56%	0%	**100%**	-	-	-	-	-	-	**-**
Update Log	13%	13%	50%	21%	0%	2%	**100%**	-	-	-	-	-	-	**-**

Table C-19-d. *Distribution of processing effort by organization per activity classification for each type of system.*

WI	Activity Classification - Processing Effort (% Change)						
Organization	MSD	WI	GC	CM	O	FA	TOTAL
Prepare Document	-99%	-98%	-100%	-99%	-	-2%	**-96%**
Process Document	-71%	-71%	-72%	-78%	-100%	-89%	**-76%**
Authorize Document	-77%	-77%	-53%	-2%	-	-54%	**-61%**
Locate Document	-	-	-100%	-100%	-100%	-100%	**-100%**
Update Database	-	-	-	-	-100%	-	**-100%**
Update Log	-100%	-100%	-100%	-100%	-	-100%	**-100%**

Table C-19-e. *Percentage decrease in processing effort due to an internet-based system.*

C.2.4.2. Distribution by Activity Skill per Activity Classification

C.2.4.2.1. Distribution of Activities by Activity Skill per Activity Classification

How does the number of activities by activity skill (managerial, technical, and clerical) vary for each activity classification for the monthly billings process with the paper-based system vs. with an internet-based system?

When the total number of activities is distributed by activity skill for each type of activity classification, we observe the following:

Paper-based process

- Of the 3133 activities to prepare documents: 0% were managerial activities, 36% were technical activities, and 64% were clerical activities.
- Of the 135 activities to process documents: 3% were managerial and 97% were clerical activities.
- Of the 39 activities to authorize documents: 100% were managerial activities.
- Of the 100 activities to locate documents: 100% were clerical activities.
- Of the 391 activities to update the accounting database: 1% were technical and 99% were clerical activities.
- Of the 1262 activities to update the log: 16% were technical activities and 84% were clerical activities.

Internet-based process

- All activity classifications would be unaffected or the effect would be negligible.

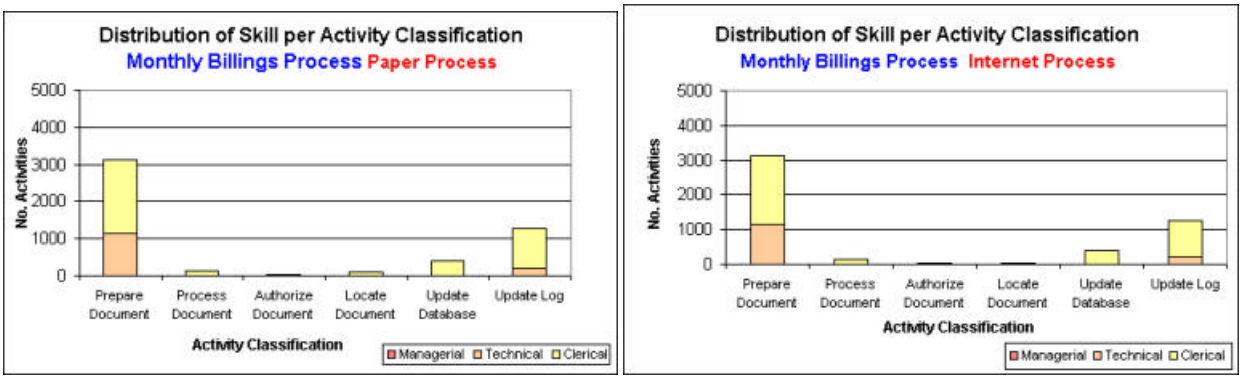

Figure C-20-a, b. *Distribution of activities by activity skill per activity classification for the monthly billings process with the paper-based system vs. an internet-based system.*

WI	Activity Skill - Number of Activities							
	Paper				Internet			
Activity Classification	Managerial	Technical	Clerical	TOTAL	Managerial	Technical	Clerical	TOTAL
Prepare Document	3	1135	1995	**3133**	3	1135	1990	**3128**
Process Document	4	0	131	**135**	4	0	123	**127**
Authorize Document	39	0	0	**39**	39	0	0	**39**
Locate Document	0	0	100	**100**	0	0	21	**21**
Update Database	2	0	389	**391**	2	0	389	**391**
Update Log	0	207	1055	**1262**	0	207	1055	**1262**
TOTAL	**48**	**1342**	**3670**	**5060**	**48**	**1342**	**3578**	**4968**

Table C-20-a. *Number of activities by activity skill per activity classification for the paper-based system vs. an internet-based system.*

WI	Activity Skill - Number of Activities (%)							
	Paper				Internet			
Activity Classification	Managerial	Technical	Clerical	TOTAL	Managerial	Technical	Clerical	TOTAL
Prepare Document	0%	36%	64%	**100%**	0%	36%	64%	**100%**
Process Document	3%	0%	97%	**100%**	3%	0%	97%	**100%**
Authorize Document	100%	0%	0%	**100%**	100%	0%	0%	**100%**
Locate Document	0%	0%	100%	**100%**	0%	0%	100%	**100%**
Update Database	1%	0%	99%	**100%**	1%	0%	99%	**100%**
Update Log	0%	16%	84%	**100%**	0%	16%	84%	**100%**

Table C-20-b. *Distribution of activities by activity skill per activity classification for each type of system.*

C.2.4.2.2. Distribution of Processing Effort by Activity Skill per Activity Classification

How does the processing effort by activity skill (managerial, technical, and clerical) vary for each activity classification for the monthly billings process with the paper-based system vs. with an internet-based system?

When the processing effort is distributed by activity skill for each type of activity classification, we observe the following:

Paper-based process

- Of the processing effort to prepare documents: 3% was consumed by managerial activities, 32% by technical activities, and 64% by clerical activities.
- Of the processing effort to process documents: 15% was consumed by managerial activities and 85% was consumed by clerical activities.
- Of the processing effort to authorize documents: 100% was consumed by managerial activities.
- Of the processing effort to locate documents: 100% was consumed by clerical activities.
- Of the processing effort to update the accounting database: 1% was consumed by managerial activities and 99% by clerical activities.
- Of the processing effort to update logs: 100% was consumed by clerical activities.

Internet-based process

- Of the processing effort to prepare documents: 82% would be consumed by managerial activities and 18% by clerical activities.
- Of the processing effort to process documents: 14% would be consumed by managerial activities and 86% by clerical activities.
- Of the processing effort to authorize documents: 100% would be consumed by managerial activities.
- No processing effort would be needed to locate documents, update the accounting database, or update the logs.
- Of the processing effort to update the log: 100% would be consumed by managerial activities.

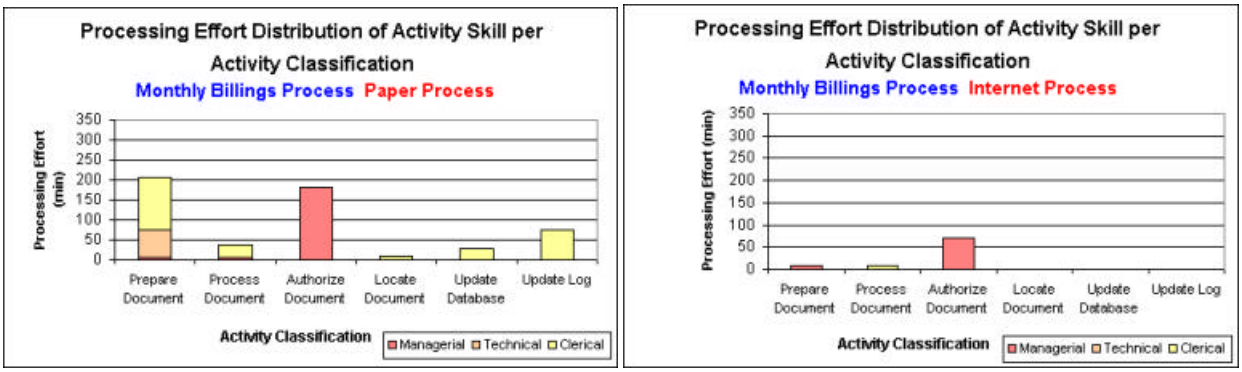

Figure C-20-c, d. *Distribution of processing effort by activity skill per activity classification for the monthly billings process with the paper-based system vs. an internet-based system.*

WI	Activity Skill - Processing Effort (min)							
	Paper				Internet			
Activity Classification	Managerial	Technical	Clerical	TOTAL	Managerial	Technical	Clerical	TOTAL
Prepare Document	7	67	133	**207**	7	0	2	**9**
Process Document	6	0	33	**39**	1	0	8	**9**
Authorize Document	181	0	0	**181**	71	0	0	**71**
Locate Document	0	0	10	**10**	0	0	0	**0**
Update Database	0	0	27	**27**	0	0	0	**0**
Update Log	0	0	76	**76**	0	0	0	**0**
TOTAL	**195**	**67**	**279**	**541**	**79**	**0**	**10**	**89**

Table C-20-c. *Processing effort by activity skill per activity classification for the paper-based system vs. an internet-based system.*

WI	Activity Skill - Processing Effort (%)							
	Paper				Internet			
Activity Classification	Managerial	Technical	Clerical	TOTAL	Managerial	Technical	Clerical	TOTAL
Prepare Document	3%	32%	64%	**100%**	82%	0%	18%	**100%**
Process Document	15%	0%	85%	**100%**	14%	0%	86%	**100%**
Authorize Document	100%	0%	0%	**100%**	100%	0%	0%	**100%**
Locate Document	0%	0%	100%	**100%**	-	-	-	**-**
Update Database	1%	0%	99%	**100%**	-	-	-	**-**
Update Log	0%	0%	100%	**100%**	-	-	-	**-**

Table C-20-d. *Distribution of processing effort by activity skill per activity classification for each type of system.*

WI	Activity Skill - Processing Effort (min)								
	Managerial			Technical			Clerical		
Activity Classification	Paper	Internet	% Change	Paper	Internet	% Change	Paper	Internet	% Change
Prepare Document	7	7	-1%	67	0	-100%	133	2	-99%
Process Document	6	1	-78%	0	0	-	33	8	-76%
Authorize Document	181	71	-61%	0	0	-	0	0	-
Locate Document	0	0	-	0	0	-	10	0	-100%
Update Database	0	0	-100%	0	0	-	27	0	-100%
Update Log	0	0	-	0	0	-	76	0	-100%
TOTAL	195	79	-59%	67	0	-100%	279	10	-97%

Table C-20-e. *Percentage decrease in processing effort due to an internet-based system.*

C.2.4.3. Distribution by Effect on Activity per Activity Classification

C.2.4.3.1. Distribution of Activities by Effect on Activity per Activity Classification

An internet-based system would affect activities in terms of processing effort. For each activity classification, how many activities would remain the same? How many would be reduced? How many would be automated? How many would be eliminated?

When the total number of activities is distributed by effect on activity for each activity classification, we observe the following:

From the paper-based process to the internet-based process

- An internet-based system would automate 99% of the activities to prepare documents, 0.1% would remain the same, 0.2% would be reduced, and 0.2% would be eliminated.
- An internet-based system would automate 83% of the activities to process documents, 3% would remain the same, 8% would be reduced and 6% would be eliminated.
- An internet-based system would reduce 18% of the activities to authorize documents, 64% would remain the same, and 18% would be automated.
- An internet-based system would automate 21% of the activities to locate documents, and 79% would be eliminated.
- An internet-based system would automate 100% of the activities to update the accounting database.
- An internet-based system would automate 100% of the activities to update logs.

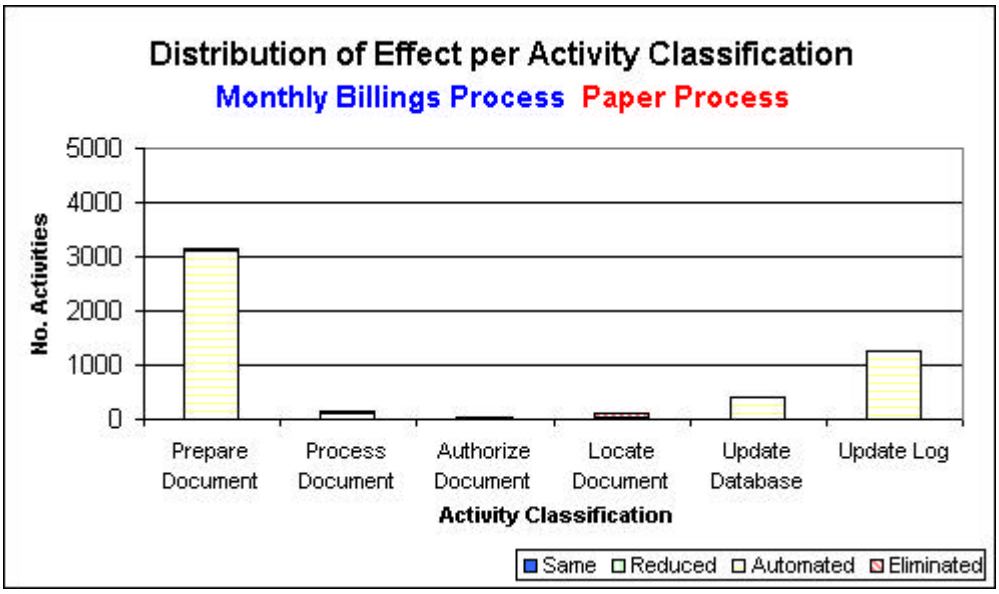

Figure C-21-a. *Distribution of activities by effect on activity per activity classification for the monthly billings process due to the paper-based system vs. an internet-based system.*

WI	Effect - Number of Activities				
Activity Classification	Same	Reduced	Automated	Eliminated	TOTAL
Prepare Document	4	7	3117	5	**3133**
Process Document	4	11	112	8	**135**
Authorize Document	25	7	7	0	**39**
Locate Document	0	0	21	79	**100**
Update Database	0	0	391	0	**391**
Update Log	0	0	1262	0	**1262**
TOTAL	**33**	**25**	**4910**	**92**	**5060**

Table C-21-a. *Number of activities by effect on activity per activity classification.*

WI	Effect - Number of Activities (%)				
Activity Classification	Same	Reduced	Automated	Eliminated	TOTAL
Prepare Document	0.1%	0.2%	99%	0.2%	**100%**
Process Document	3%	8%	83%	6%	**100%**
Authorize Document	64%	18%	18%	0%	**100%**
Locate Document	0%	0%	21%	79%	**100%**
Update Database	0%	0%	100%	0%	**100%**
Update Log	0%	0%	100%	0%	**100%**

Table C-21-b. *Distribution of activities by effect on activity per activity classification.*

C.2.4.3.2. Distribution of Processing Effort by Effect on Activity per Activity Classification

An internet-based system would affect activities in terms of processing effort. For each activity classification, how much of the processing effort would remain the same? How much would be reduced? How much would be automated? How much would be eliminated?

When the processing effort is distributed by effect on activity for each activity classification, we observe the following:

From the paper-based process to the internet-based process

- An internet-based system would reduce 3% of the processing effort to prepare documents, 4% would remain the same, 93% would be automated and 1% would be eliminated.
- An internet-based system would reduce 28% of the processing effort to process documents, 8% would remain the same, 48% would be automated and 16% would be eliminated.
- An internet-based system would reduce 85% of the processing effort to authorize documents, 14% would remain the same, and 1% would be automated.
- An internet-based system would automate 19% of the processing effort to locate documents, and 81% would be eliminated.
- An internet-based system would automate 100% of the processing effort to update the accounting database.
- An internet-based system would automate 100% of the processing effort to update logs.

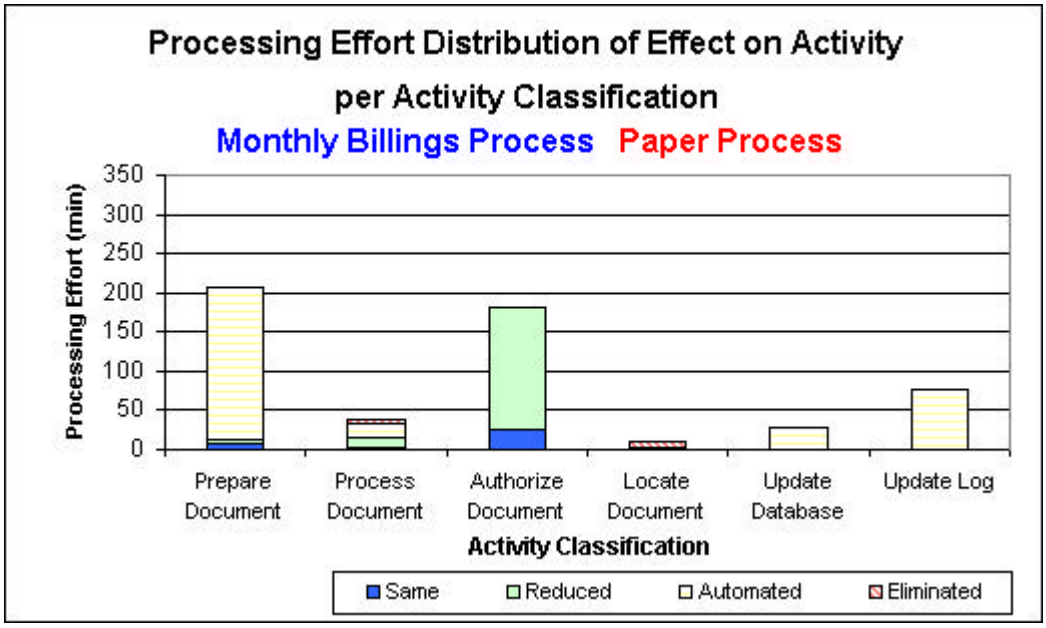

Figure C-21-b. *Distribution of processing effort by effect on activity per activity classification for the monthly billings process due to the paper-based system vs. an internet-based system.*

WI	Effect - Processing Effort (min)				
Activity Classification	Same	Reduced	Automated	Eliminated	TOTAL
Prepare Document	7	6	193	1	**207**
Process Document	3	11	18	6	**39**
Authorize Document	26	155	1	0	**181**
Locate Document	0	0	2	8	**10**
Update Database	0	0	27	0	**27**
Update Log	0	0	76	0	**76**
TOTAL	**36**	**172**	**318**	**15**	**541**

Table C-21-c. *Processing effort by effect on activity per activity classification.*

WI	Effect - Processing Effort (%)				
Activity Classification	Same	Reduced	Automated	Eliminated	TOTAL
Prepare Document	4%	3%	93%	1%	**100%**
Process Document	8%	28%	48%	16%	**100%**
Authorize Document	14%	85%	0.5%	0%	**100%**
Locate Document	0%	0%	19%	81%	**100%**
Update Database	0%	0%	100%	0%	**100%**
Update Log	0%	0%	100%	0%	**100%**

Table C-21-d. *Distribution of processing effort by effect on activity per activity classification.*

In conclusion, our analysis shows internet-based systems can be very useful in streamlining the monthly billings process and making the best use of people's talents by taking advantage of technology to automate clerical and technical activities and also to eliminate paper-based activities that are no longer relevant.