



CIFE CENTER FOR INTEGRATED FACILITY ENGINEERING

**Potential Benefits of
Internet-Based Project Control Systems –
A Study On Time Card Processing
*Appendix C***

By

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APPENDIX C. TIME CARD ANALYSIS AND RESULTS

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

C.1. Results of Time Card Analysis - Single Parameter

This section presents an overview of how each dimension varies as a function of each parameter in the process for the 9 time cards the WI sub processed.

C.1.1. Overall Process Analysis Results

C.1.1.1. Total Number of Activities

How many activities did the WI Sub perform to process 9 time cards with the paper-based system vs. with an internet-based system?

Paper-based process

- The total process consisted of 1397 activities or 155 activities per time card.

Internet-based process

- The total process would consist of 1199 activities or 134 activities per time card.
- 180 activities would be eliminated with the internet-based system - a decrease of 14% (Figure C-1-a).

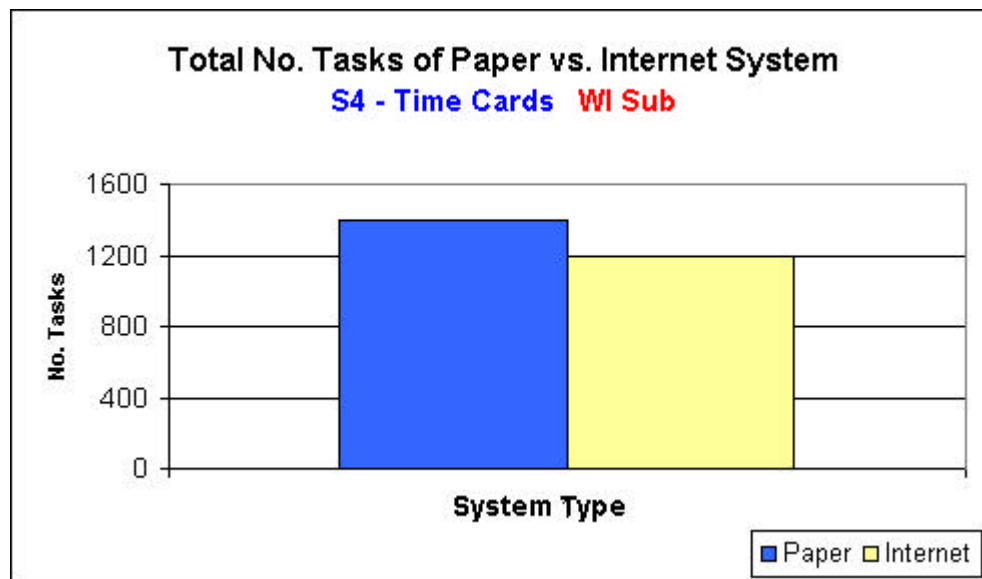


Figure C-1-a. Comparison of total number of activities to process 9 time cards with paper-based system vs. internet-based system.

System Type	Paper	Internet	% Change
TOTAL Number of Activities	1397	1199	-14%

Table C-1-a. An internet-based system would decrease the total number of activities to process 9 time cards with a paper-based system by 14%.

C.1.1.2. Total Processing Effort

How much effort did the WI Sub expend to process 9 time cards 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 118 minutes or approximately 13.1 minutes per time card.

Internet-based process

- The total processing effort would be 31 minutes or approximately 3.4 minutes per time card.
- The difference in effort is about 74% or an increase in productivity by a factor of 4:1 (Figure C-1-b).

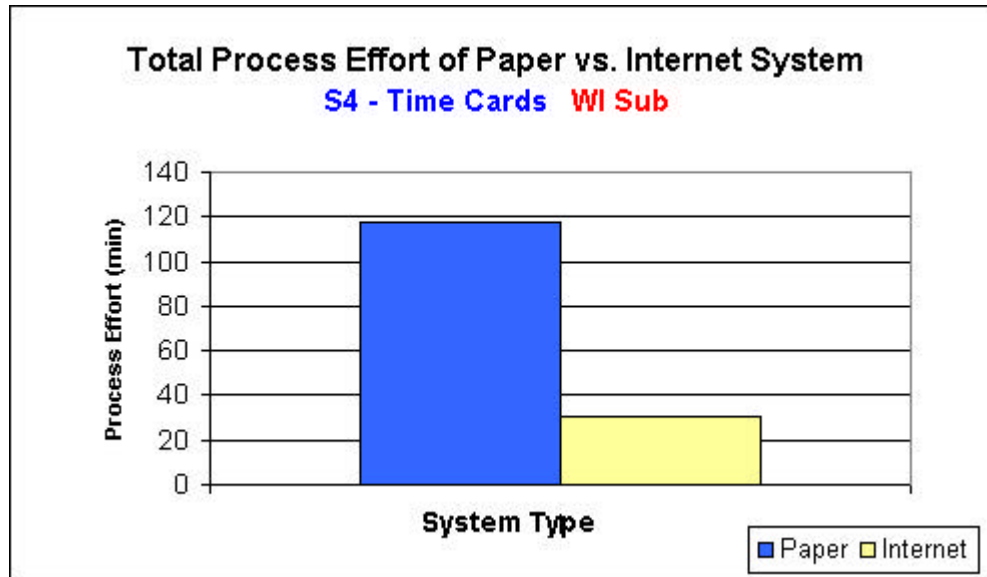


Figure C-1-b. Comparison of total processing effort to process 9 time cards with paper-based system vs. internet-based system.

System Type	Paper (min)	Internet (min)	% Change
TOTAL Processing Effort	118	31	-74%

Table C-1-b. An internet-based system would decrease the total processing effort to process 9 time cards with a paper-based system by 74%, an increase in overall productivity of 4.

C.1.1.3. Total Calendar Time

How many days did the WI Sub take to process 9 time cards with the paper-based system vs. with the internet-based system? What decrease in overall process duration would this imply?

Paper-based process

- The processing of time cards spans a period of 16 workdays or 21 calendar days including weekends (see Figure C-1-c).
- We assume process "S41 - Manage Time Cards (Field Office)" takes 1 day and "S42 - Manage Time Cards (Home Office)" takes 1 day on the following business day. For example, for time card 9, "S41" was performed on Thursday 12/18/97, and "S42" was performed on Friday 12/19/97.
- Therefore, the overall duration is a minimum of $21+1=22$ calendar days.

Internet-based process

- We assume process "S41 - Manage Time Cards (Field Office)" takes 1 day and "S42 - Manage Time Cards (Home Office)" takes 0 days since this work is either automated or eliminated (these results are discussed in section C.1.5).
- Therefore, the overall duration for the S4 process for all 9 time cards is equal to the number of calendar days, which is 21 days.

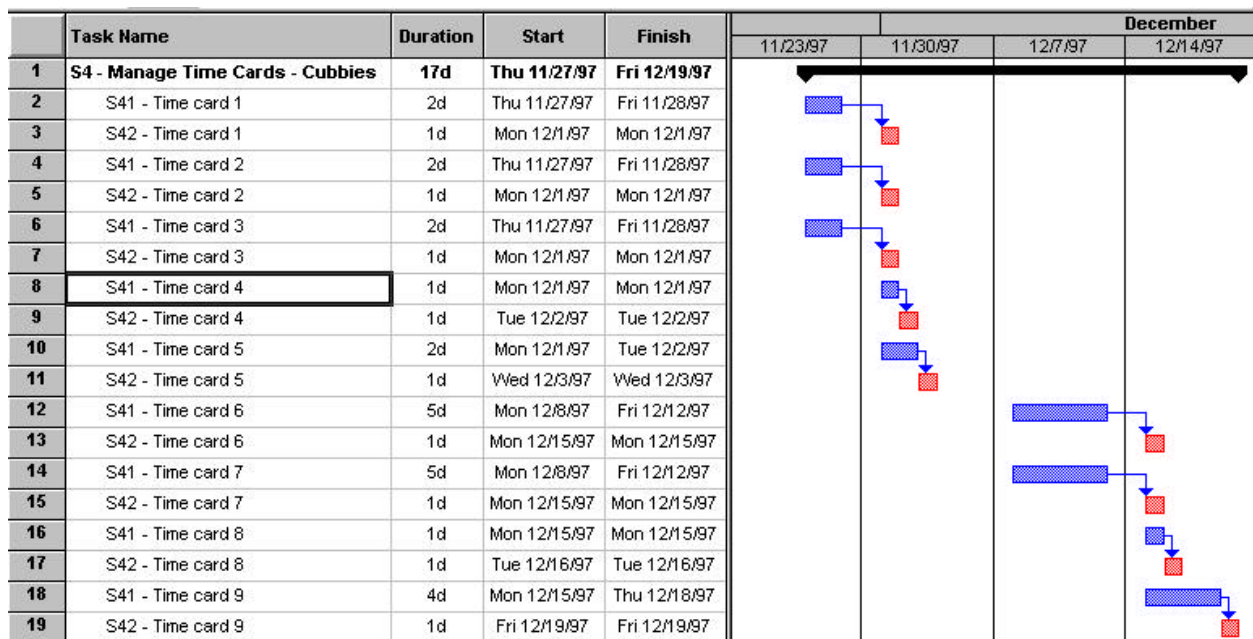


Figure C-1-c. Calendar time to process 9 time cards with paper-based system. The savings with an internet-based system would only be 1 business day since transaction S42 would be done automatically with S41.

C.1.2. Analysis Results per Transaction

C.1.2.1. Transactions per Position

What transactions does each WI Sub actor (foreman, clerk, and accounting entry person) perform in the paper-based system vs. in the internet-based system? How many handoffs exist?

Paper-based process

Field office transactions:

- The foreman performs the following transactions:
 - S411 - Prepare Time Card
 - S412 - Authorize Time Card
 - S413 - Send Time Card
 - S414 - Locate Time Card

Home office transactions:

- The clerk performs the following transaction:
 - S421 - Receive Time Card
- The accounting entry person performs the following transactions:
 - S422 - Access Accounting Database
 - S423 - Post Time Card in Accounting Database
 - S424 - Update Accounting Database
 - S425 - Locate Time Card

In the paper-based system, there are at least 3 hand-offs of the time card: Foreman ? Clerk ? Accounting entry person (see Figure 3-2).

Internet-based process

Field office transactions:

- The foreman performs the following transactions:
 - S411 - Prepare Time Card
 - S412 - Authorize Time Card
 - S413 - Send Time CardTransaction "S414 - Locate Time Card" is eliminated.

Home office transactions:

- The internet-based system automates the following transactions:
 - S421 - Receive Time Card
 - S422 - Access Accounting Database
 - S423 - Post Time Card in Accounting Database
 - S424 - Update Accounting DatabaseTransaction "S425 - Locate Time Card" is eliminated.

In the internet-based system, only the foreman handles time cards.

C.1.2.2. Total Number of Activities per Transaction

How many activities are included in each transaction to process 9 time cards with the paper-based system vs. with the internet-based system?

Paper-based process

- Transaction "S411 - Prepare Time Cards" includes 728 activities or 52% of the total activities.
- Transaction "S412 - Authorize Time Cards" includes 36 activities or 3% of the total activities.
- Transaction "S413 - Send Time Cards" includes 45 activities or 3% of the total activities.
- Transaction "S414 - Archive Time Cards - Field Office" includes 90 activities or 6% of the total activities.
- Transaction "S421 - Receive Time Cards" includes 36 activities or 3% of the total activities.
- Transaction "S422 - Access Accounting Database" includes 45 activities or 3% of the total activities.
- Transaction "S423 - Post Time Cards in Accounting Database" includes 300 activities or 22% of the total Activities.
- Transaction "S424 - Update Accounting Database" includes 27 activities or 2% of the total activities.
- Transaction "S425 - Archive Time Cards - Home Office" includes 90 activities or 6% of the total activities.

Internet-based process

- Most transactions include the same number of activities as in the paper-based system.
- The main exceptions are transactions "S414" and "S425" since the work to archive time cards would be eliminated with the internet-based system (Figure C-2-a).

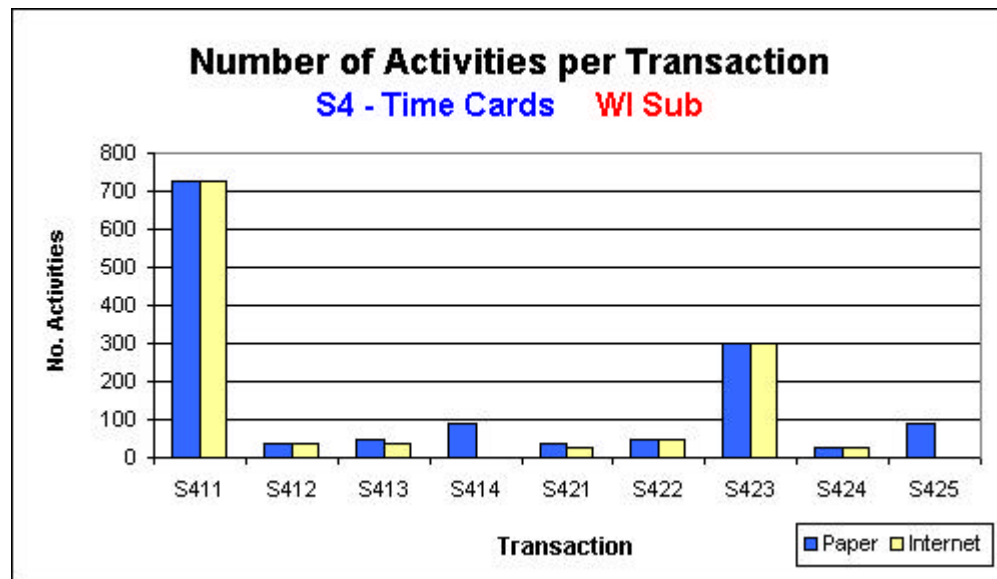


Figure C-2-a. Comparison of activities per transaction to process 9 time cards with paper-based system vs. internet-based system.

Transaction	Paper	% of Activities	Internet	% of Activities
S411 - Prepare Time Card	728	52%	728	61%
S412 - Authorize Time Card	36	3%	36	3%
S413 - Send Time Card	45	3%	36	3%
S414 - Archive Time Card	90	6%	0	0%
S421 - Receive Time Card	36	3%	27	2%
S422 - Access Accounting DB	45	3%	45	4%
S423 - Post Time Card in DB	300	22%	300	25%
S424 - Update Accounting DB	27	2%	27	2%
S425 - Archive Time Card	90	6%	0	0%
TOTAL Number of Activities	1397	100%	1199	100%

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

C.1.2.3. Processing Effort per Transaction

How much effort did each transaction take to process 9 time cards with the paper-based system vs. with the internet-based system?

Paper-based process

- Transaction "S411 - Prepare Time Cards" took 54 minutes or 46% of the total processing effort.
- Transaction "S412 - Authorize Time Cards" took 5 minutes or 4% of the total processing effort.
- Transaction "S413 - Send Time Cards" took 4 minutes or 4% of the total processing effort.
- Transaction "S414 - Archive Time Cards - Field Office" took 9 minutes or 8% of the total processing effort.
- Transaction "S421 - Receive Time Cards" took 2 minutes or 2% of the total processing effort.
- Transaction "S422 - Access Accounting Database" took 7 minutes or 6% of the total processing effort.
- Transaction "S423 - Post Time Cards in Accounting Database" took 25 minutes or 21% of the total processing effort.
- Transaction "S424 - Update Accounting Database" took 2 minutes or 2% of the total processing effort.
- Transaction "S425 - Archive Time Cards - Home Office" took 9 minutes or 8% of the total processing effort.

Internet-based process

- Transaction "S411 - Prepare Time Cards" would take 25 minutes or 83% of the total processing effort. This is a reduction of 54% in processing effort.
- Transaction "S412 - Authorize Time Cards" would take 5 minutes or 12% of the total processing effort. This is a reduction of 17% in processing effort.
- Transaction "S413 - Send Time Cards" would take 2 minutes or 5% of the total processing effort. This is a reduction of 67% 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).

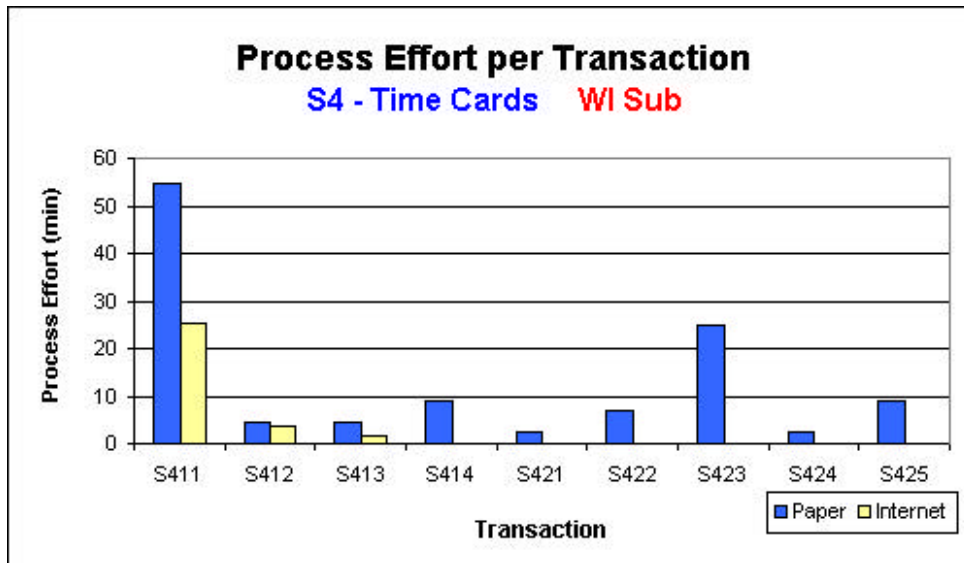


Figure C-2-b. Comparison of processing effort per transaction to process 9 time cards with paper-based system vs. internet-based system.

Transaction	Paper (min)	% of Effort	Internet (min)	% of Effort
S411 - Prepare Time Card	54	46%	25	83%
S412 - Authorize Time Card	5	4%	4	12%
S413 - Send Time Card	4	4%	2	5%
S414 - Archive Time Card	9	8%	0	0%
S421 - Receive Time Card	2	2%	0	0%
S422 - Access Accounting DB	7	6%	0	0%
S423 - Post Time Card in DB	25	21%	0	0%
S424 - Update Accounting DB	2	2%	0	0%
S425 - Archive Time Card	9	8%	0	0%
TOTAL Processing Effort	118	100%	31	100%

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

Transaction	Paper (min)	Internet (min)	% Change
S411 - Prepare Time Card	54	25	-54%
S412 - Authorize Time Card	5	4	-17%
S413 - Send Time Card	4	2	-67%
S414 - Archive Time Card	9	0	-100%
S421 - Receive Time Card	2	0	-100%
S422 - Access Accounting DB	7	0	-100%
S423 - Post Time Card in DB	25	0	-100%
S424 - Update Accounting DB	2	0	-100%
S425 - Archive Time Card	9	0	-100%
TOTAL Processing Effort	118	31	-74%

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

C.1.3. Analysis Results per Position

C.1.3.1. Total Number of Activities per Position

How many activities did the WI sub actors (foreman, clerk, and accounting entry person) perform to process 9 time cards with the paper-based system vs. with the internet-based system?

Paper-based process

- The foreman performed 899 activities or 62% of the total activities.
- The clerk performed 36 activities or 2% of the total activities.
- The accounting entry person performed 462 activities or 36% of the total activities.

Internet-based process

- The foreman would perform 1199 activities or 100% of the total activities (Figure C-3-a).
- The clerk would perform 0 activities. His work would be automated and reassigned to the foreman.
- The accounting entry person would perform 0 activities. Her work would be automated or eliminated, and reassigned to the foreman.

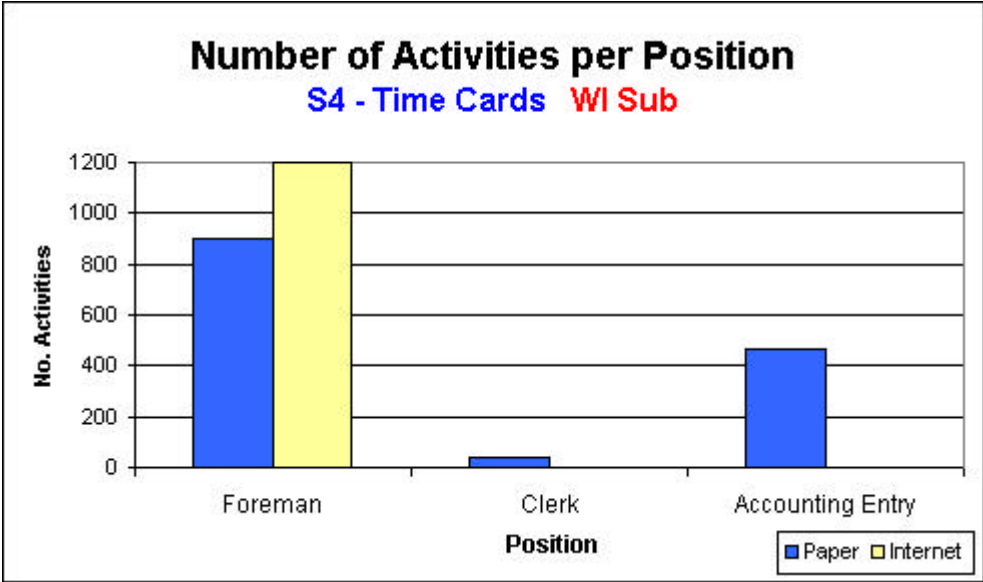


Figure C-3-a. Comparison of number of activities per position to process 9 time cards with paper-based system vs. internet-based system.

Position	Paper	% of Activities	Internet	% of Activities
Foreman	899	62%	1199	100%
Clerk	36	2%	-	-
Accounting Entry	462	36%	-	-
TOTAL Number of Activities	1397	100%	1199	100%

Table C-3-a. Distribution of number of activities per position for each type of system. The clerk's and accounting entry's activities have been reassigned to the foreman.

C.1.3.2. Processing Effort per Position

How much effort would the WI sub actors (foreman, clerk, and accounting entry person) expend to process 9 time cards with the paper-based system vs. with an internet-based system?

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

Who would be eliminated from the process due to an internet-based system?

Paper-based process

- The foreman took 73 minutes or 62% of the total processing effort.
- The clerk took 2 minutes or 2% of the total processing effort.
- The accounting entry person took 43 minutes or 36% of the total processing effort.

Internet-based process

- The foreman would take 31 minutes or 100% of the total processing effort. Even though the foreman is now completing all the work for the time cards, he would still spend less than half the time working on time cards with an internet-based system (Figure C-3-b).
- The clerk would take 0 minutes. He would be completely eliminated from the process.
- The accounting entry person would take 0 minutes. She would also be completely eliminated from the process.

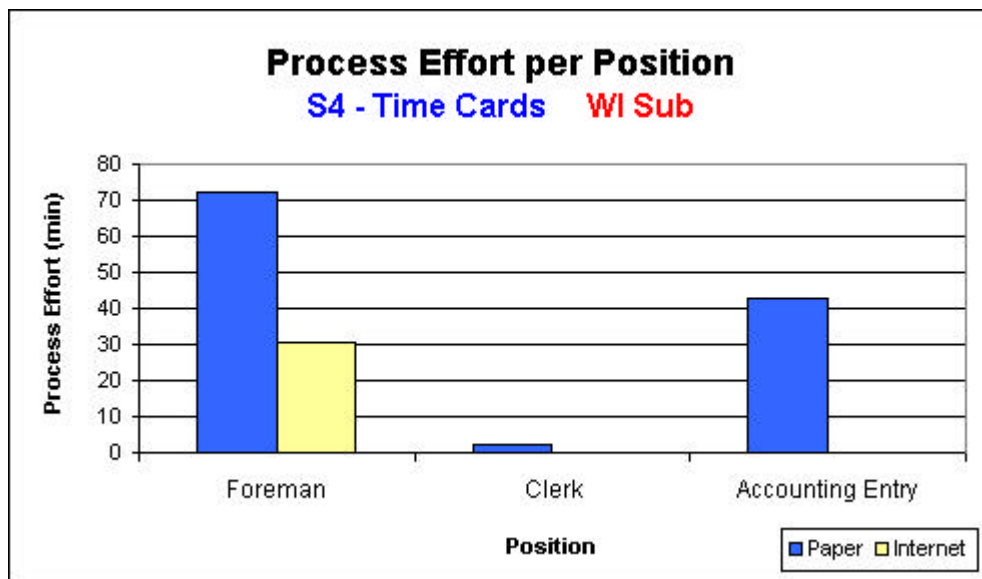


Figure C-3-b. Comparison of processing effort per position to process 9 time cards with paper-based system vs. internet-based system.

Position	Paper (min)	% of Time	Internet (min)	% of Time
Foreman	73	62%	31	100%
Clerk	2	2%	-	-
Accounting Entry	43	36%	-	-
TOTAL Processing Effort	118	100%	31	100%

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

Position	Paper (min)	Internet (min)	% Change
Foreman	73	31	-58%
Clerk	2	-	-100%
Accounting Entry	43	-	-100%
TOTAL Processing Effort	118	31	-74%

Table C-3-c. Percentage decrease of processing effort per position 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 time card), technical (e.g., calculate total work hours), or clerical (e.g., enter cost code 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 252 managerial activities or 18% of the total activities.
- There are 380 technical activities or 27% of the total activities.
- There are 765 clerical activities or 55% 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 180 activities. This would be a reduction of 26% in the number of clerical activities over the paper-based system (Figure C-4-a).

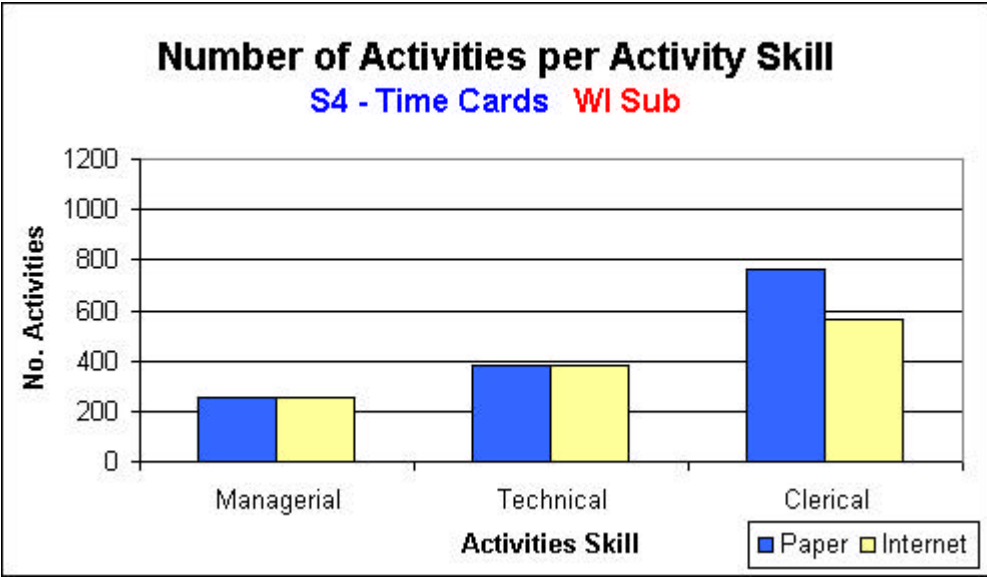


Figure C-4-a. Comparison of activities per activity skill to process 9 time cards with paper-based system vs. internet-based system.

Activity Skill	Paper	% of Activities	Internet	% of Activities
Managerial	252	18%	252	21%
Technical	380	27%	380	32%
Clerical	765	55%	567	47%
TOTAL Number of Activities	1397	100%	1199	100%

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

Activity Skill	Paper	Internet	% Change
Managerial	252	252	0%
Technical	380	380	0%
Clerical	765	567	-26%
TOTAL Number of Activities	1397	1199	-14%

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 to process 9 time cards 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 24 minutes or 20% of the total processing effort.
- The technical activities took 26 minutes or 23% of the total processing effort.
- The clerical activities took 68 minutes or 57% of the total processing effort.

Internet-based process

- The managerial activities would take 23 minutes, only 6% less effort than with the paper-based system. This result is to be expected since managerial activities generally involve judgment, which is not significantly affected by the type of system used. However, managerial activities now comprise 74% of the total processing effort! This is a much better use of talent and skill.
- The technical Activities would take 5 minutes or 16% of the total processing effort. This is a reduction of 81% in effort.
- The clerical activities would take only 3 minutes or 10% of the total processing effort. This would be a reduction of 96% 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.

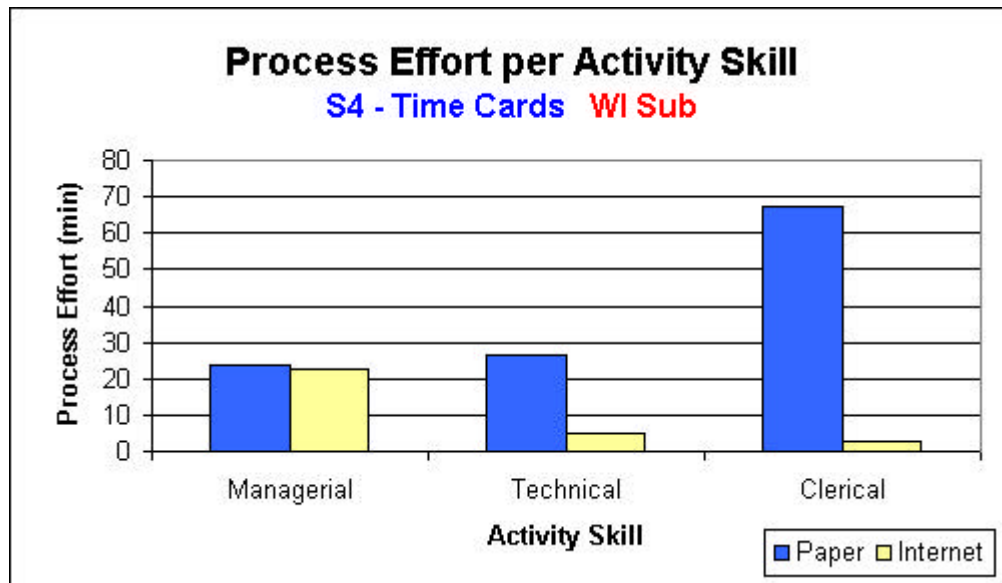


Figure C-4-b. Comparison of processing effort per activity skill for the paper-based system vs. an internet-based system to process 9 time cards.

Activity Skill	Paper (min)	% of Effort	Internet (min)	% of Effort
Managerial	24	20%	23	74%
Technical	26	23%	5	16%
Clerical	68	57%	3	10%
TOTAL Processing Effort	118	100%	31	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	24	23	-6%
Technical	26	5	-81%
Clerical	68	3	-96%
TOTAL Processing Effort	118	31	-74%

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 activities would be reduced? How many activities would be automated? How many activities would be eliminated?

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

- There are 312 activities or 22% of the total activities that would remain the same in terms of processing effort (Figure C-5-a).
- There are 9 activities or 1% of the total activities that would be reduced.
- There are 878 activities or 63% of the total activities that would be automated.
- There are 198 activities or 14% of the total activities that would be eliminated.

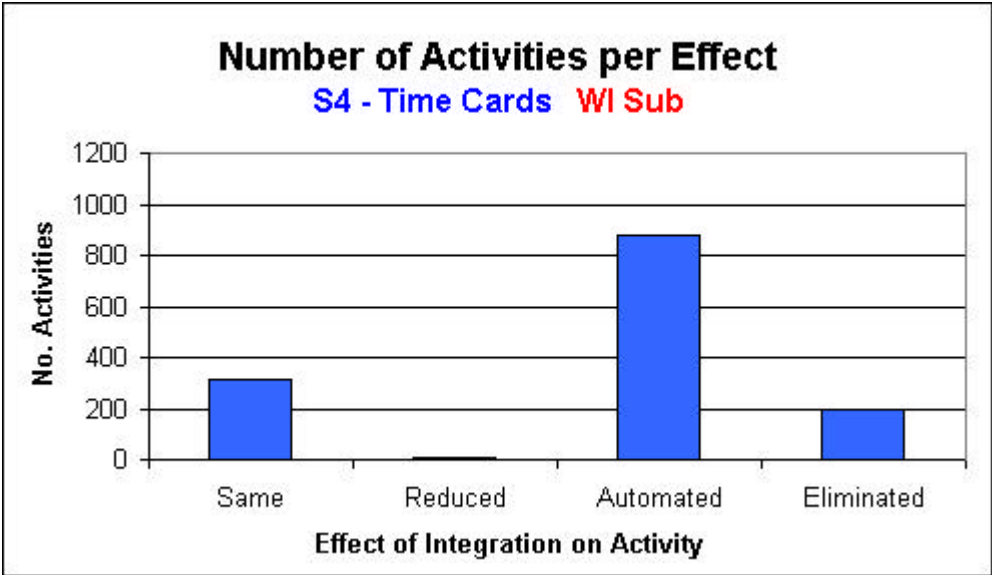


Figure C-5-a. Distribution of activities per effect on activity to process 9 time cards going from the paper-based system to the internet-based system.

Effect	Paper	% of Activities	Internet
Same	312	22%	312
Reduced	9	1%	9
Automated	878	63%	878
Eliminated	198	14%	-
TOTAL Number of Activities	1397	100%	1199

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 29 minutes or 25% of the total paper-based processing effort.
- The effort for activities that are reduced would drop from 3 minutes to 2 minutes or 2% of the total paper-based processing effort.
- The effort for activities that would be automated is 66 minutes or 56% of the total paper-based effort (Figure C-5-b).
- The effort for activities that would be eliminated is 20 minutes or 17% of the processing effort.
- Altogether, 86 minutes or 72% of the total processing effort would be automated or eliminated.

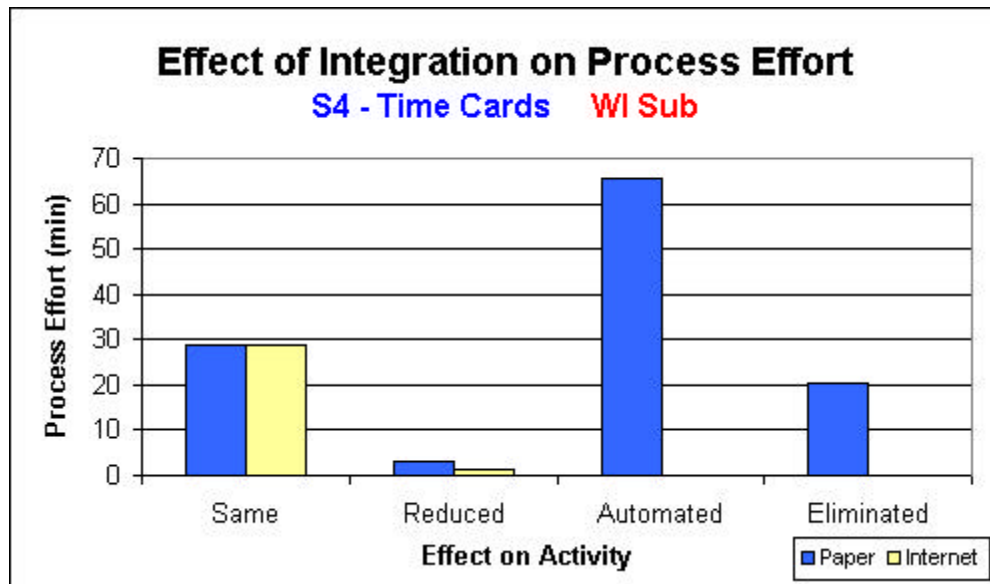


Figure C-5-b. Distribution of processing effort per effect on activity to process 9 time cards going from the paper-based system to an internet-based system.

Effect	Paper (min)	% of Effort	Internet (min)	% of Effort
Same	29	25%	29	95%
Reduced	3	2%	2	5%
Automated	66	56%	-	-
Eliminated	20	17%	-	-
TOTAL Processing Effort	118	100%	31	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 time card), to process documents (e.g., send time card), to authorize documents (e.g., review time card), to locate documents (e.g., archive time card), 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 were 728 activities to prepare documents or 52% of the total activities.
- There were 90 activities to process documents or 6% of the total activities.
- There were 36 activities to authorize documents or 3% of the total activities.
- There were 180 activities to locate documents or 13% of the total activities.
- There were 363 activities to update the accounting database or 26% of the total activities.

Internet-based process

- The number of activities to prepare documents would remain the same, yet the percentage would rise to 61% (Figure C-6-a).
- The number of activities to process documents would decrease to 72 activities, yet the percentage would stay at 6%.
- The number of activities to authorize documents would remain the same, and the percentage would stay at 3%.
- The number of activities to locate documents goes to 0. All these activities would be eliminated.
- The number of activities to update the accounting database would remain the same, and the percentage would increase to 30%.

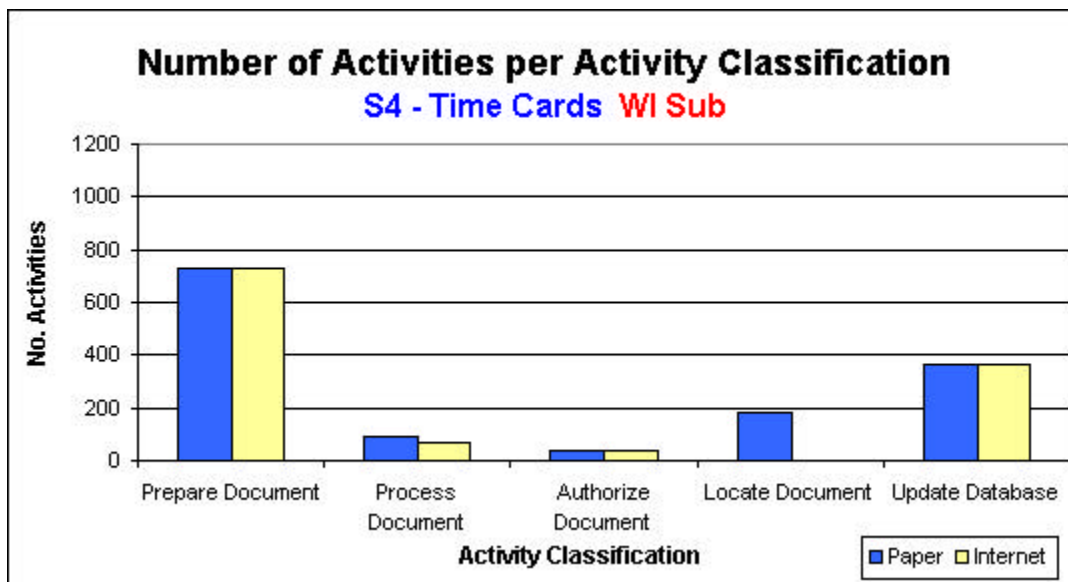


Figure C-6-a. Comparison of activities per activity classification to process 9 time cards with the paper-based system vs. internet-based system.

Activity Classification	Paper	% of Activities	Internet	% of Activities
Prepare Document	728	52%	728	61%
Process Document	90	6%	72	6%
Authorize Document	36	3%	36	3%
Locate Document	180	13%	0	0%
Update Database	363	26%	363	30%
TOTAL Number of Activities	1397	100%	1199	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 time card), to process documents (e.g., send time card), to authorize documents (e.g., review time card), to locate documents (e.g., archive time card), 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 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 54 minutes or 47% of the total processing effort.
- The effort to process documents was 10 minutes or 8% of the total processing effort.
- The effort to authorize documents was 5 minutes or 4% of the total processing effort.
- The effort to locate documents was 18 minutes or 15% of the total processing effort.
- The effort to update the accounting database was 31 minutes or 26% of the total processing effort.

Internet-based process

- The effort to prepare documents would decrease by 54% to 25 minutes or 83% of the total processing effort.
- The effort to process documents would decrease to 85% to 2 minutes or 5% of the total processing effort.
- The effort to authorize documents would decrease by 17% to 4 minutes or 12% of the total processing effort.
- The effort to locate (archive/retrieve) documents goes 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).

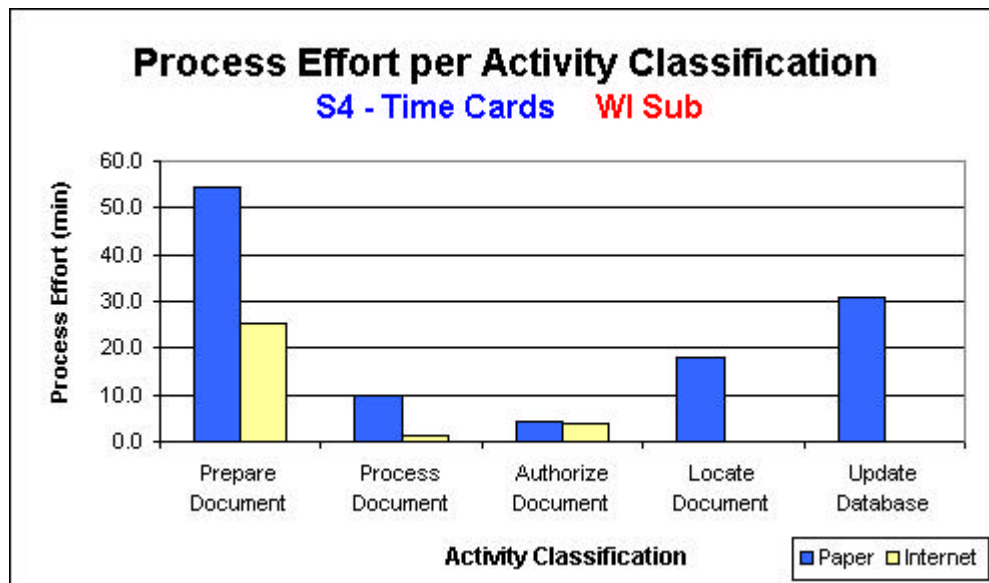


Figure C-6-b. Comparison of processing effort per activity classification to process 9 time cards with the paper-based system vs. internet-based system. The effort to locate documents and update the accounting database goes to 0 in the internet-based system since these activities are automated or eliminated.

Activity Classification	Paper (min)	% of Effort	Internet (min)	% of Effort
Prepare Document	54	47%	25	83%
Process Document	10	8%	2	5%
Authorize Document	5	4%	4	12%
Locate Document	18	15%	-	-
Update Database	31	26%	-	-
TOTAL Processing Effort	118	100%	31	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	54	25	-54%
Process Document	10	2	-85%
Authorize Document	5	4	-17%
Locate Document	18	-	-100%
Update Database	31	-	-100%
TOTAL Processing Effort	118	31	-74%

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 252 activities at the document level or 18% of the total activities.
- There were 1145 activities at the information element level or 82% of the total activities (Figure C-7-a).

Internet-based process

- The number of activities at the document level would decrease by 64% to 90 activities or 8% of the total activities.
- The number of activities at the information element level would decrease by 3% to 1109 activities or 92% of the total activities.

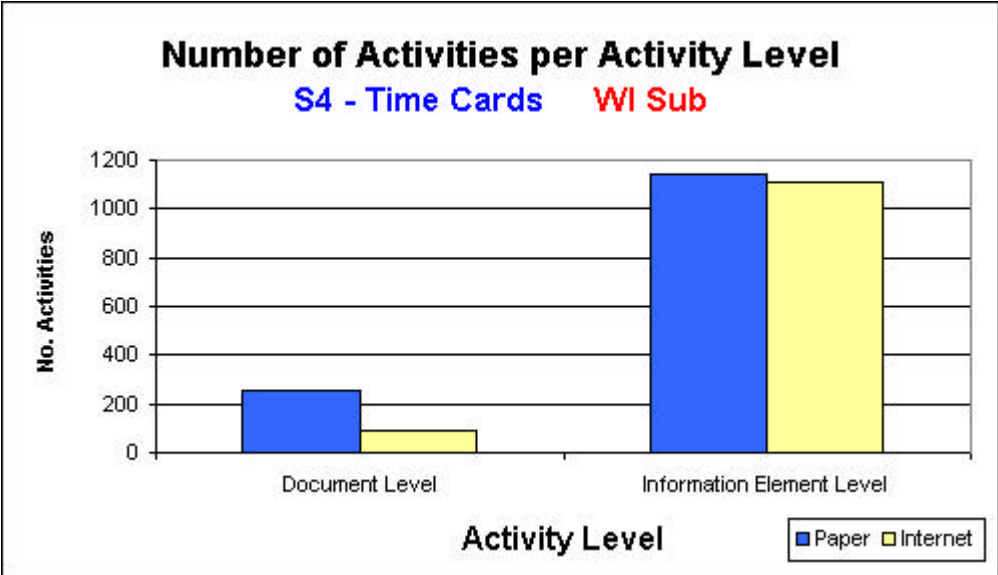


Figure C-7-a. Comparison of activities per activity level to process 9 time cards with paper-based system vs. internet-based system.

Activity Level	Paper	% of Activities	Internet	% of Activities
Document Level	252	18%	90	8%
Information Element Level	1145	82%	1109	92%
TOTAL Number of Activities	1397	100%	1199	100%

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

Activity Level	Paper	Internet	% Change
Document Level	252	90	-64%
Information Element Level	1145	1109	-3%
TOTAL Number of Activities	1397	1199	-14%

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 was 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 32 minutes at the document level or 27% of the total processing effort.
- The processing effort was 86 minutes at the information element level or 73% of the total processing effort.

Internet-based process

- The processing effort at the document level would decrease by 83% to 5 minutes or 17% of the total processing effort (Figure C-7-b).
- The processing effort at the information element level would decrease by 71% to 26 minutes or 83% of the total processing effort.

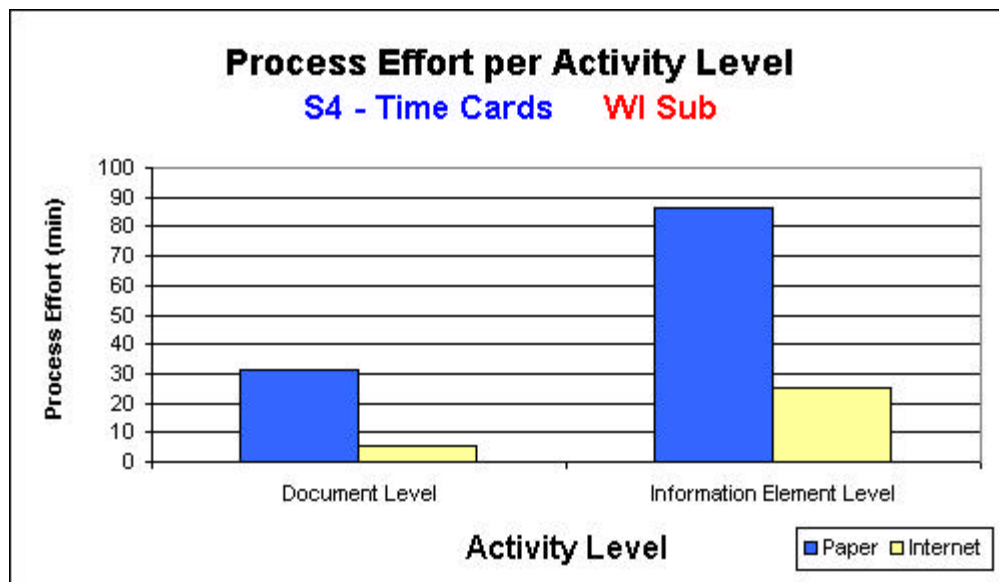


Figure C-7-b. Comparison of processing effort per activity level to process 9 time cards with paper-based system vs. internet-based system.

Activity Level	Paper (min)	% of Activities	Internet (min)	% of Activities
Document Level	32	27%	5	17%
Information Element Level	86	73%	26	83%
TOTAL Processing Effort	118	100%	31	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	32	5	-83%
Information Element Level	86	26	-71%
TOTAL Processing Effort	118	31	-74%

Table C-7-d. Percentage decrease in processing effort per activity level due to an 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 1145 activities at the information element level:
 - 216 activities or 19% required new information entry.
 - 195 activities or 17% used information an internet-based system could generate automatically (e.g., enter document date).
 - 141 activities or 12 used information an internet-based system could calculate automatically (e.g., calculate total RT labor hours).
 - 72 activities or 6% used information an internet-based system could obtain automatically from function category "S1 - Setup Project" (e.g., enter project name).
 - 120 activities or 11% used information an internet-based system could obtain automatically from function category "S2 - Scope Management" (e.g., enter cost code description).
 - 401 activities or 35% used information an internet-based system could obtain automatically from within the same function category "S4 - Manage Field Resources" (e.g., enter cost code ID).

Internet-based process

- Of the 1109 activities at the information element level:
 - The number of activities whose source would be S4 would decrease by 9% to 365 activities or 33% of the activities at the information level (Figure C-8-a).
 - All other activities would remain the same as in the paper-based system.

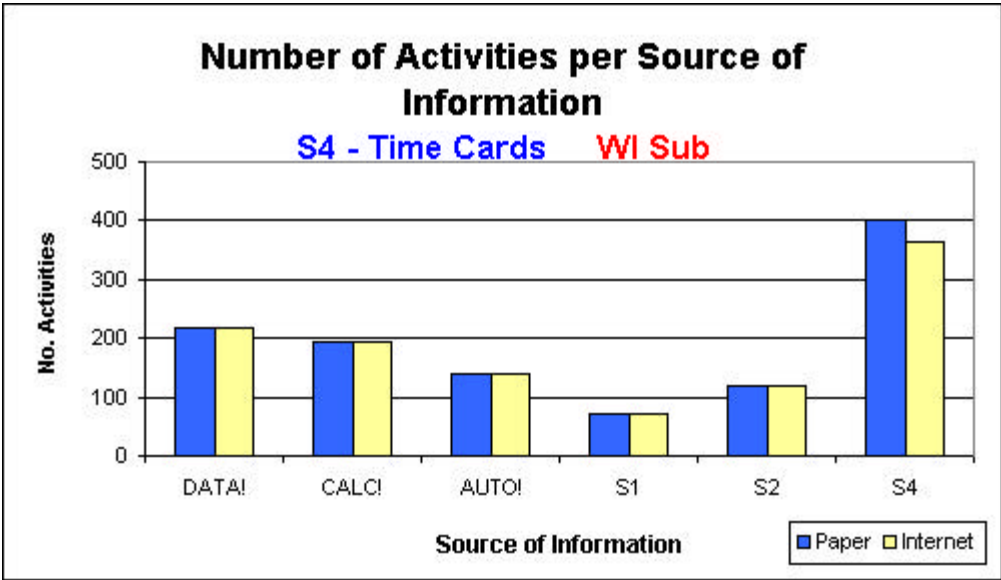


Figure C-8-a. Comparison of activities per source of information to process 9 time cards for activities at the information element level in the paper-based system vs. an internet-based system.

Source of Information	Paper	% of Activities	Internet	% of Activities
DATA!	216	19%	216	19%
AUTO!	195	17%	195	18%
CALC!	141	12%	141	13%
S1	72	6%	72	6%
S2	120	11%	120	11%
S4	401	35%	365	33%
TOTAL Number of Activities	1145	100%	1109	100%

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

Source of Information	Paper	Internet	% Change
DATA!	216	216	-
AUTO!	195	195	-
CALC!	141	141	-
S1	72	72	-
S2	120	120	-
S4	401	365	-9%
TOTAL Number of Activities	1145	1109	-3%

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 was used for activities whose information could be automatically generated (AUTO!), calculated (CALC!), or obtained from another process (i.e., S1, S2, or S4)?

Paper-based process

- The processing effort was 86 minutes for activities at the information element level. Of this amount:
 - 20 minutes or 23% was for activities that required new information entry.
 - 11 minutes or 13% was for activities that could automatically generate the information (e.g., enter document date).
 - 7 minutes or 8% was for activities that calculate information (e.g., calculate total Regular Time labor hours).
 - 5 minutes or 6% was for activities whose information comes from function category "S1 - Setup Project" (e.g., project name).
 - 10 minutes or 11% was for activities whose information comes from function category "S2 - Scope Management" (e.g., cost codes).
 - 33 minutes or 39% was for activities whose information comes from within the same function category "S4 - Manage Field Resources" (e.g., RT labor hours total per day).

Internet-based process

- The processing effort would be 25 minutes for activities at the information element level. Of this amount:
 - 19 minutes or 74% would be for activities that require new information entry.
 - 2 minutes or 6% would be for activities whose information would come from function category "S1 - Setup Project" (e.g., project name).
 - 5 minutes or 20% would be for activities whose information would come from function category "S2 - Scope Management" (e.g., cost codes). These types of activities would be integrated, yet would still require manual selection.
- All other activities would be automated or eliminated, thus their time would be reduced to 0 (Figure C-8-b).

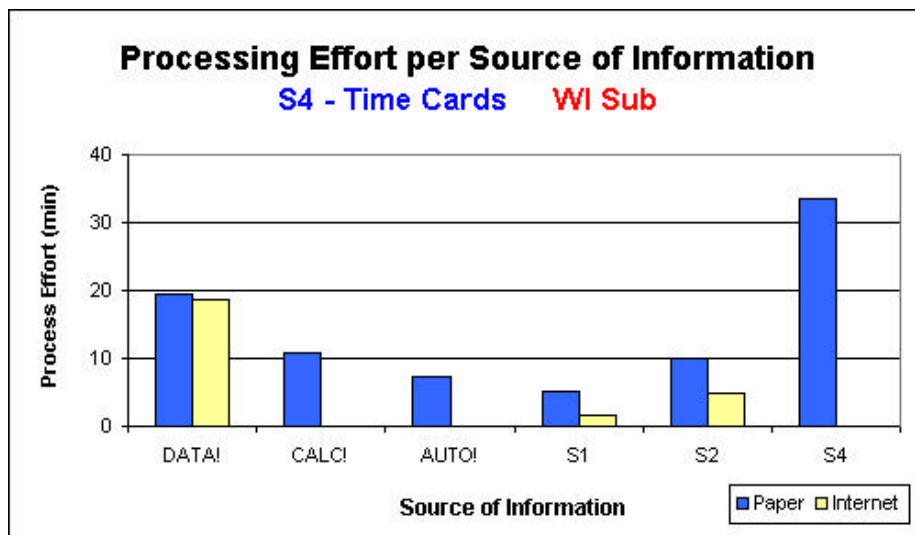


Figure C-8-b. Comparison of processing effort per source of information for activities at the information element level to process 9 time cards with the paper-based system vs. an internet-based system.

Source of Information	Paper (min)	% of Effort	Internet (min)	% of Effort
DATA!	20	23%	19	74%
AUTO!	11	13%	0	-
CALC!	7	8%	0	-
S1	5	6%	1	6%
S2	10	11%	5	20%
S4	33	39%	0	-
TOTAL Processing Effort	86	100%	25	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!	20	19	-4%
AUTO!	11	0	-100%
CALC!	7	0	-100%
S1	5	1	-71%
S2	10	5	-50%
S4	33	0	-100%
TOTAL Processing Effort	86	25	-71%

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.

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?

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

Paper-based process

- Of the 1145 information elements:
 - 0 were "\$ Amounts".
 - 240 or 21% were "Dates".
 - 9 or 1% were "Hyperlinks" (references to other documents).
 - 215 or 19% were alphanumeric "IDs".
 - 351 or 31% were "Numbers".
 - 9 or 1% were "Signatures".
 - 303 or 26% were "Text" elements.
 - 18 or 25% were "Time" elements.

Internet-based process

- Of the 1109 information elements:
 - The number of "Dates" would decrease by 15% to 204 "Dates" or 18% of the information elements.
 - All other data types would remain the same as in the paper-based system (Figure C-9-a).

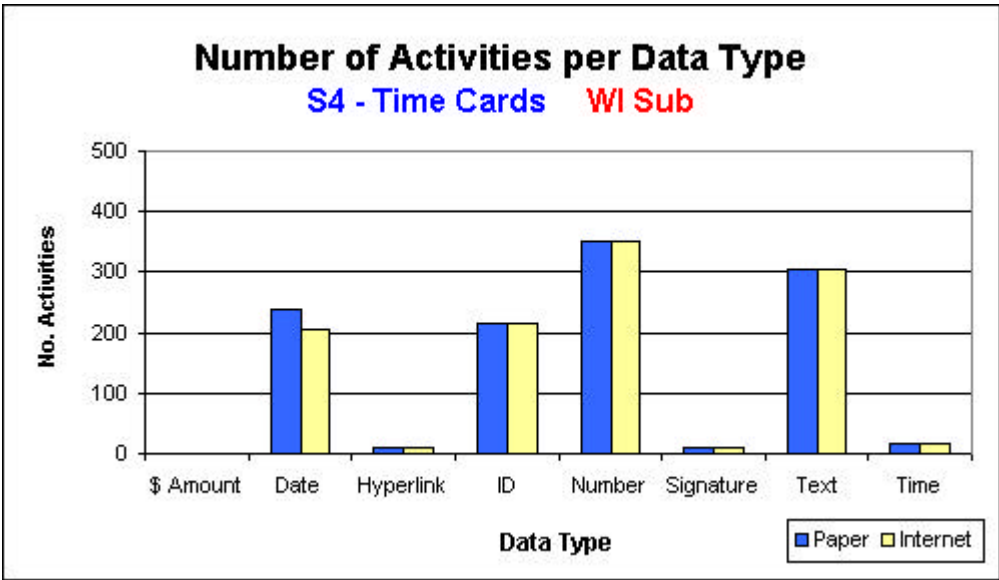


Figure C-9-a. Comparison of activities per data type for activities at the information element level to process 9 time cards with the paper-based system vs. an internet-based system.

Data Type	Paper	% of Activities	Internet	% of Activities
\$ Amount	-	-	-	-
Date	240	21%	204	18%
Hyperlink	9	1%	9	1%
ID (alphanumeric)	215	19%	215	19%
Number	351	31%	351	32%
Signature (encrypted text)	9	1%	9	1%
Text	303	26%	303	27%
Time	18	2%	18	2%
TOTAL Number of Activities	1145	100%	1109	100%

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

Data Type	Paper	Internet	% Change
\$ Amount	-	-	-
Date	240	204	-15%
Hyperlink	9	9	-
ID (alphanumeric)	215	215	-
Number	351	351	-
Signature (encrypted text)	9	9	-
Text	303	303	-
Time	18	18	-
TOTAL Number of Activities	1145	1109	-3%

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 is 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 0 minutes since they do not appear in this process.
- The processing effort for "Dates" was 18 minutes or 21% of the processing effort.
- The processing effort for "Hyperlinks" was 2 minutes or 2% of the processing effort.
- The processing effort for "IDs" was 17 minutes or 20% of the processing effort.
- The processing effort for "Numbers" was 24 minutes or 28% of the processing effort.
- The processing effort for "Signatures" was 1 minute or 1% of the processing effort.
- The processing effort for "Text" elements was 24 minutes or 28% of the processing effort.
- The processing effort for "Time" elements was 0 minutes since they do not appear in this process.

Internet-based process

- The processing effort for "Dates" would decrease by 73% to 5 minutes or 20% of the processing effort.
- The processing effort for "Hyperlinks" would remain the same.
- The processing effort for "IDs" would decrease by 67% to 6 minutes or 23% of the processing effort.
- The processing effort for "Numbers" would decrease by 79% to 5 minutes or 20% of the processing effort (Figure C-9-b).
- The processing effort for "Signatures" would remain the same.
- The processing effort for "Text" elements would decrease by 70% to 7 minutes or 28% of the processing effort.

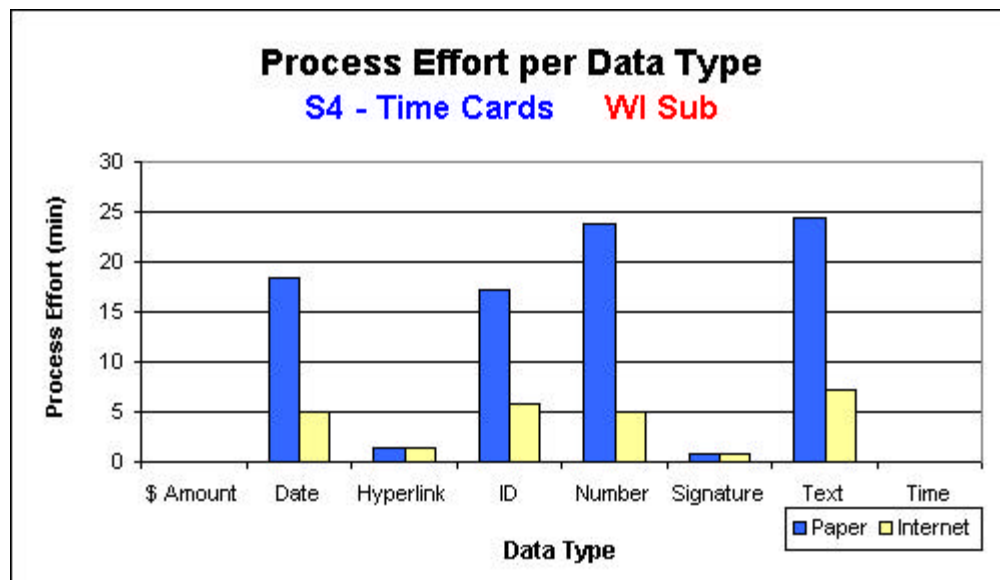


Figure C-9-b. Comparison of processing effort per data type for activities at the information element level to process 9 time cards in the paper-based system vs. an internet-based system.

Data Type	Paper (min)	% of Effort	Internet (min)	% of Effort
\$ Amount	-	-	-	-
Date	18	21%	5	20%
Hyperlink	2	2%	2	6%
ID (alphanumeric)	17	20%	6	23%
Number	24	28%	5	20%
Signature (encrypted text)	1	1%	1	3%
Text	24	28%	7	28%
Time	0	0%	0	0%
TOTAL Processing Effort	86	100%	25	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	-	-	-
Date	18	5	-73%
Hyperlink	2	2	0%
ID (alphanumeric)	17	6	-67%
Number	24	5	-79%
Signature (encrypted text)	1	1	0%
Text	24	7	-70%
Time	0	0	-
TOTAL Processing Effort	86	25	-71%

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

C.2. Results of Time Card Analysis - Multi-Parameter

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

C.2.1. Distribution per Position

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

C.2.1.1. Distribution by Activity Skill per Position

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

How does the number of activities by type of skill (managerial, technical, or clerical) vary for each position to process 9 time cards with the paper-based system vs. with an internet-based system?

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

Paper-based process

- The distribution of activities for the foreman is as follows: 26% managerial, 42% technical, and 32% clerical activities (Figure C-10-a).
- The distribution of activities for the clerk is as follows: 100% clerical activities.
- The distribution of activities for the accounting entry person is as follows: 4% managerial and 96% clerical activities.

Internet-based process

- All of the clerk's and accounting entry person's activities have been reassigned to the foreman (Figure C-10-b).
- The distribution of activities for the foreman would now be as follows: 21% managerial, 32% technical, and 47% clerical activities.

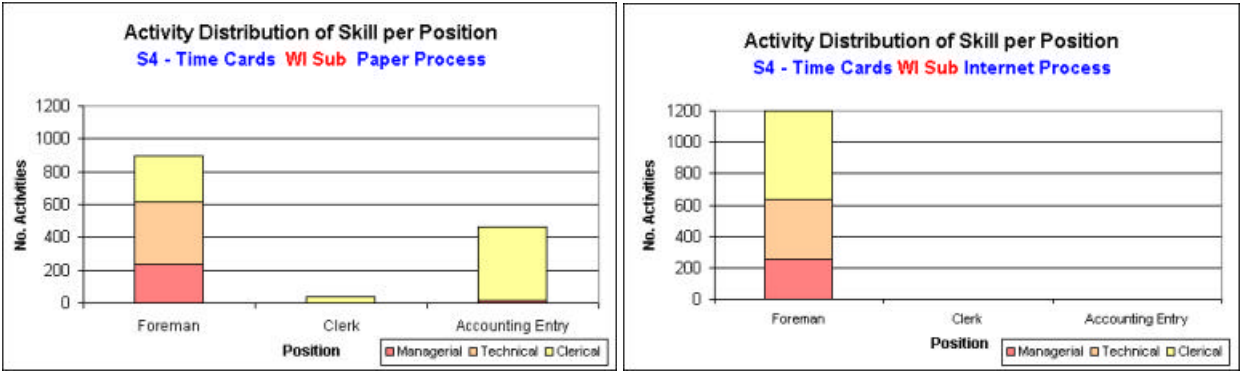


Figure C-10-a, b. Distribution of activities by activity skill per position to process 9 time cards with the paper-based system vs. an internet-based system.

WI	Activity Skill - Number of Activities							
	Paper				Internet			
Position	Managerial	Technical	Clerical	TOTAL	Managerial	Technical	Clerical	TOTAL
Foreman	234	380	285	899	252	380	567	1199
Clerk	-	-	36	36	-	-	-	-
Accounting Entry	18	-	444	462	-	-	-	-
TOTAL	252	380	765	1397	252	380	567	1199

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

WI	Activity Skill - Number of Activities (%)							
	Paper				Internet			
Position	Managerial	Technical	Clerical	TOTAL	Managerial	Technical	Clerical	TOTAL
Foreman	26%	42%	32%	100%	21%	32%	47%	100%
Clerk	-	-	100%	100%	-	-	-	-
Accounting Entry	4%	-	96%	100%	-	-	-	-

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

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

How does the processing effort by type of skill (managerial, technical, or clerical) vary for each position to process 9 time cards with the paper-based system vs. with the internet-based system?

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

Paper-based process

- The distribution of processing effort for the foreman is as follows: 31% managerial, 36% technical, and 33% clerical ? approximately equal amounts.
- The distribution of processing effort for the clerk is as follows: 100% clerical.
- The distribution of processing effort for the accounting entry person is as follows: 3% managerial and 97% clerical.

Internet-based process

- The foreman spends most of his effort (74%) on managerial activities. Ideally, he should spend 100% to make full use of his skills and not waste them on clerical activities.
- The effort for the clerk and accounting entry person is reduced to 0 since their activities are automated or eliminated and reassigned to the foreman.

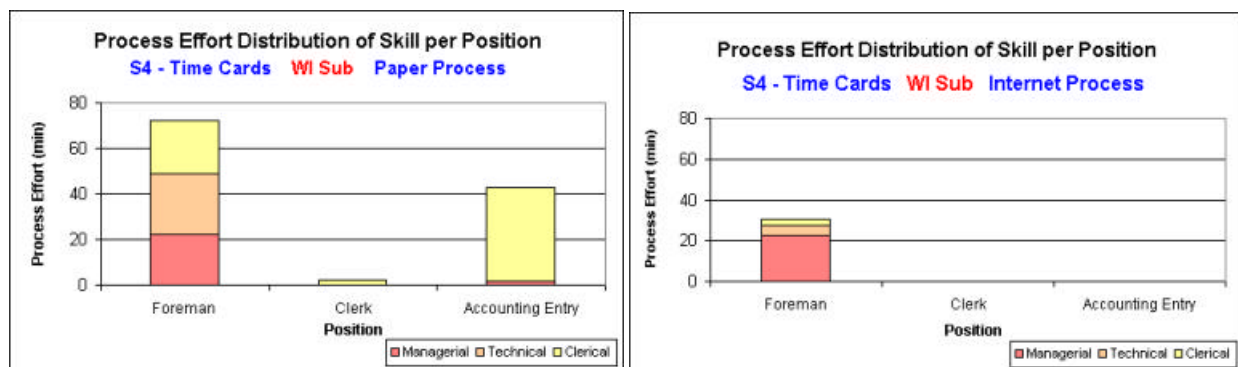


Figure C-10-c, d. Distribution of processing effort by activity skill per position to process 9 time cards with the paper-based system vs. an internet-based system.

WI	Activity Skill - Processing Effort (min)							
	Paper				Internet			
Position	Managerial	Technical	Clerical	TOTAL	Managerial	Technical	Clerical	TOTAL
Foreman	23	26	24	73	23	5	3	31
Clerk	-	-	2	2	-	-	-	0
Accounting Entry	1	-	42	43	-	-	-	0
TOTAL	24	26	68	118	23	5	3	31

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

WI	Activity Skill - Processing Effort (%)							
	Paper				Internet			
Position	Managerial	Technical	Clerical	TOTAL	Managerial	Technical	Clerical	TOTAL
Foreman	31%	36%	33%	100%	74%	16%	10%	100%
Clerk	-	-	100%	100%	-	-	-	-
Accounting Entry	3%	-	97%	100%	-	-	-	-

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

WI	Activity Skill - Processing Effort (min)								
	Managerial			Technical			Clerical		
Position	Paper	Internet	% Change	Paper	Internet	% Change	Paper	Internet	% Change
Foreman	23	23	0%	26	5	-81%	24	3	-87%
Clerk	-	-	-	-	-	-	2	-	-100%
Accounting Entry	1	-	-100%	-	-	-	42	-	-100%
TOTAL	24	23	-6%	26	5	-81%	68	3	-95%

Table C-10-e. Percentage decrease of processing effort by activity skill per position due to an internet-based system.

C.2.1.2. Distribution by Effect on Activity per Position

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

An internet-based system would affect the processing effort of activities with the paper-based system. For each position, 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 position, we observe the following:

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

- Of the foreman's number of activities, 35% would remain the same, 1% would be reduced, 53% would be automated, and 11% would be eliminated.
- Of the clerk's number of activities, 100% would be automated.
- Of the accounting entry person's number of activities, 81% would be automated and the remaining 19% would be eliminated.

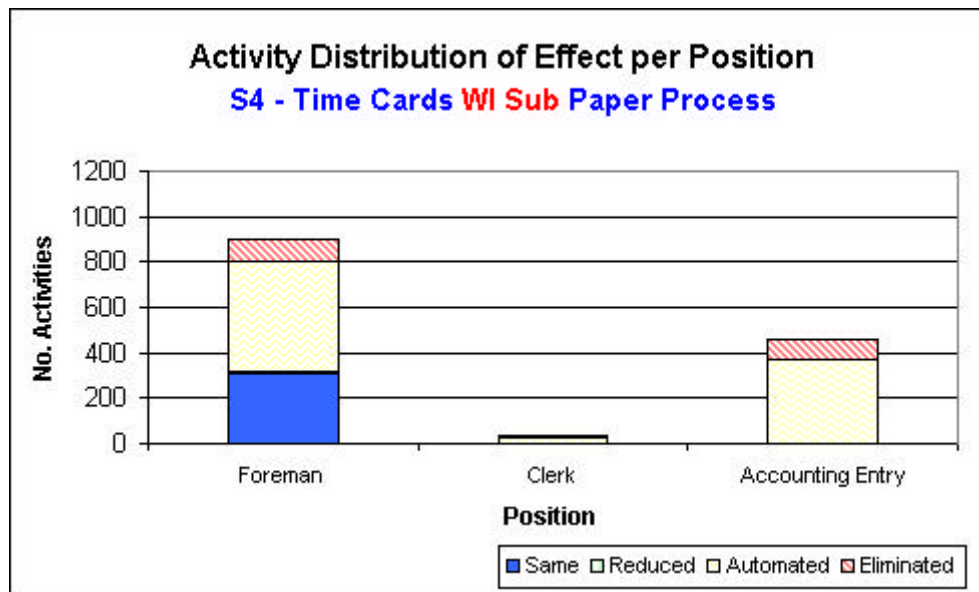


Figure C-11-a. Distribution of activities by effect on activity per position to process 9 time cards with the paper-based system vs. an internet-based system.

WI	Effect - Number of Activities				TOTAL
	Same	Reduced	Automated	Eliminated	
Position					
Foreman	312	9	479	99	899
Clerk	-	-	27	9	36
Accounting Entry	-	-	372	90	462
TOTAL	312	9	878	198	1397

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

WI	Effect - Number of Activities (%)				
Position	Same	Reduced	Automated	Eliminated	TOTAL
Foreman	35%	1%	53%	11%	100%
Clerk	-	-	75%	25%	100%
Accounting Entry	-	-	81%	19%	100%

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

C.2.1.2.2. Distribution of Processing Effort by Effect per Position

An internet-based system would affect the processing effort of activities with the paper-based system. What would be the effect on each position'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 position, we observe the following:

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

- Of the foreman's processing effort, 40% would remain the same, 4% would be reduced, 42% would be automated, and 13% would be eliminated.
- Of the clerk's processing effort, 33% would be automated and 67% would be eliminated.
- Of the accounting entry person's processing effort, 79% would be automated and 21% would be eliminated.

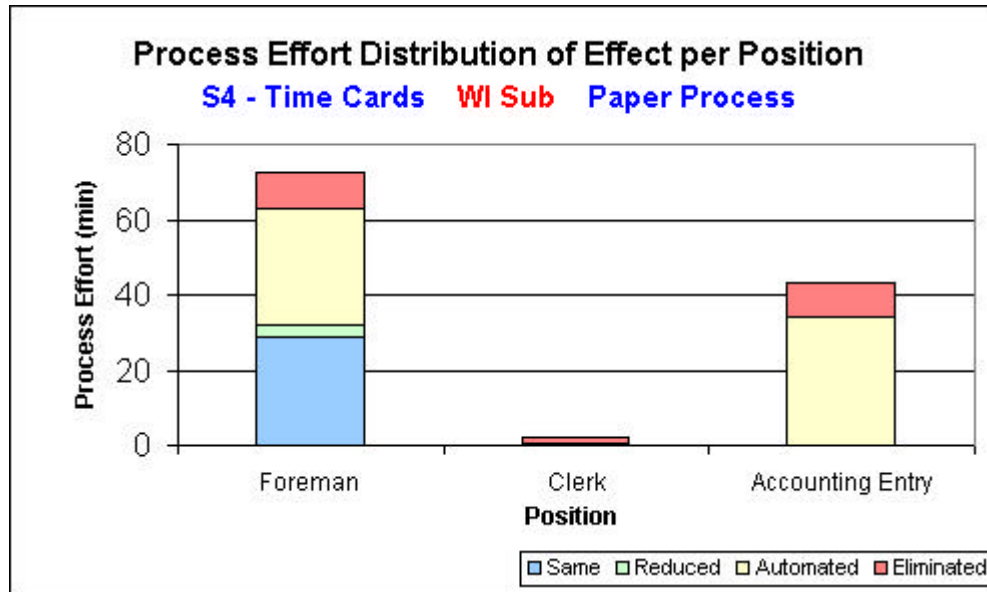


Figure C-11-b. Distribution of processing effort by effect on activity per position to process 9 time cards due to the paper-based system vs. an internet-based system.

WI	Effect - Processing Effort (min)				
Position	Same	Reduced	Automated	Eliminated	TOTAL
Foreman	29	3	31	10	73
Clerk			1	1	2
Accounting Entry			34	9	43
TOTAL	29	3	66	20	118

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

WI	Effect - Processing Effort (%)				
Position	Same	Reduced	Automated	Eliminated	TOTAL
Foreman	40%	4%	42%	13%	100%
Clerk			33%	67%	100%
Accounting Entry			79%	21%	100%

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

C.2.1.3. Distribution by Activity Classification per Position

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

How many activities did each position use to prepare documents (e.g., create time card), to process documents (e.g., send time card), to authorize documents (e.g., review time card), to locate documents (e.g., archive time card), or to update the accounting database (e.g., enter cost code description) in the paper-based system vs. in an internet-based system?

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

Paper-based process

- The foreman used 81% of his activities to prepare the time cards, 5% to process them, 4% to authorize them, and 10% to locate (archive) them.
- The clerk used 100% of his activities to process the time cards.
- The accounting entry person used 2% of her activities to process time cards, 20% to locate (archive) them, and 78% to update the database.

Internet-based process

- The foreman would use 61% of his activities to prepare the time cards, 6% to process them, 3% to authorize them, and 30% to update the database.
- The activities to locate (archive) time cards would be eliminated.

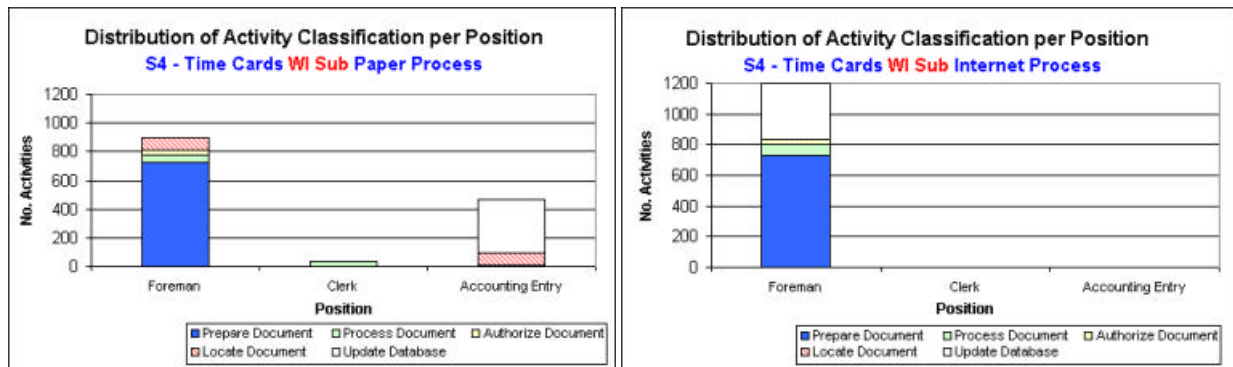


Figure C-12-a, b. Distribution of activities by activity classification per position to process 9 time cards for the paper-based system vs. an internet-based system.

WI - PAPER	Activity Classification - Number of Activities					
Position	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	TOTAL
Foreman	728	45	36	90	-	899
Clerk	-	36	-	-	-	36
Accounting Entry	-	9	-	90	363	462
TOTAL	728	72	36	180	363	1397

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

WI - PAPER	Activity Classification - Number of Activities (%)					
Position	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	TOTAL
Foreman	81%	5%	4%	10%	-	100%
Clerk	-	100%	-	-	-	100%
Accounting Entry	-	2%	-	19%	79%	100%

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

WI - INTERNET	Activity Classification - Number of Activities					
Position	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	TOTAL
Foreman	728	72	36	-	363	1199
Clerk	-	-	-	-	-	0
Accounting Entry	-	-	-	-	-	0
TOTAL	728	72	36	0	363	1199

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

WI - INTERNET	Activity Classification - Number of Activities (%)					
Position	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	TOTAL
Foreman	61%	6%	3%	-	30%	100%
Clerk	-	-	-	-	-	-
Accounting Entry	-	-	-	-	-	-

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

C.2.1.3.2. Distribution of Processing Effort by Activity Classification per Position

How much processing effort was required per position to prepare documents (e.g., create time card), to process documents (e.g., send time card), to authorize documents (e.g., review time card), to locate documents (e.g., archive time card), or to update the accounting database (e.g., enter cost code description) 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 person feel the impact of the internet-based system most?

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

Paper-based process

- The foreman spends 76% of his effort preparing time cards, 6% processing them, 6% authorizing them, and 12% locating (archiving) them.
- The clerk spends 100% of his effort processing time cards.
- The accounting entry person spends 7% of her effort processing time cards, 21% locating (archiving) them, and 72% updating the database.

Internet-based process

- The foreman would spend 83% of his effort preparing time cards, 5% processing them, and 12% authorizing them.
- The effort spent locating (archiving) time cards would be eliminated.
- The effort spent updating the database would be automated and assumed to be 0.

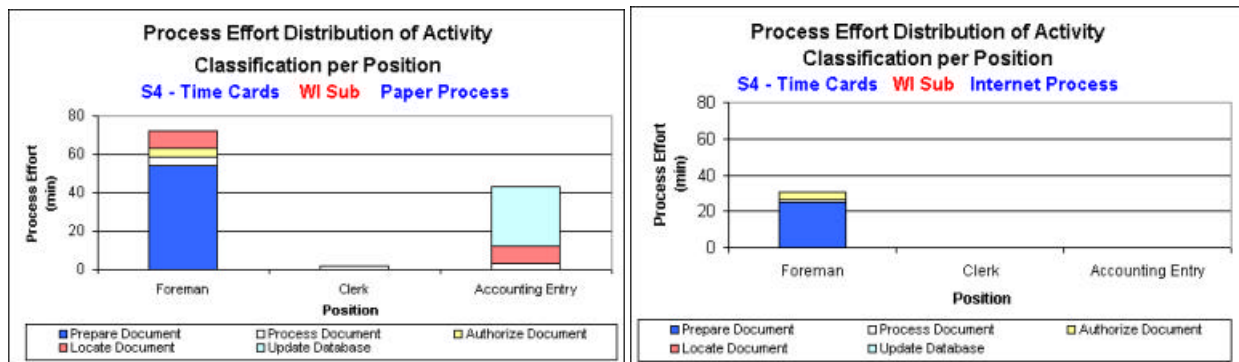


Figure C-12-c, d. Distribution of processing effort by activity classification per position to process 9 time cards for the paper-based system vs. an internet-based system.

WI - PAPER	Activity Classification - Processing Effort (min)					
Position	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	TOTAL
Foreman	54	5	5	9		73
Clerk		2				2
Accounting Entry		3		9	31	43
TOTAL	54	10	5	18	31	118

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

WI - PAPER						
Activity Classification - Processing Effort (%)						
Position	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	TOTAL
Foreman	76%	6%	6%	12%		100%
Clerk		100%				100%
Accounting Entry		7%		21%	72%	100%

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

WI - INTERNET						
Activity Classification - Processing Effort (min)						
Position	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	TOTAL
Foreman	25	2	4			31
Clerk						0
Accounting Entry						0
TOTAL	25	2	4	0	0	31

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

WI - INTERNET						
Activity Classification - Processing Effort (%)						
Position	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	TOTAL
Foreman	83%	5%	12%			100%
Clerk						-
Accounting Entry						-

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

WI						
Activity Classification - Processing Effort (% Change)						
Position	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	TOTAL
Foreman	-54%	-67%	-17%	-100%	-	-58%
Clerk	-	-100%	-	-	-	-100%
Accounting Entry	-	-	-	-100%	-100%	-100%

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: position, effect on activity, and activity classification.

C.2.2.1. Distribution by Position per Activity Skill

How does the number of activities by position (foreman, clerk, or accounting entry person) vary for each activity skill to process 9 time cards with the paper-based system vs. with an internet-based system?

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

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

Paper-based process

- Of the managerial activities: the foreman performed 93%, and the accounting entry person 7%.
- Of the technical activities: the foreman performed 100%.
- Of the clerical activities: the foreman performed 37%, the clerk 5%, and the accounting entry person 58%.

Internet-based process

- The foreman would perform all managerial, technical, and clerical activities.

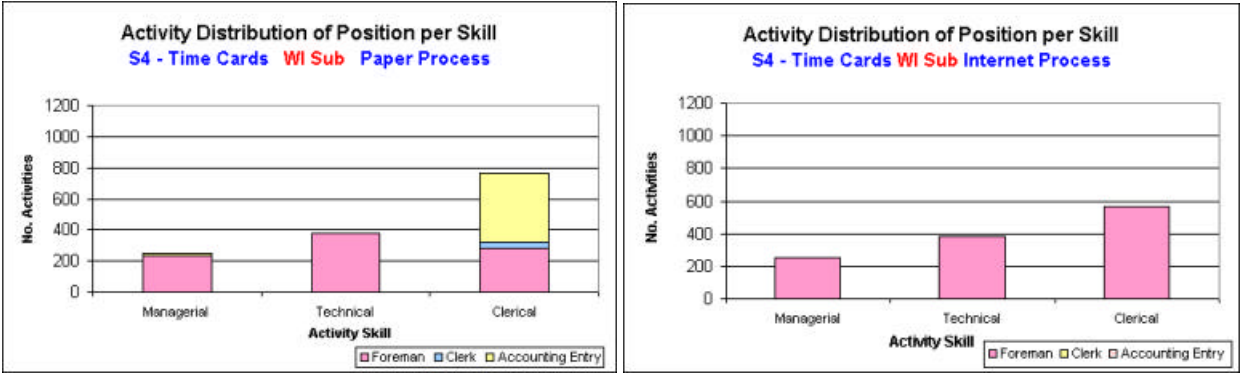


Figure C-13-a, b. Distribution of activities by position per activity skill to process 9 time cards with the paper-based system vs. an internet-based system.

WI	Position - Number of Activities							
	Paper				Internet			
Skill	Foreman	Clerk	Accounting Entry	TOTAL	Foreman	Clerk	Accounting Entry	TOTAL
Managerial	234	-	18	252	252	-	-	252
Technical	380	-	-	380	380	-	-	380
Clerical	285	36	444	765	567	-	-	567
TOTAL	899	36	462	1397	1199	0	0	1199

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

WI	Position - Number of Activities (%)							
	Paper				Internet			
Skill	Foreman	Clerk	Accounting Entry	TOTAL	Foreman	Clerk	Accounting Entry	TOTAL
Managerial	93%	-	7%	100%	100%	-	-	100%
Technical	100%	-	-	100%	100%	-	-	100%
Clerical	37%	5%	58%	100%	100%	-	-	100%

Table C-13-b. Distribution of activities by position 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 position (foreman, clerk, or accounting entry person) vary for each activity skill to process 9 time cards with the paper-based system vs. with an internet-based system?

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

Paper-based process

- For managerial activities: 94% of the effort was by the foreman, and 6% by the accounting entry person.
- For technical activities: 100% of the effort was by the foreman.
- For clerical activities: 35% of the effort was by the foreman, 3% by the clerk, and 62% by the accounting entry person (Figure C-13-c).

Internet-based process

- For managerial, technical, and clerical activities 100% of the effort would be by the foreman (Figure C-13-d).

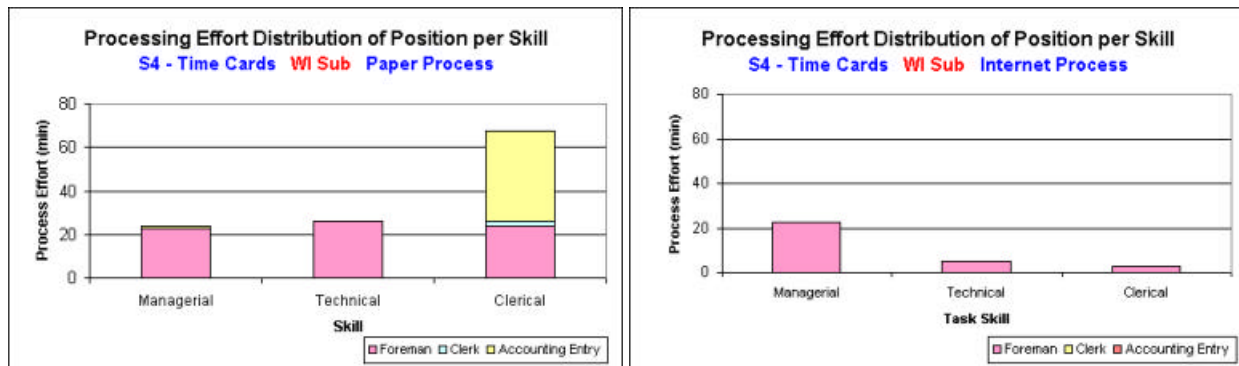


Figure C-13-c, d. Distribution of processing effort by position per activity skill to process 9 time cards with the paper-based system vs. an internet-based system.

WI	Position - Processing Effort (min)							
	Paper				Internet			
Skill	Foreman	Clerk	Accounting Entry	TOTAL	Foreman	Clerk	Accounting Entry	TOTAL
Managerial	23	-	1	24	23	-	-	23
Technical	26	-	-	26	5	-	-	5
Clerical	24	2	42	68	3	-	-	3
TOTAL	73	2	43	118	31	0	0	31

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

WI	Position							
	Paper				Internet			
Skill	Foreman	Clerk	Accounting Entry	TOTAL	Foreman	Clerk	Accounting Entry	TOTAL
Managerial	94%	-	6%	100%	100%	-	-	100%
Technical	100%	-	-	100%	100%	-	-	100%
Clerical	35%	3%	62%	100%	100%	-	-	100%

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

WI	Position - Processing Effort (min)								
	Foreman			Clerk			Accounting Entry		
Skill	Paper	Internet	% Change	Paper	Internet	% Change	Paper	Internet	% Change
Managerial	23	23	0%	-	-	-	1	-	-100%
Technical	26	5	-81%	-	-	-	-	-	-
Clerical	24	3	-87%	2	-	-100%	42	-	-100%

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 position, 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: 93% would remain the same, and 7% would be automated.
- Of the technical activities: 16% would remain the same, and 84% would be automated.
- Of the clerical activities: only 2% would remain the same, 1% would be reduced, 71% would be automated, and 26% would be eliminated.

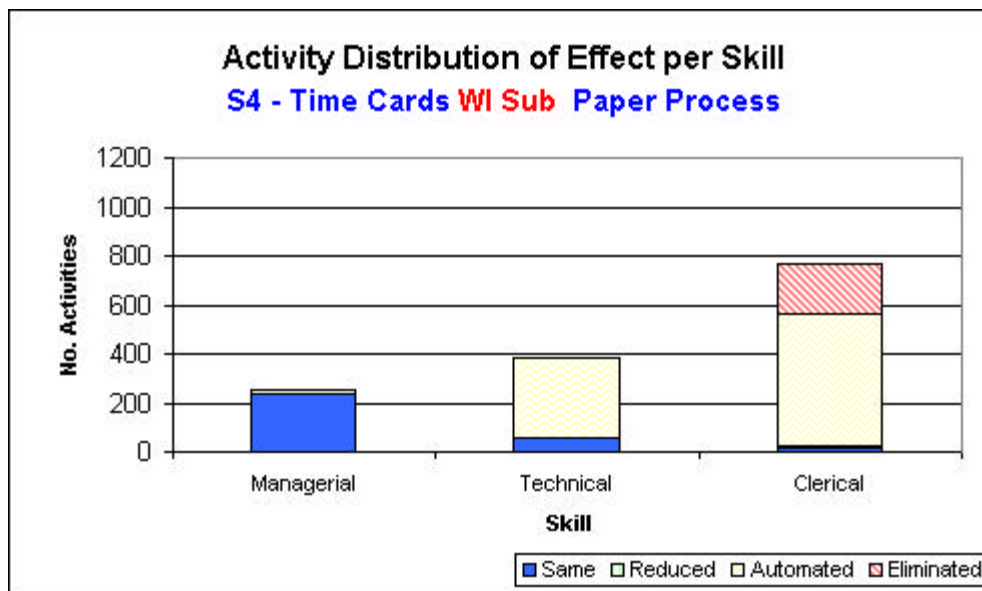


Figure C-14-a. Distribution of activities by effect on activity per activity skill to process 9 time cards due to the paper-based system vs. an internet-based system.

WI	Effect - Number of Activities				
Activity Skill	Same	Reduced	Automated	Eliminated	TOTAL
Managerial	234		18		252
Technical	60		320		380
Clerical	18	9	540	198	765
TOTAL	312	9	878	198	1397

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	93%	-	7%	-	100%
Technical	16%	-	84%	-	100%
Clerical	2%	1%	71%	26%	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 activities would be reduced? How many activities would be automated? How many activities 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: 94% would remain the same, and 6% would be automated.
- Of the effort for technical activities: 19% would remain the same, and 81% would be automated.
- Of the effort for clerical activities: only 2% would remain the same, 5% would be reduced, 63% would be automated, and 30% would be eliminated.

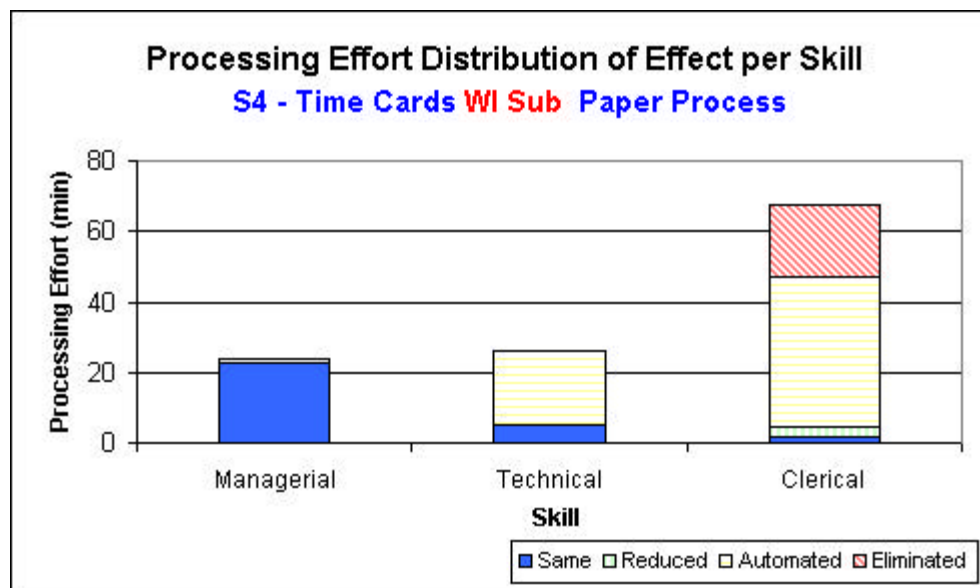


Figure C-14-b. Distribution of processing effort by effect on activity per activity skill to process 9 time cards due to the paper-based system vs. an internet-based system.

WI	Effect - Processing Effort (min)				
Activity Skill	Same	Reduced	Automated	Eliminated	TOTAL
Managerial	22	-	2	-	24
Technical	5	-	21	-	26
Clerical	2	3	43	20	68
TOTAL	29	3	66	20	118

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	94%	-	6%	-	100%
Technical	19%	-	81%	-	100%
Clerical	2%	5%	63%	30%	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, or update the database) vary for each activity skill to process 9 time cards with the paper-based system vs. with the 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: 82% were to prepare the time cards, 11% to authorize them, and 7% to update the database.
- Of the technical activities: 98% were to prepare the time cards, and 2% to authorize them.
- Of the clerical activities: 20% were to prepare the time cards, 12% to process them, 23% to locate them and 45% to update the database.

Internet-based process

- Of the managerial activities: 82% would be to prepare the time cards, 11% to authorize them, and 7% to update the database.
- Of the technical activities: 98% would be to prepare the time cards, and 2% to authorize them.
- Of the clerical activities: 26% would be to prepare the time cards, 13% to process them, and 61% to update the database.

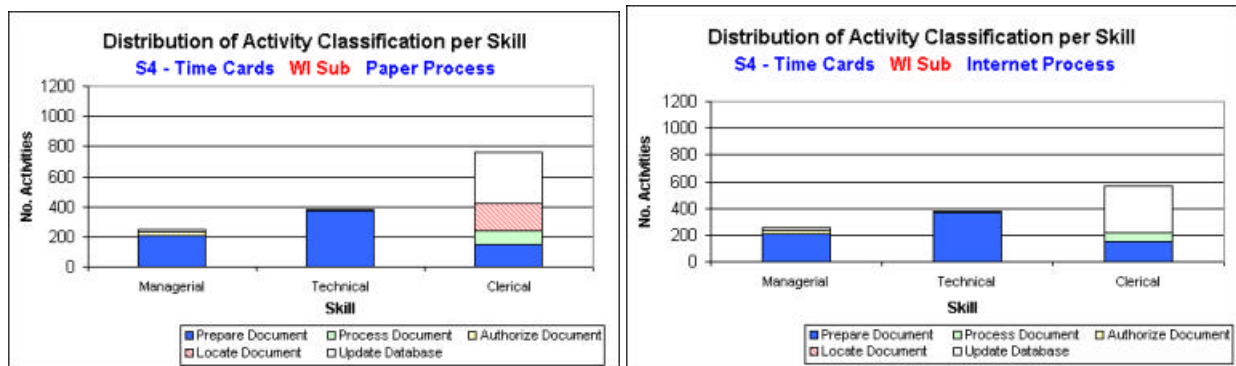


Figure C-15-a, b. Distribution of activities by activity classification per activity skill to process 9 time cards with the paper-based system vs. an internet-based system.

WI - PAPER	Activity Classification - Number of Activities					
Activity Skill	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	TOTAL
Managerial	207	-	27	-	18	252
Technical	371	-	9	-	-	380
Clerical	150	90	-	180	345	765
TOTAL	728	90	36	180	363	1397

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	TOTAL
Managerial	82%	-	11%	-	7%	100%
Technical	98%	-	2%	-	-	100%
Clerical	20%	12%	-	23%	45%	100%

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

WI - INTERNET	Activity Classification					
Activity Skill	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	TOTAL
Managerial	207	-	27	-	18	252
Technical	371	-	9	-	-	380
Clerical	150	72	-	-	345	567
TOTAL	728	72	36	0	363	1199

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	TOTAL
Managerial	82%	-	11%	-	7%	100%
Technical	98%	-	2%	-	-	100%
Clerical	26%	13%	-	-	61%	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, or update the database) vary for each activity skill to process 9 time cards 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: 78% was to prepare the time cards, 16% to authorize them, and 6% to update the database.
- Of the effort spent on technical activities: 97% was to prepare the time cards, and 3% to authorize them.
- Of the effort spent on clerical activities: 15% was to prepare the time cards, 14% to process them, 27% to locate them and 44% to update the database.

Internet-based process

- Of the effort spent on managerial activities: 83% would be to prepare the time cards, and 17% to authorize them.
- Of the effort spent on technical activities: 100% would be to prepare the time cards.
- Of the effort spent on clerical activities: 50% would be to prepare the time cards, and 50% to process them.

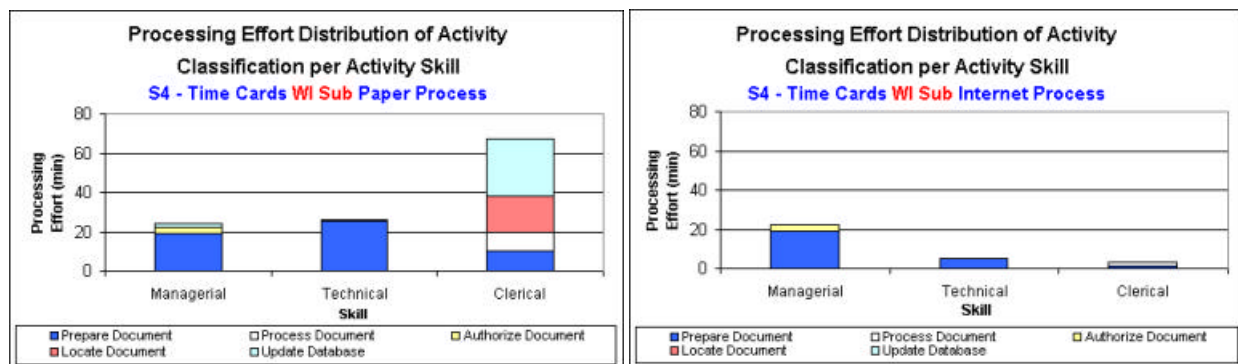


Figure C-15-c, d. Distribution of processing effort by activity classification per activity skill to process 9 time cards with the paper-based system vs. an internet-based system.

WI - PAPER	Activity Classification - Processing Effort (min)					
Activity Skill	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	TOTAL
Managerial	19	-	4	-	1	24
Technical	25	-	1	-	-	26
Clerical	10	10	-	18	30	68
TOTAL	54	10	5	18	31	118

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	TOTAL
Managerial	78%	-	16%	-	6%	100%
Technical	97%	-	3%	-	-	100%
Clerical	15%	14%	-	27%	44%	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	TOTAL
Managerial	19	-	4	-	0	23
Technical	5	-	0	-	-	5
Clerical	1.5	1.5	-	0	0	3
TOTAL	25	2	4	0	0	31

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	TOTAL
Managerial	83%	-	17%	-	-	100%
Technical	100%	-	-	-	-	100%
Clerical	50%	50%	-	-	-	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	TOTAL
Managerial	-	-	-	-	-100%	-95%
Technical	-80%	-	-100%	-	-	-81%
Clerical	-85%	0%	-	0%	-100%	-6%

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

C.2.3. Distribution per Effect of Integration on Activity

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

C.2.3.1. Distribution by Position per Effect on Activity

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

How would the number of activities be distributed by position (foreman, clerk, or accounting entry person) for each effect on activity to process 9 time cards going from the paper-based system to an internet-based system?

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

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

- Of the activities that remain the same: the foreman would perform 100%.
- Of the activities an internet-based system would reduce in processing effort: the foreman would perform 100%.
- Of the activities that an internet-based system would automate: the foreman would perform 55%, the clerk 3%, and the accounting entry person 42%.
- Of the activities that an internet-based system would eliminate: the foreman would perform 50%, the clerk 5%, and the accounting entry person 45%.

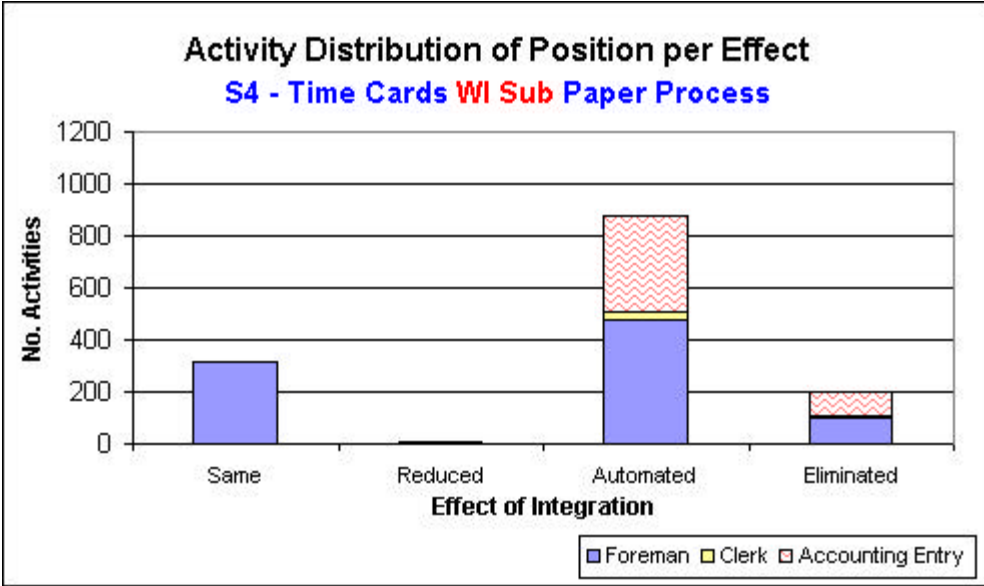


Figure C-16-a. Distribution of activities by position per effect on activity to process 9 time cards due to the paper-based system vs. an internet-based system.

WI Effect on Activity	Position - Number of Activities			TOTAL
	Foreman	Clerk	Accounting Entry	
Same	312	-	-	312
Reduced	9	-	-	9
Automated	479	27	372	878
Eliminated	99	9	90	198
TOTAL	899	36	462	1397

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

WI	Position - Relative % of Total Number of activities			
Effect on Activity	Foreman	Clerk	Accounting Entry	TOTAL
Same	100%			100%
Reduced	100%			100%
Automated	55%	3%	42%	100%
Eliminated	50%	5%	45%	100%

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

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

How would the processing effort be distributed by position (foreman, clerk, or accounting entry person) for each effect on activity to process 9 time cards going from the paper-based system to an internet-based system?

When the total processing effort is distributed by position 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: 100% would be for the foreman.
- Of the processing effort for activities that would be reduced: 100% would be for the foreman.
- Of the processing effort for activities that would be automated: 47% would be due to the foreman, 1% to the clerk, and 52% to the accounting entry person.
- Of the processing effort for activities that would be eliminated: 48% would be due to the foreman, 7% to the clerk and 45% to the accounting entry person.

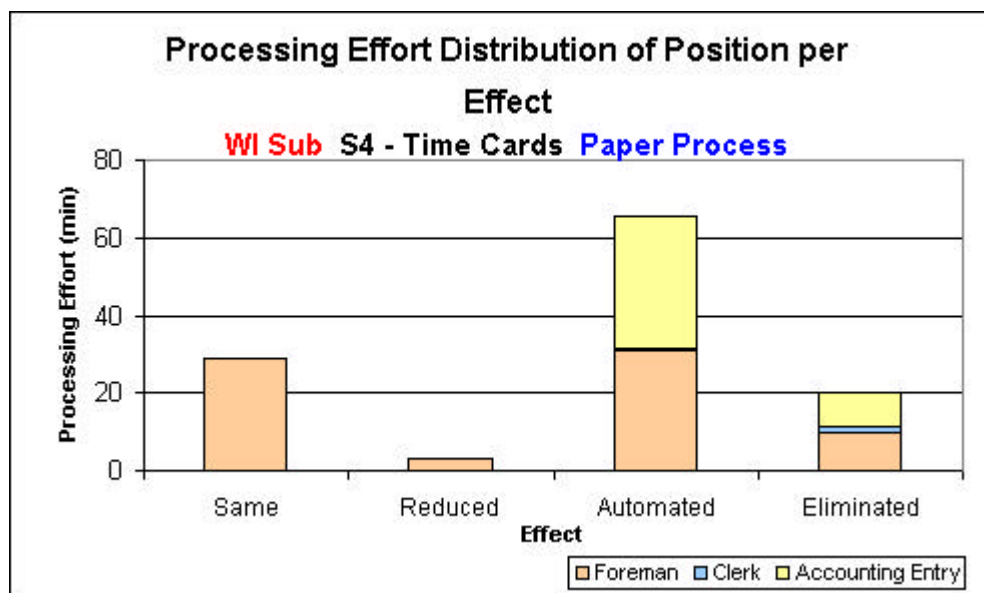


Figure C-16-b. Distribution of processing effort by position per effect on activity to process 9 time cards due to the paper-based system vs. an internet-based system.

WI	Position - Processing Effort (min)			
Effect on Activity	Foreman	Clerk	Accounting Entry	TOTAL
Same	29	-	-	29
Reduced	3	-	-	3
Automated	31	1	34	66
Eliminated	10	1	9	20
TOTAL	73	2	43	118

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

WI	Position - Processing Effort (%)			
Effect on Activity	Foreman	Clerk	Accounting Entry	TOTAL
Same	100%	-	-	100%
Reduced	100%	-	-	100%
Automated	47%	1%	52%	100%
Eliminated	48%	7%	45%	100%

Table C-16-d. Distribution of processing effort by position 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

What would be the distribution in the number of activities by activity skill (managerial, technical, or clerical) for each effect on activity to process 9 time cards 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: 75% would be managerial activities, 19% technical activities, and only 6% clerical activities.
- Of the activities that an internet-based system would reduce in processing effort: 100% would be clerical.
- Of the activities that an internet-based system would eliminate: 100% would be clerical activities.

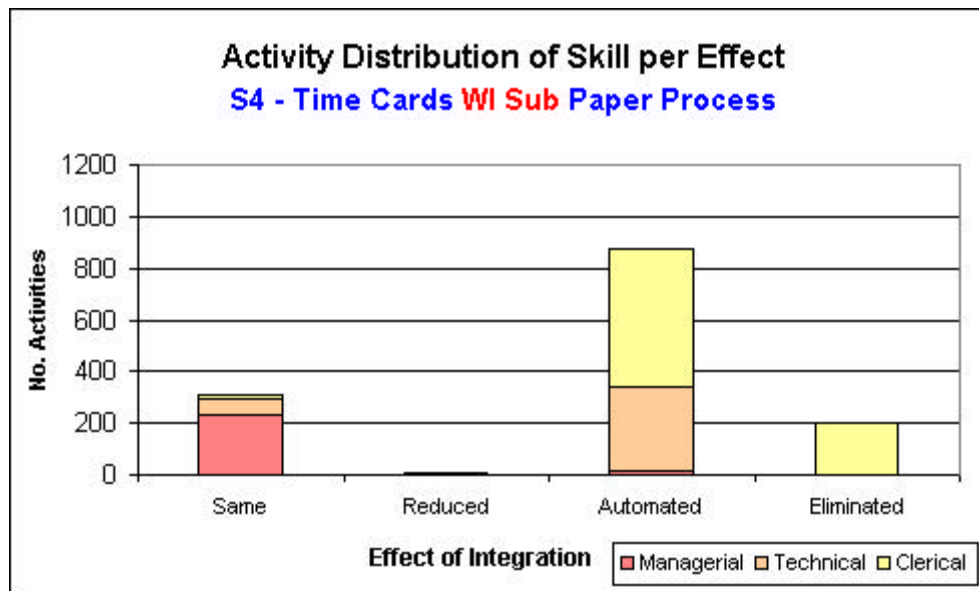


Figure C-17-a. Distribution of activities by activity skill per effect on activity to process 9 time cards from the paper-based system to an internet-based system.

WI	Activity Skill - Number of Activities			
Effect on Activity	Managerial	Technical	Clerical	TOTAL
Same	234	60	18	312
Reduced	-	-	9	9
Automated	18	320	540	878
Eliminated	-	-	198	198
TOTAL	252	380	765	1397

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	75%	19%	6%	100%
Reduced	0%	0%	100%	100%
Automated	2%	36%	62%	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 to process 9 time cards 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: 78% would be for managerial activities, 17% for technical activities, and 5% for clerical activities.
- Of the processing effort for activities that would be reduced: 100% would be for clerical activities.
- Of the processing effort for activities that would be automated: 2% would be for managerial activities, 32% for technical activities, and 66% for clerical activities.
- Of the processing effort for activities that would be eliminated: 100% would be for clerical activities.

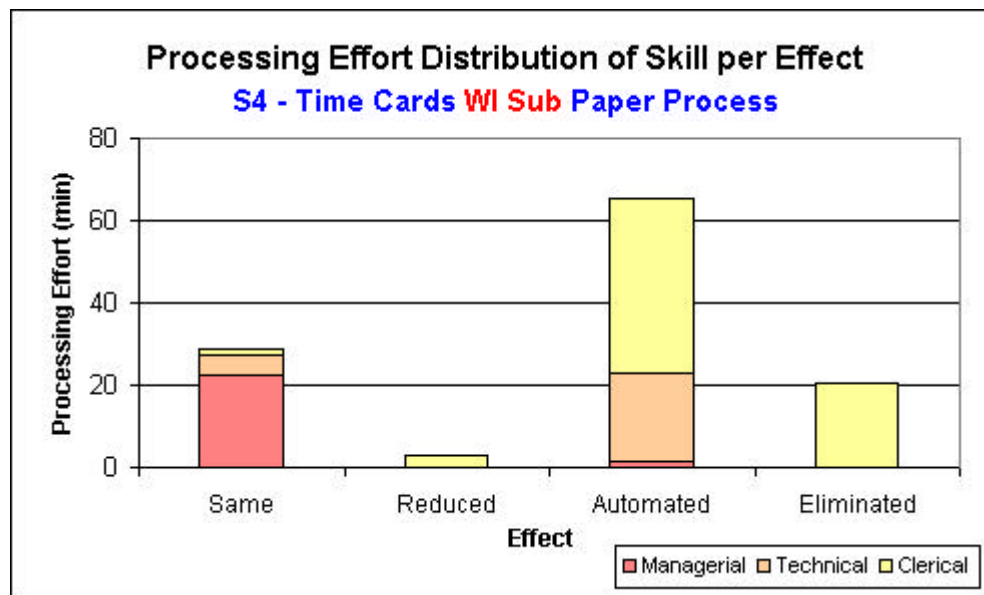


Figure C-17-b. Distribution of processing effort by activity skill per effect on activity to process 9 time cards due to the paper-based system vs. an internet-based system.

WI	Activity Skill - Processing Effort (min)			
Effect on Activity	Managerial	Technical	Clerical	TOTAL
Same	22	5	2	29
Reduced			3	3
Automated	2	21	43	66
Eliminated			20	20
TOTAL	24	26	68	118

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	78%	17%	5%	100%
Reduced			100%	100%
Automated	2%	32%	66%	100%
Eliminated			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 to process 9 time cards 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: 91% would be to prepare the time cards, and 9% to authorize them.
- Of the activities that an internet-based system would reduce in processing effort: 100% would be to process time cards.
- Of the activities that an internet-based system would automate: 51% would be to prepare the time cards, 7% to process them, 1% to authorize them, and 41% to update the accounting database.
- Of the activities that an internet-based system would eliminate: 9% would be to process time cards, and 91% would be to locate (archive) them.

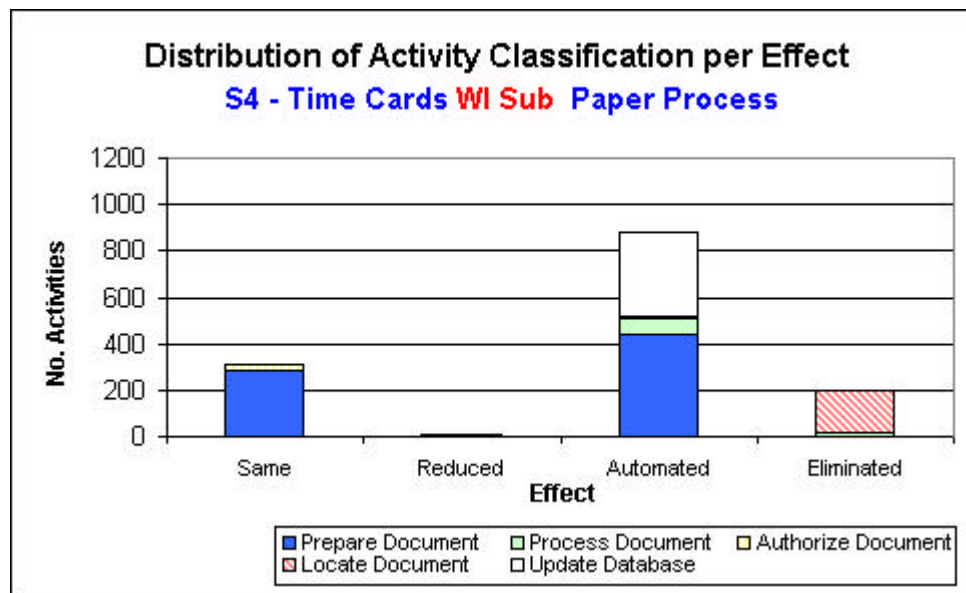


Figure C-18-a. Distribution of activities by activity classification per effect on activity to process 9 time cards from the paper-based system to an internet-based system.

WI	Activity Classification - Number of Activities					TOTAL
	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	
Effect on Activity						
Same	285	-	27	-	-	312
Reduced	-	9	-	-	-	9
Automated	443	63	9	-	363	878
Eliminated	-	18	-	180	-	198
TOTAL	728	90	36	180	363	1397

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	TOTAL
Same	91%		9%			100%
Reduced		100%				100%
Automated	51%	7%	1%		41%	100%
Eliminated		9%		91%		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 to process 9 time cards 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: 87% would be to prepare the time cards, and 13% to authorize them.
- Of the processing effort for activities that an internet-based system would reduce: 100% would be to process time cards.
- Of the activities that an internet-based system would automate: 45% would be to prepare the time cards, 7% to process them, 1% to authorize them, and 47% to update the accounting database.
- Of the activities that an internet-based system would eliminate: 11% would be to process time cards, and 89% would be to locate (archive) them.

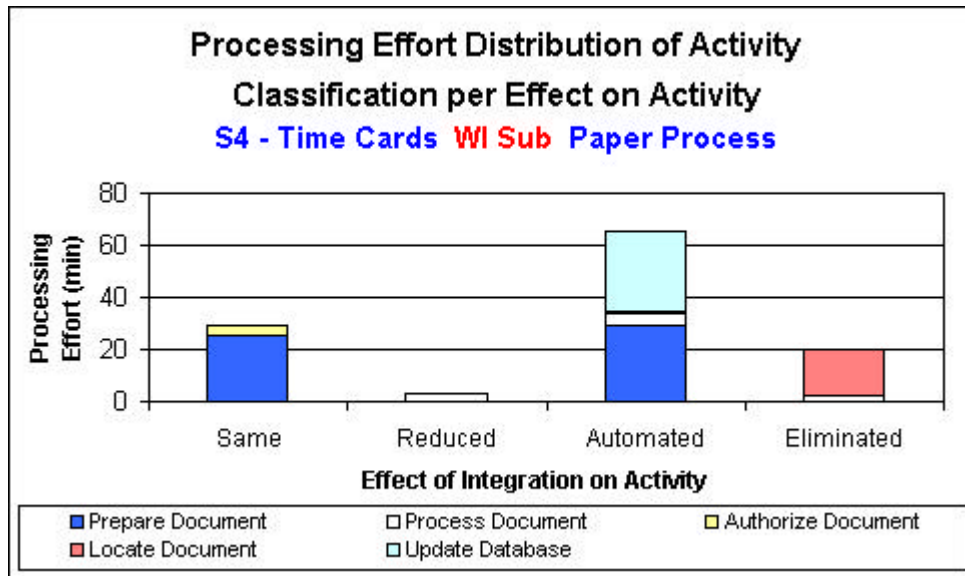


Figure C-18-b. Distribution of processing effort by activity classification per effect on activity to process 9 time cards with the paper-based system vs. an internet-based system.

WI	Activity Classification - Processing Effort (min)					
	Prepare Document	Process Document	Authorize Document	Locate Document	Update Database	TOTAL
Same	25	-	4	-	-	29
Reduced	-	3	-	-	-	3
Automated	29	5	1	-	31	66
Eliminated	-	2	-	18	-	20
TOTAL	54	10	5	18	31	118

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	TOTAL
Same	87%		13%			100%
Reduced		100%				100%
Automated	45%	7%	1%		47%	100%
Eliminated		11%		89%		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: position, activity skill, and effect on activity.

C.2.4.1. Distribution by Position per Activity Classification

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

How does the number of activities by position (foreman, clerk, or accounting entry person) vary for each activity classification to process 9 time cards with the paper-based system vs. with the internet-based system?

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

Paper-based process

- Of the activities to prepare time cards: the foreman performed 100%.
- Of the activities to process time cards: the foreman performed 50%, the clerk 40%, and the accounting entry person 10%.
- Of the activities to authorize time cards: the foreman performed 100%.
- Of the activities to locate time cards: the foreman performed 50%, and the accounting entry person 50%.
- Of the activities to update the accounting database: the accounting entry person performed 100%.

Internet-based process

- The foreman would perform all activities.

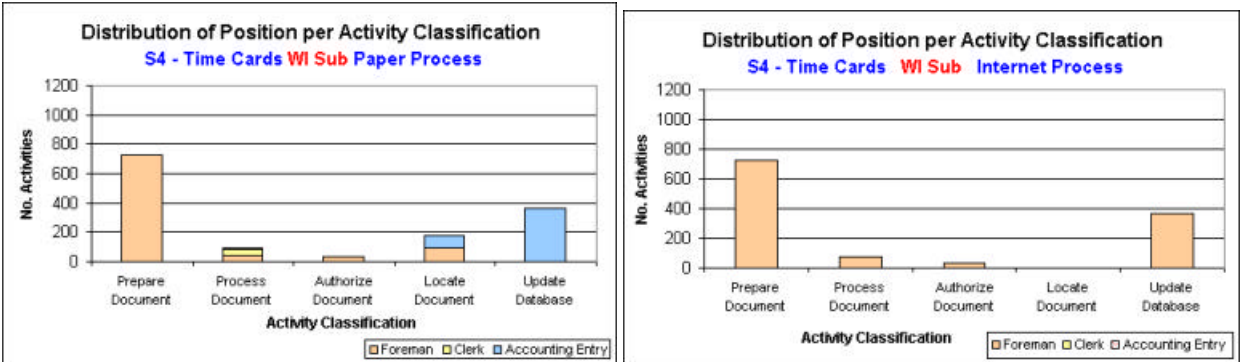


Figure C-19-a, b. Distribution of activities by position per activity classification to process 9 time cards with the paper-based system vs. an internet-based system.

WI	Position - Number of Activities							
	Paper				Internet			
Activity Classification	Foreman	Clerk	Accounting Entry	TOTAL	Foreman	Clerk	Accounting Entry	TOTAL
Prepare Document	728	-	-	728	728	-	-	728
Process Document	45	36	9	90	72	-	-	72
Authorize Document	36	-	-	36	36	-	-	36
Locate Document	90	-	90	180	0	-	-	0
Update Database	0	-	363	363	363	-	-	363
TOTAL	899	36	462	1397	1199	0	0	1199

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

WI	Position - Number of Activities							
	Paper				Internet			
Activity Classification	Foreman	Clerk	Accounting Entry	TOTAL	Foreman	Clerk	Accounting Entry	TOTAL
Prepare Document	100%	-	-	100%	100%	-	-	100%
Process Document	50%	40%	10%	100%	100%	-	-	100%
Authorize Document	100%	-	-	100%	100%	-	-	100%
Locate Document	50%	-	50%	100%	-	-	-	0%
Update Database	-	-	100%	100%	100%	-	-	100%

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

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

How does the processing effort by position (foreman, clerk, or accounting entry person) vary for each activity classification to process 9 time cards with the paper-based system vs. with the internet-based system?

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

Paper-based process

- Of the processing effort to prepare time cards: the foreman would expend 100%.
- Of the processing effort to process time cards: the foreman would expend 46%, the clerk 23%, and the accounting entry person 31%.
- Of the processing effort to authorize time cards: the foreman would expend 100%.
- Of the processing effort to locate time cards: the foreman would expend 50% and the accounting entry person 50%.
- Of the processing effort to update the accounting database: the accounting entry person would expend 100%.

Internet-based process

- The foreman would expend 100% of the processing effort for all types of activities.

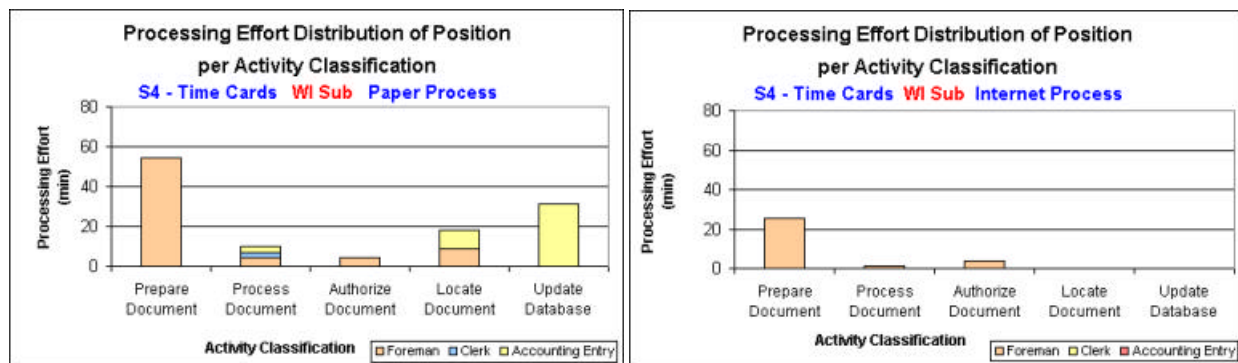


Figure C-19-c, d. Distribution of processing effort by position per activity classification to process 9 time cards with the paper-based system vs. an internet-based system.

WI	Position - Processing Effort (min)							
	Paper				Internet			
Activity Classification	Foreman	Clerk	Accounting Entry	TOTAL	Foreman	Clerk	Accounting Entry	TOTAL
Prepare Document	54	-	-	54	25	-	-	25
Process Document	5	2	3	10	2	-	-	2
Authorize Document	5	-	-	5	4	-	-	4
Locate Document	9	-	9	18	-	-	-	0
Update Database	-	-	31	31	-	-	-	0
TOTAL	73	2	43	118	31	0	0	31

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

WI	Position - Processing Effort (%)							
	Paper				Internet			
Activity Classification	Foreman	Clerk	Accounting Entry	TOTAL	Foreman	Clerk	Accounting Entry	TOTAL
Prepare Document	100%	-	-	100%	100%	-	-	100%
Process Document	46%	23%	31%	100%	100%	-	-	100%
Authorize Document	100%	-	-	100%	100%	-	-	100%
Locate Document	50%	-	50%	100%	-	-	-	100%
Update Database	-	-	100%	100%	-	-	-	100%

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

WI	Position - Processing Effort (min)								
	Foreman			Clerk			Accounting Entry		
Activity Classification	Paper	Internet	% Change	Paper	Internet	% Change	Paper	Internet	% Change
Prepare Document	54	25	-54%	-	-	-	-	-	-
Process Document	5	2	-67%	2	-	-100%	3	-	-
Authorize Document	5	4	-17%	-	-	-	-	-	-
Locate Document	9	-	-100%	-	-	-	9	-	-100%
Update Database	-	-	-	-	-	-	31	-	-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 to process 9 time cards with the paper-based system vs. with the 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 activities to prepare time cards: 28% were managerial activities, 51% were technical activities, and 21% were clerical activities.
- Of the activities to process time cards: 100% were clerical activities.
- Of the activities to authorize time cards: 75% were managerial activities, and 25% were technical activities.
- Of the activities to locate time cards: 100% were clerical activities.
- Of the activities to update the accounting database: 5% were managerial activities, and 95% were clerical activities.

Internet-based process

- Of the activities to locate time cards: 100% would be eliminated.
- All other activity classifications would be unaffected.

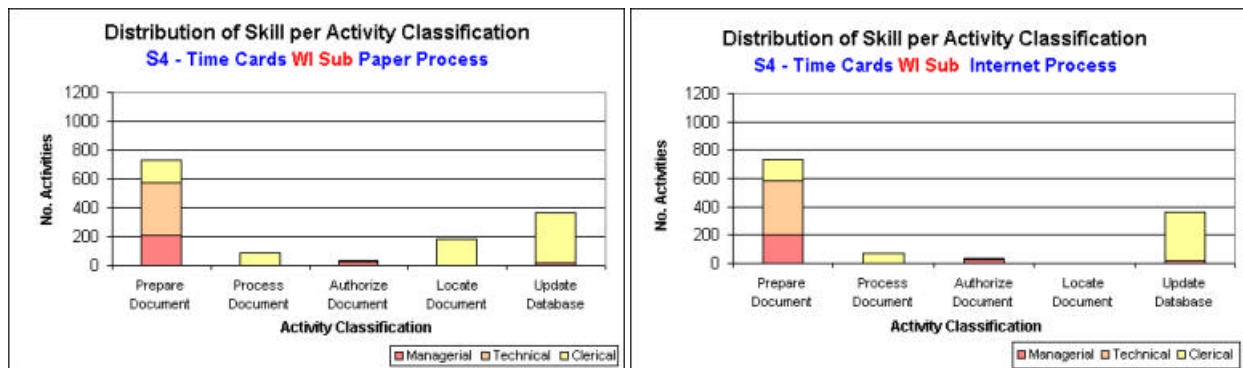


Figure C-20-a, b. Distribution of activities by activity skill per activity classification to process 9 time cards with the paper-based system vs. an internet-based system.

WI	Activity Skill - Number of Activities							
	Paper				Internet			
Activity Classification	Managerial	Technical	Clerical	TOTAL	Managerial	Technical	Clerical	TOTAL
Prepare Document	207	371	150	728	207	371	150	728
Process Document	-	-	90	90	-	-	72	72
Authorize Document	27	9	-	36	27	9	-	36
Locate Document	-	-	180	180	-	-	0	0
Update Database	18	-	345	363	18	-	345	363
TOTAL	252	380	765	1397	252	380	567	1199

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	28%	51%	21%	100%	28%	51%	21%	100%
Process Document	-	-	100%	100%	-	-	100%	100%
Authorize Document	75%	25%	-	100%	75%	25%	-	100%
Locate Document	-	-	100%	100%	-	-	-	0%
Update Database	5%	-	95%	100%	5%	-	95%	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 to process 9 time cards with the paper-based system vs. with the 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 time cards: managerial activities expend 34%, technical activities expend 47%, and clerical activities expend 19%.
- Of the processing effort to process time cards: clerical activities expend 100%.
- Of the processing effort to authorize time cards: managerial activities expend 83% and technical activities expend 17%.
- Of the processing effort to locate time cards: clerical activities expend 100%.
- Of the processing effort to update the accounting database: managerial activities expend 5% and clerical activities expend 95%.

Internet-based process

- Of the processing effort to prepare time cards: managerial activities would expend 74%, technical activities 20%, and clerical activities 6%.
- Of the processing effort to process time cards: clerical activities would expend 100%.
- Of the processing effort to authorize time cards: managerial activities would expend 100%.
- No processing effort would be needed to locate time cards or update the accounting database.

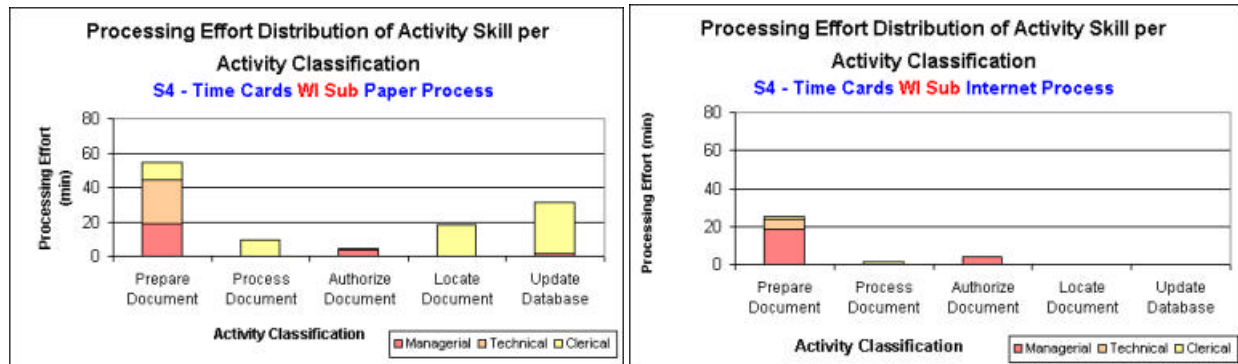


Figure C-20-c, d. Distribution of processing effort by activity skill per activity classification to process 9 time cards with the paper-based system vs. an internet-based system.

WI	Activity Skill - Processing Effort (min)							
	Paper				Internet			
Activity Classification	Managerial	Technical	Clerical	TOTAL	Managerial	Technical	Clerical	TOTAL
Prepare Document	19	25	10	54	19	5	1.5	25
Process Document	-	-	10	10	-	-	1.5	2
Authorize Document	4	1	-	5	4	0	-	4
Locate Document	-	-	18	18	-	-	0	0
Update Database	1	-	30	31	0	-	0	0
TOTAL	24	26	68	118	23	5	3	31

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	34%	47%	19%	100%	74%	20%	6%	100%
Process Document	-	-	100%	100%	-	-	100%	100%
Authorize Document	83%	17%	-	100%	100%	0%	-	100%
Locate Document	-	-	100%	100%	-	-	-	0%
Update Database	5%	-	95%	100%	-	-	-	0%

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	19	19	0%	26	5	-80%	10	2	-85%
Process Document	-	-	-	-	-	-	10	2	-85%
Authorize Document	4	4	0%	1	0	-100%	-	-	-
Locate Document	-	-	-	-	-	-	18	0	-100%
Update Database	2	0	-100%	-	-	-	30	0	-100%

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 61% of the activities to prepare time cards and 39% would remain the same.
- An internet-based system would reduce 10% of the activities to process time cards, automate 70%, and eliminate 20%.
- An internet-based system would automate 25% of the activities to authorize time cards and 75% would remain the same.
- An internet-based system would eliminate 100% of the activities to locate time cards.
- An internet-based system would automate 100% of the activities to update the accounting database.

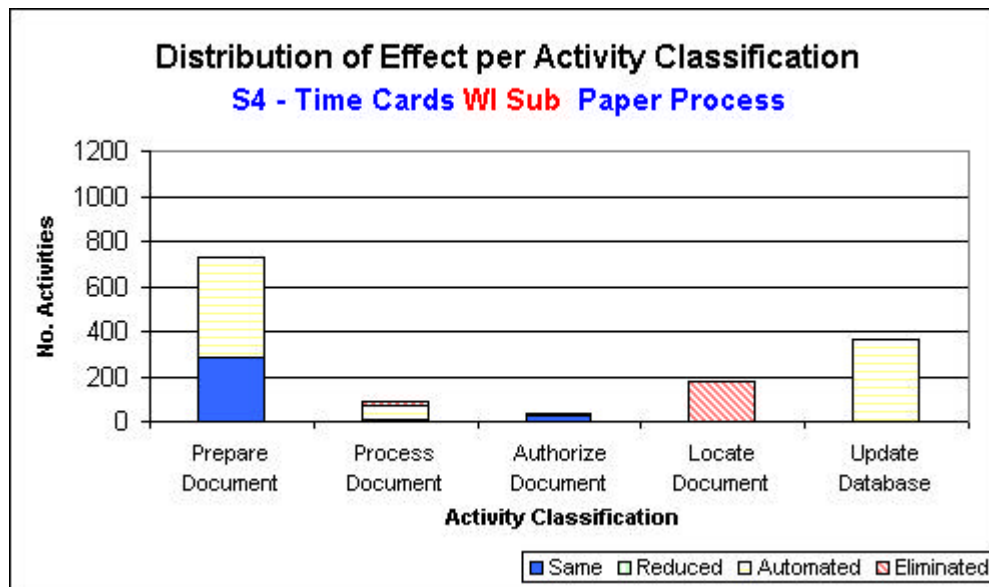


Figure C-21-a. Distribution of activities by effect on activity per activity classification to process 9 time cards due to the paper-based system vs. an internet-based system.

WI	Effect - Number of Activities				TOTAL
	Same	Reduced	Automated	Eliminated	
Activity Classification					
Prepare Document	285	-	443	-	728
Process Document	-	9	63	18	90
Authorize Document	27	-	9	-	36
Locate Document	-	-	-	180	180
Update Database	-	-	363	-	363
TOTAL	312	9	878	198	1397

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	39%	-	61%	-	100%
Process Document	-	10%	70%	20%	100%
Authorize Document	75%	-	25%	-	100%
Locate Document	-	-	-	100%	100%
Update Database	-	-	100%	-	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 automate 54% of the processing effort to prepare time cards and 46% would remain the same.
- An internet-based system would reduce 31% of the processing effort to process time cards, automate 46%, and eliminate 23%.
- An internet-based system would automate 17% of the processing effort to authorize time cards and 83% would remain the same.
- An internet-based system would eliminate 100% of the processing effort to locate time cards.
- An internet-based system would automate 100% of the processing effort to update the accounting database.

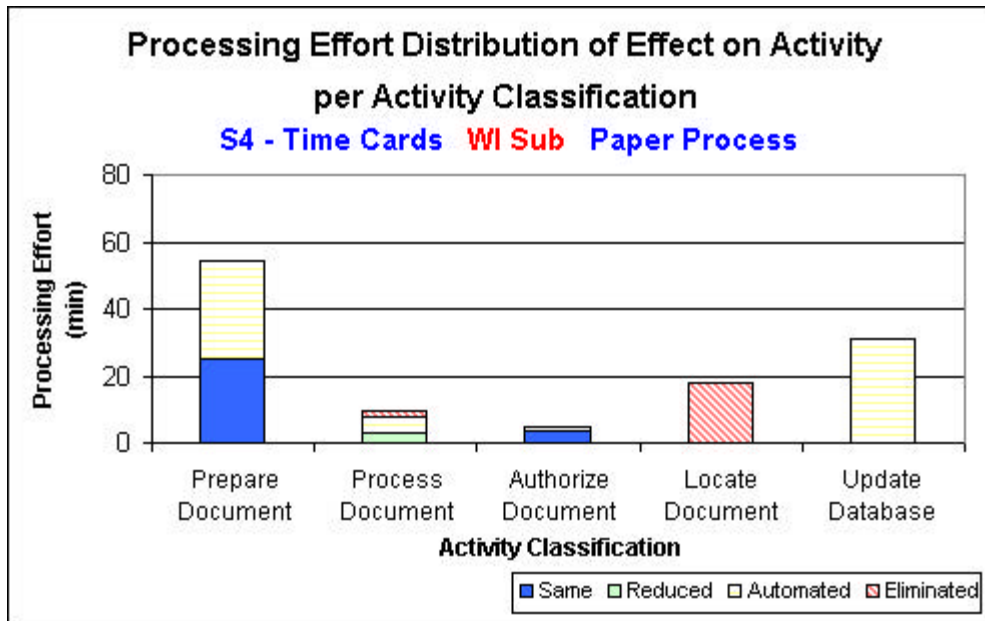


Figure C-21-b. Distribution of processing effort by effect on activity per activity classification to process 9 time cards due to the paper-based system vs. an internet-based system.

WI	Effect - Processing Effort (min)				TOTAL
	Same	Reduced	Automated	Eliminated	
Activity Classification					
Prepare Document	25	-	29	-	54
Process Document	-	3	5	2	10
Authorize Document	4	-	1	-	5
Locate Document	-	-	-	18	18
Update Database	-	-	31	-	31
TOTAL	29	3	66	20	118

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	46%	-	54%	-	100%
Process Document	-	31%	46%	23%	100%
Authorize Document	83%	-	17%	-	100%
Locate Document	-	-	-	100%	100%
Update Database	-	-	100%	-	100%

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