Work Measurement of ANSOS
Project Report

The University of Michigan Hospitals
Management Systems Department
April 16, 1990

Submitted By:

Eileen Lei
Darya Lin
Scott Severance
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IOE 481 - Hospital Systems
Instructor: Richard Coffey
Coordinator: John Gialanella
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ACKNOWLEDGEMENTS:

We would like to express our sincere thanks to the following people for helping us complete this project:

John Gialanella, our Coordinator, for all of his help, support, guidance, time, and effort throughout this project.

Gail Benjamin and Ann Kaiser, our clients, for providing us with the necessary information we needed to complete a successful project.

Michelle Hebersold and Karen Ruhlig, our time study participants, for taking their time to participate in our time study of ANSOS.

Richard Coffey, our instructor, for his guidance in organizing this project.

And all others who contributed to this project.
Work Measurement of ANSOS
Project Report

EXECUTIVE SUMMARY:

Since December of 1989, most patient care units of the University Hospital, Pediatric/Perinatal/Psychiatric (P/P/P) Hospitals, University of Michigan Hospitals Operating Rooms (OR), and Ambulatory Care Service (ACS) have been using the Automated Nurse Staffing Office System (ANSOS). The nurse managers use ANSOS to create and change work schedules, produce unit reports, and maintain payroll data. ANSOS was designed for central use but is currently used decentrally, hence the nurse managers spend extensive time on the system performing simple activities. In addition to the inconvenient wait times for ANSOS to serve multiple users, many of the nurse managers do not have the time nor training to fully utilize ANSOS' capabilities.

The purpose of this project was to quantify the amount of time required to perform scheduling and payroll tasks using ANSOS. It was determined that this could be accomplished by the centralization of most of the ANSOS related activities, such as the printing of various reports and time cards. Once these ANSOS related activities are centralized, they can be delegated to someone other than a nurse manager, such as a clerk, to perform. This will, in effect, alleviate a substantial amount of valuable time, which the nurse managers could use much more effectively.
A time study was performed of the ANSOS related activities, and then the annualized activity volumes for these tasks were estimated using various sources of information. It was determined that a total of 12.9 full time equivalents would be required to perform these ANSOS clerical duties, for all the University of Michigan Hospitals. Centralizing this function would conservatively reduce the nurse managers' time by a minimum of 24,000 hours annually.

BACKGROUND:

Since December of 1989, most patient care units of the University Hospital, Pediatric/Perinatal/Psychiatric (P/P/P) Hospitals, University of Michigan Hospitals Operating Rooms (OR), and Ambulatory Care Services (ACS) have been using the Automated Nurse Staffing Office System (ANSOS). The nurse managers use ANSOS to create and change work schedules, produce unit reports, and maintain payroll data. The demanding responsibilities of these managers, however, are not effectively supported by this system.

In order to use ANSOS, the nurse managers need to be familiar with computers, typing, and the various commands used in running the ANSOS system and in differentiating the shift, hours, and payroll symbols. Many of the nurse managers do not have enough time to commit to completely familiarizing themselves with the system. Some also lack the typing and computer skills needed to use ANSOS efficiently. Besides these skills mentioned, which are vital in using ANSOS, the nurse managers are
also required to invest extra time in order to actually utilize the system functions. The ANSOS system user guide is a 210 page manual, and does not lend itself to easy learning for nontechnical users. In addition, since ANSOS was designed to be used centrally and is currently used decentrally at some 70 to 80 locations, the system takes a long time for loading, assembling, and printing any needed information. In short, the use of ANSOS is a time consuming process which requires much attention and time commitment from the nurse managers in addition to their already demanding patient care unit management responsibilities.

PURPOSE:

The purpose of this report was to determine the time commitment required by the nurse managers at the University of Michigan Hospitals to perform all of their ANSOS-related tasks. The annual time requirements to perform ANSOS activities were estimated, and then the resource conditions needed to perform these ANSOS related tasks, for all of the hospitals' units, were determined. Several recommendations will also be discussed.

INTRODUCTION:

As of March 12, 1990, there was a total of 79 units comprising of 2600 individual employees on ANSOS. Each of the 79 nurse managers using ANSOS have to perform at least several activities on a weekly or
biweekly basis. These activities can be categorized by five different ANSOS modules: the Controller, the Report Writer, the Scheduler, the Staffer and the Staffer Reporter. The modules are listed below with brief descriptions about each of their functions:

1) **The Controller** is used to:
   - Create or delete budget positions
   - Maintain and view an employee’s personnel data (name, skill level, etc.)
   - View an entire unit’s personnel data
   - Alter personnel data
   - Transfer an employee to another position
   - Terminate an employee
   - Alter master schedules
   - Print a position report for each unit
   - Print a list of vacant positions
   - Print a list of employees “marked” for termination
   - Print a wage report
   - Print a scheduling plan sheet

2) **The Report Writer** is used to:
   - Create and save custom reports using controller data fields
   - Modify reports created

3) **The Scheduler** is used to:
   - Enter special requests for a scheduling period
   - Create schedules
- Print schedules for evaluation and/or posting
- Alter schedules if necessary
- Print a house coverage report
- Print individual schedule labels

4) The **Staffer** is used to:
- Perform daily staffing functions
- Input acuity information and determine target staffing, or input target staffing directly
- Print the staffing worksheet for each shift
- View/alter a nurse's staffing duty
- View or print a unit's staffing for a given day
- Quickly look up nurses by skill, qualification, code, unit preference, shift, etc.

5) The **Staffer Reporter** is used to:
- Produce end-of-the-period management reports on the activity of the previous period, as well as provide year-to-date information.

Each of the modules have their own passwords and functions, which the nurse managers must know in order to use ANSOS.

To assess the resources needed to work with ANSOS, an activity breakdown for using ANSOS was obtained from the nurse managers. A time study was then performed to estimate the amount of time required to perform these ANSOS related tasks for the University of Michigan Hospitals.
PROJECT PARTICIPANTS:

This project involved the cooperation, communication, and understanding between the following three parties:

1. **The student engineers**: Eileen Lei; Darya Lin; and Scott Severance.
2. **The coordinator**: John Gialanella, Senior Clinical Systems Analyst.
3. **The clients**: Gail Benjamin, Nursing Systems Planner, and Ann Kaiser, Nursing Support Services Manager.

The student engineers followed the guidance of the coordinator in communicating with the clients and in preparing and completing a successful project.

PROJECT PLAN, APPROACH, AND METHODOLOGY:

In estimating the amount of resources needed to work with ANSOS, the following items were determined:

**Activity breakdown:**

A breakdown of all ANSOS related tasks performed by the nurse managers was obtained. The data entries and tasks are listed below for each module:

A. Using the **Controller** module:
   - Entering Personnel Information

(See left side of sample screen in Figure 1)
**FIGURE 1. SAMPLE CONTROLLER SCREEN**
- Entering Scheduling Information
  (See right side of sample screen in Figure 1)
- Creating and Printing Plan Sheets
- Userfields data entry
- Position Reports

B. Using the Scheduler module:
- Creating initial schedules
- Entering schedule requests
  (See Figure 2 for sample Scheduler screen.)

C. Using the Staffer module:
- Entering schedule changes

D. Using the Staffer Reporter and Report Writer modules to create, assemble and print:
- Individual Activity Reports
- Non productive Time Report
- Productivity Reports
- New-hires Reports
- Employee transfer Reports
- Employee termination Reports
- Weekly Rosters
- Daily Rosters
- Straight day Reports
- Straight evening/night Reports
### FIGURE 2. SAMPLE SCHEDULER SCREEN

#### SCHEDULING SEARCH PARAMETERS

**SEARCH CONTROL**
- Shift order for initial: 121
- Min undercover to consider: 3
- Min score to consider: 5
- Max minutes to search: 5

**COVERAGE WEIGHTS**
- Under Coverage: 1111
- Over coverage: 1111
- Under cum coverage: 999

**SCHEDULE WEIGHTS**
- Single day on: 5
- Single day off: 5
- Exceeding max workstretch: 5
- Exceeding target rotation: 10
- Single day rotation: 5
- Rotation before day off: 15
- Split weekend: 5
- Doubleback: 99
- Seniority factor: 1

**PULL PARAMETERS**
- PULL units: JJK
- PULL skills: H
- Min pull (hrs per shift): 6

---

Reset to Default □  Copy from Unit □
- Overappointment time Reports
- Weekend Reports

E. Using the Timecard module to:
- Run Timecards
- Correct Timecards

**Time Study:**

A time study was performed on the actual times it took nurse managers who are well familiarized with ANSOS to perform the required tasks.

A. Time Study Participants:

The students timed two nurse managers who were chosen by the clients, Ann Kaiser and Gail Benjamin. The clients felt that the two nurse managers chosen were proficient in performing ANSOS related tasks and therefore were given performance ratings of 100%. In other words, the clients felt that the study participants' performance using ANSOS was at a level compatible to a person adeptly trained in using ANSOS. The study participants (operators) timed were:

Operator A:

Name: Karen Ruhlig
Title: Nursing Services, Survival Flight
Experience: 18 months using ANSOS, UMH Trainer for ANSOS
Operator B:

Name: Michelle Hebersold  
Title: Clinical Nurse Supervisor, Neurology/Neurosurgery  
Experience: 8 months using ANSOS

B. Time Study Equipment:

An Advance Quartz Digital (Sports Timer) Stopwatch was used to take the times throughout the time study. The raw data was recorded on No. 100 time study forms of the Industrial and Operations Engineering Department at the University of Michigan, Ann Arbor.

C. Time Study Experiment Conditions:

The time study took place at the University of Michigan Hospitals, on February 28, 1990 from 2:00 pm to 5:00 pm in a room equipped with two ANSOS connected computer terminals. The atmospheric and lighting conditions were comfortable and adequate. The noise level in the room was also at a minimal level. The entire time study took place in the presence of the coordinator, John Gialanella.

D. Time Study Data:

Michelle Hebersold and Karen Ruhlig were asked to simulate several tasks using ANSOS. Activities in the following modules were timed:

1) The Controller
2) The Scheduler
3) The Staffer
4) The Report Writer
5) The Staffer Reporter

It should be noted that in several cases, the subjects entered their own personnel information into the module. Therefore, in some instances, the actual times should be longer, since the operator would be entering information from a data sheet. The raw data collected during the time study was analyzed and Table 1 was created.

**Activity frequency:**

Table 2 shows the frequency per unit of time for each of the activities listed in Table 1. The data in Table 2 was obtained from the following sources:

- The activity breakdowns were obtained from the clients.

- The normal times per unit of activity were timed during the time study.

Since there were two operators timed, for the ANSOS related activity times, the students chose the shorter times when creating Table 2. For example, to enter personnel data, Operator A had a time of 2:02 while Operator B had a time of 2:58. In Table 2, 2:02 was chosen (2:02 equals 2.03 minutes) on the assumption that when a professional data entry clerk is doing the job, they would be efficient in their performance. Also, they won't have to compete for access time with others to get on ANSOS, since not as many personnel will be using the system. In cases where there was only one time recorded, that time was used. The numbers from Table 1 were converted from minutes and seconds to decimal minutes for Table 2.
### TABLE 1. TIME STUDY DATA FOR ANSOS MODULES

<table>
<thead>
<tr>
<th>ANSOS MODULE</th>
<th>ACTIVITY</th>
<th>CUMULATIVE TIME (MINUTES : SECONDS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>OPER. A</td>
</tr>
<tr>
<td>CONTROLLER</td>
<td>ENTERING PERSONNEL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MAIN SCREEN</td>
<td>0:00</td>
</tr>
<tr>
<td></td>
<td>FUNCTION MENU</td>
<td>0:21</td>
</tr>
<tr>
<td></td>
<td>VIEW UNIT</td>
<td>0:34</td>
</tr>
<tr>
<td></td>
<td>VIEW INDIVIDUAL</td>
<td>0:41</td>
</tr>
<tr>
<td></td>
<td>FINISH TYPING</td>
<td>2:02</td>
</tr>
<tr>
<td>PLAN SHEETS</td>
<td>MAIN SCREEN</td>
<td>0:00</td>
</tr>
<tr>
<td></td>
<td>FUNCTION MENU</td>
<td>0:22</td>
</tr>
<tr>
<td></td>
<td>VIEW UNIT</td>
<td>0:26</td>
</tr>
<tr>
<td></td>
<td>SEE PLAN SHEET</td>
<td>5:41</td>
</tr>
<tr>
<td>STAFFER</td>
<td>SCHEDULE CHANGES BY PERSON</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MAIN SCREEN</td>
<td>0:00</td>
</tr>
<tr>
<td></td>
<td>FUNCTION MENU</td>
<td>1:39</td>
</tr>
<tr>
<td></td>
<td>VIEW UNIT</td>
<td>2:03</td>
</tr>
<tr>
<td></td>
<td>VIEW INDIVIDUAL</td>
<td>2:08</td>
</tr>
<tr>
<td></td>
<td>FINISH TYPING</td>
<td>3:00</td>
</tr>
<tr>
<td></td>
<td>SCHEDULE CHANGES BY DAY</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FUNCTION MENU</td>
<td>0:00</td>
</tr>
<tr>
<td></td>
<td>CHANGE DAY</td>
<td>1:19</td>
</tr>
<tr>
<td></td>
<td>VIEW UNIT</td>
<td>1:29</td>
</tr>
<tr>
<td>WEEKLY STAFFER</td>
<td>MAIN SCREEN</td>
<td>0:00</td>
</tr>
<tr>
<td></td>
<td>FUNCTION MENU</td>
<td>0:34</td>
</tr>
<tr>
<td></td>
<td>VIEW ATTENDANCE MODULE</td>
<td>0:40</td>
</tr>
<tr>
<td></td>
<td>DONE READING UNITS</td>
<td>6:57</td>
</tr>
<tr>
<td></td>
<td>SEE REPORT FILE</td>
<td>7:09</td>
</tr>
<tr>
<td>STAFFER REPORTER</td>
<td>TO GO TO REPORTER</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MAIN SCREEN</td>
<td>0:00</td>
</tr>
<tr>
<td></td>
<td>FUNCTION MENU</td>
<td>0:40</td>
</tr>
<tr>
<td></td>
<td>REPORTER MENU</td>
<td>19:03</td>
</tr>
<tr>
<td>SCHEDULER</td>
<td>ENTERING REQUESTS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MAIN SCREEN</td>
<td>0:00</td>
</tr>
<tr>
<td></td>
<td>FUNCTION MENU</td>
<td>0:31</td>
</tr>
<tr>
<td></td>
<td>VIEW UNIT</td>
<td>0:51</td>
</tr>
<tr>
<td></td>
<td>VIEW INDIVIDUAL</td>
<td>1:12</td>
</tr>
<tr>
<td></td>
<td>FINISH TYPING</td>
<td>1:20</td>
</tr>
<tr>
<td>REPORT WRITER</td>
<td>GETTING REPORT READY TO PRINT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MAIN SCREEN</td>
<td>0:00</td>
</tr>
<tr>
<td></td>
<td>FUNCTION MENU</td>
<td>1:38</td>
</tr>
<tr>
<td></td>
<td>CHOOSE YOUR REPORT</td>
<td>2:42</td>
</tr>
<tr>
<td></td>
<td>ASSEMBLE REPORT TO PRINT</td>
<td>4:36</td>
</tr>
<tr>
<td>ANSOS MODULE ACTIVITY</td>
<td>NORMAL TIME IN MIN.</td>
<td>STANDARD TIME IN MIN.</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>---------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>CONTROLLER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEW HIRES</td>
<td>2.03</td>
<td>2.33</td>
</tr>
<tr>
<td>CHANGE PERSONNEL DATA</td>
<td>1.03</td>
<td>1.18</td>
</tr>
<tr>
<td>SCHEDULER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLAN SHEETS</td>
<td>5.68</td>
<td>6.53</td>
</tr>
<tr>
<td>STAFFER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCHEDULE CHANGES (BY PERSON)</td>
<td>3</td>
<td>0.00</td>
</tr>
<tr>
<td>PRINT TIME CARDS</td>
<td>7.15</td>
<td>0.00</td>
</tr>
<tr>
<td>STAFFER REPORTER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INDIVIDUAL ACTIVITY REPORT</td>
<td>19.05</td>
<td>21.91</td>
</tr>
<tr>
<td>WEEKLY ROSTER</td>
<td>19.05</td>
<td>21.91</td>
</tr>
<tr>
<td>DAILY ROSTER</td>
<td>19.05</td>
<td>21.91</td>
</tr>
<tr>
<td>PRODUCTIVITY REPORT</td>
<td>19.05</td>
<td>21.91</td>
</tr>
<tr>
<td>NON-PRODUCTIVE TIME REPORT</td>
<td>19.05</td>
<td>21.91</td>
</tr>
<tr>
<td>NEW HIRE REPORT</td>
<td>19.05</td>
<td>21.91</td>
</tr>
<tr>
<td>TRANSFER REPORTS</td>
<td>19.05</td>
<td>21.91</td>
</tr>
<tr>
<td>TERMINATION REPORT</td>
<td>19.05</td>
<td>21.91</td>
</tr>
<tr>
<td>STRAIGHT DAY REPORT</td>
<td>19.05</td>
<td>21.91</td>
</tr>
<tr>
<td>STRAIGHT EVENING/NIGHT REPORT</td>
<td>19.05</td>
<td>21.91</td>
</tr>
<tr>
<td>WEEKEND REPORT</td>
<td>19.05</td>
<td>21.91</td>
</tr>
<tr>
<td>OVERAPPOINTMENT REPORT</td>
<td>19.05</td>
<td>21.91</td>
</tr>
<tr>
<td>REPORT WRITER</td>
<td>4.60</td>
<td>5.29</td>
</tr>
<tr>
<td>POSITION REPORT</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
For example, 5:41 is equivalent to 5.68 minutes.

- The standard times per unit of activity were obtained by multiplying the normal times by the allowance factor of 1.15, made for personal, fatigue and delay allowances for the job. In other words, an allowance of 15% was made (see the APPENDIX for further information).

- Annualized activity data was obtained from the nurse managers. This data is shown in Table 3 and described below:

1. Number of New Hires:

   For the Annual number of new hires, data was obtained for each of the 5 hospitals for one year; starting March 1989 and ending February 1990. This number was then used as the volume of new hires per hospital.

2. Number of Personnel data changes per person:

   In estimating the number of changes in personnel data, Turn Around Documents (TAD’s) were used. The TAD’s for the week of March 19, 1990 through March 23, 1990 were: 11 for the Perinatal/Pediatric/Psychiatric units and 23 for the University Hospital units. Therefore, giving a total of 34 TAD’s for 2213 employees. Dividing these two numbers by each other gives: 0.7375 TAD’s per person annually.

3. Number of Schedule changes per person:

   The number of schedule changes were obtained by averaging the number of changes and the total number of staff for several of the hospital units. Table 4, shows the raw data used to estimate the number of changes made
<table>
<thead>
<tr>
<th></th>
<th>M/W/H</th>
<th>PSYCH</th>
<th>CR</th>
<th>UH</th>
<th>ACS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NUMBER OF NEW HIRES</strong></td>
<td>93.6</td>
<td>26.4</td>
<td>26.63</td>
<td>216.75</td>
<td>30</td>
</tr>
<tr>
<td>(3/89 - 2/90)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>NUMBER OF PERSONNEL</strong></td>
<td>606</td>
<td>126</td>
<td>182</td>
<td>1481</td>
<td>256</td>
</tr>
<tr>
<td>AS OF FEBRUARY 1990</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>NUMBER OF UNITS</strong></td>
<td>12</td>
<td>5</td>
<td>6</td>
<td>24</td>
<td>22</td>
</tr>
</tbody>
</table>
### TABLE 4. NUMBER OF ANNUAL SCHEDULE CHANGES.

<table>
<thead>
<tr>
<th>UNIT</th>
<th>NUMBER OF CHANGES BIWEEKLY</th>
<th>NUMBER OF CHANGES ANNUALLY</th>
<th>TOTAL NUMBER OF EMPLOYEES</th>
</tr>
</thead>
<tbody>
<tr>
<td>4B</td>
<td>133</td>
<td>3458</td>
<td>47</td>
</tr>
<tr>
<td>4DC</td>
<td>70</td>
<td>1820</td>
<td>44</td>
</tr>
<tr>
<td>6A</td>
<td>231</td>
<td>6006</td>
<td>60</td>
</tr>
<tr>
<td>6C</td>
<td>136</td>
<td>3536</td>
<td>37</td>
</tr>
<tr>
<td>7B</td>
<td>204</td>
<td>5304</td>
<td>35</td>
</tr>
<tr>
<td>7C</td>
<td>189</td>
<td>4914</td>
<td>65</td>
</tr>
<tr>
<td>K2</td>
<td>66</td>
<td>1716</td>
<td>31</td>
</tr>
<tr>
<td>PICU</td>
<td>108</td>
<td>2808</td>
<td>90</td>
</tr>
<tr>
<td>HOLDEN</td>
<td>244</td>
<td>6344</td>
<td>114</td>
</tr>
<tr>
<td>ER</td>
<td>255</td>
<td>6630</td>
<td>64</td>
</tr>
<tr>
<td>L&amp;D</td>
<td>79</td>
<td>2054</td>
<td>33</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1715</td>
<td>44590</td>
<td>620</td>
</tr>
</tbody>
</table>
per person annually. The total number of changes annually was 44590, and the total staff was 620, giving an estimate of 71.92 changes per person annually.

4. Number of plan sheets, time cards and various reports:

The number of plan sheets, time cards and all the reports was obtained from the clients.

Table 5 shows the volume of the annualized activities. The numbers in Table 5 were obtained by multiplying the annualized activity volume by either:

1) The number of units per hospital.
2) The number of employees per hospital.

For example, for preparing plan sheets:

The annualized activity volume = 13 per unit

Number of ambulatory care units = 22

Therefore, the annualized activity volume for the ambulatory care units is:

13 plan sheets annually/unit X 22 units = 286 plan sheets annually.

Table 6 incorporates data from Tables 2 and 5 and shows the time spent annually on the ANSOS related activities timed. The times per hospital were obtained by multiplying the annualized activity volume (found in Table 5) by the time per unit of activity (found in Table 2).

For example, for preparing plan sheets for the ambulatory care units:

The annualized activity volume = 286 plan sheets annually.

The time per plan sheet preparation = 0.11 hours.

Therefore:

The annualized activity time = 286 X 0.11 = 31.46 hours.
<table>
<thead>
<tr>
<th>ANSOS MODULE ACTIVITY</th>
<th>ANNUALIZED ACTIVITY VOLUME</th>
<th>VOLUME PER HOSPITAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONTROLLER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEW HIRES</td>
<td>393.38 NEW HIRES</td>
<td>93.6 M/W/H 26.4 PSYCH 26.6 CR 216.8 UH 30 ACS 393.4 TOTAL</td>
</tr>
<tr>
<td>CHANGE PERSONNEL DATA</td>
<td>0.7987 / PERSON</td>
<td>446.9 M/W/H 92.9 PSYCH 134.2 CR 1196 UH 188.9 ACS 2058.9 TOTAL</td>
</tr>
<tr>
<td>PLAN SHEETS</td>
<td>13 / UNIT</td>
<td>168.95 M/W/H 70.396 PSYCH 84.475 CR 337.899 UH 309.74 ACS 971.46 TOTAL</td>
</tr>
<tr>
<td><strong>STAFFER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCHEDULE CHANGES</td>
<td>71.92 / PERSON</td>
<td>43583.5 M/W/H 9061.9 PSYCH 13089.4 CR 105513.5 UH 18411.5 ACS 190659.8 TOTAL</td>
</tr>
<tr>
<td>(BY PERSON)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRINT TIME CARDS</td>
<td>26 / PERSON</td>
<td>2433.6 M/W/H 686.4 PSYCH 692.4 CR 5635.5 UH 780 ACS 10227.9 TOTAL</td>
</tr>
<tr>
<td><strong>STAFFER REPORTER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INDIVIDUAL ACTIVITY REPORT</td>
<td>13 / UNIT</td>
<td>156 M/W/H 65 PSYCH 78 CR 312 UH 286 ACS 741 TOTAL</td>
</tr>
<tr>
<td>WEEKLY ROSTER</td>
<td>52 / UNIT</td>
<td>624 M/W/H 260 PSYCH 312 CR 1248 UH 1144 ACS 3120 TOTAL</td>
</tr>
<tr>
<td>DAILY ROSTER</td>
<td>260 / UNIT</td>
<td>3120 M/W/H 1300 PSYCH 1560 CR 6240 UH 5720 ACS 15444 TOTAL</td>
</tr>
<tr>
<td>PRODUCTIVITY REPORT</td>
<td>13 / UNIT</td>
<td>156 M/W/H 65 PSYCH 78 CR 312 UH 286 ACS 897 TOTAL</td>
</tr>
<tr>
<td>NON-PRODUCTIVE TIME REPORT</td>
<td>13 / UNIT</td>
<td>156 M/W/H 65 PSYCH 78 CR 312 UH 286 ACS 897 TOTAL</td>
</tr>
<tr>
<td>NEW HIRES REPORT</td>
<td>13 / UNIT</td>
<td>156 M/W/H 65 PSYCH 78 CR 312 UH 286 ACS 897 TOTAL</td>
</tr>
<tr>
<td>TRANSFER REPORTS</td>
<td>13 / UNIT</td>
<td>156 M/W/H 65 PSYCH 78 CR 312 UH 286 ACS 897 TOTAL</td>
</tr>
<tr>
<td>TERMINATION REPORT</td>
<td>13 / UNIT</td>
<td>156 M/W/H 65 PSYCH 78 CR 312 UH 286 ACS 897 TOTAL</td>
</tr>
<tr>
<td>STRAIGHT DAY REPORT</td>
<td>13 / UNIT</td>
<td>156 M/W/H 65 PSYCH 78 CR 312 UH 286 ACS 897 TOTAL</td>
</tr>
<tr>
<td>STRAIGHT EVENING/NIGHT REPORT</td>
<td>13 / UNIT</td>
<td>156 M/W/H 65 PSYCH 78 CR 312 UH 286 ACS 897 TOTAL</td>
</tr>
<tr>
<td>WEEKEND REPORT</td>
<td>13 / UNIT</td>
<td>156 M/W/H 65 PSYCH 78 CR 312 UH 286 ACS 897 TOTAL</td>
</tr>
<tr>
<td>OVERAPPOINTMENT REPORT</td>
<td>13 / UNIT</td>
<td>156 M/W/H 65 PSYCH 78 CR 312 UH 286 ACS 897 TOTAL</td>
</tr>
<tr>
<td>REPORT WRITER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POSITION REPORT</td>
<td>13 / UNIT</td>
<td>156 M/W/H 65 PSYCH 78 CR 312 UH 286 ACS 741 TOTAL</td>
</tr>
</tbody>
</table>
## TABLE 6. ANNUALIZED EARNED HOURS

<table>
<thead>
<tr>
<th>ANSOS MODULE ACTIVITY</th>
<th>ANNUAL NORMAL TIME PER HOSPITAL (IN HOURS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M/W/H</td>
</tr>
<tr>
<td>CONTROLLER</td>
<td></td>
</tr>
<tr>
<td>NEW HIRES</td>
<td>3.74</td>
</tr>
<tr>
<td>CHANGE PERSONNEL DATA</td>
<td>9.68</td>
</tr>
<tr>
<td>SCHEDULER</td>
<td></td>
</tr>
<tr>
<td>PLAN SHEETS</td>
<td>17.16</td>
</tr>
<tr>
<td>STAFFER</td>
<td></td>
</tr>
<tr>
<td>SCHEDULE CHANGES (BY PERSON)</td>
<td>2615.01</td>
</tr>
<tr>
<td>PRINT TIME CARDS</td>
<td>340.70</td>
</tr>
<tr>
<td>STAFFER REPORTER</td>
<td></td>
</tr>
<tr>
<td>INDIVIDUAL ACTIVITY REPORT</td>
<td>57.72</td>
</tr>
<tr>
<td>WEEKLY ROSTER</td>
<td>230.88</td>
</tr>
<tr>
<td>DAILY ROSTER</td>
<td>1154.40</td>
</tr>
<tr>
<td>PRODUCTIVITY REPORT</td>
<td>57.72</td>
</tr>
<tr>
<td>NON-PRODUCTIVE TIME REPORT</td>
<td>57.72</td>
</tr>
<tr>
<td>NEW HIRES REPORT</td>
<td>57.72</td>
</tr>
<tr>
<td>TRANSFER REPORTS</td>
<td>57.72</td>
</tr>
<tr>
<td>TERMINATION REPORT</td>
<td>57.72</td>
</tr>
<tr>
<td>STRAIGHT DAY REPORT</td>
<td>57.72</td>
</tr>
<tr>
<td>STRAIGHT EVENING/NIGHT REPORT</td>
<td>57.72</td>
</tr>
<tr>
<td>WEEKEND REPORT</td>
<td>57.72</td>
</tr>
<tr>
<td>OVERAPPOINTMENT REPORT</td>
<td>57.72</td>
</tr>
<tr>
<td>REPORT WRITER</td>
<td></td>
</tr>
<tr>
<td>POSITION REPORT</td>
<td>14.04</td>
</tr>
<tr>
<td>TOTAL</td>
<td>4962.81</td>
</tr>
</tbody>
</table>
Finally, Figure 3 summarizes the data in Table 6. It shows the estimated annual time requirements to perform the studied ANSOS module activities.

CONCLUSIONS AND RECOMMENDATIONS:

In determining the necessary resource requirements to perform all ANSOS related activities, the students considered the following:

- The data collected during the time study, shown in Table 1.
- Tables 2, 5, and 6 which were created by considering information such as the number of units and the number of employees per unit at the University of Michigan hospitals (the raw data is shown in Tables 3 and 4).
- The opinions and suggestions on the improvement of the current system by the clients and several other nurse managers.
- The coordinator's advice.

The students also obtained information from a recent nurse managers meeting (week ending March 16, 1990). At this meeting, the following tasks were identified by the head nurses as tasks they could delegate:

1. Using the Controller to:
   A. Update personnel information
   B. Print Plan sheets
2. Using the Report Writer to print position reports.
3. Using the Staffer to print time cards.
FIGURE 3. ESTIMATED ANNUAL TIME REQUIREMENTS TO PERFORM STUDIED ANSOS MODULE ACTIVITIES.
4. Using the Staffer Reporter to print:
   A. Individual activity reports.
   B. Daily rosters.
   C. Weekly rosters.
   D. Penalties paid reports.

In addition to the tasks mentioned, the students feel that the task of using the Staffer to make schedule changes by person or by day, can also be delegated to someone other than a nurse manager to complete. These activities would be performed at a central location for all the units of the University of Michigan hospitals.

Delegating all the responsibilities mentioned above, would save the nurse managers at the University of Michigan hospitals nearly 24,000 hours annually. This estimate is extremely conservative as it is based on the time required by an efficient data terminal operator experienced in the use of ANSOS. In order to delegate this responsibility, the following resources are required:

1) **Number of full time equivalents (FTE's) needed:**

24,000 hours of clerical work annually would require 12.9 full time clerks (this number takes into account personal and fatigue delays and benefit days taken off. The number of full time equivalents (FTE's) needed for each hospital, is shown in **Table 7**.

The data in Table 7 was obtained using the annualized earned hours,
TABLE 7. NUMBER OF FULL TIME EQUIVALENTS (FTE'S) REQUIRED.

<table>
<thead>
<tr>
<th></th>
<th>M/W/H</th>
<th>PSYCH</th>
<th>OR</th>
<th>UH</th>
<th>ACS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANNUAL EARNED HOURS</td>
<td>4962.8</td>
<td>1473.6</td>
<td>1883.1</td>
<td>11202</td>
<td>4874.3</td>
</tr>
<tr>
<td>ANNUAL HOURS PER FTE</td>
<td>2080</td>
<td>2080</td>
<td>2080</td>
<td>2080</td>
<td>2080</td>
</tr>
<tr>
<td>NUMBER OF PRODUCTIVE</td>
<td>2.39</td>
<td>0.71</td>
<td>0.91</td>
<td>5.39</td>
<td>2.34</td>
</tr>
<tr>
<td>FTE'S</td>
<td>2.62</td>
<td>0.78</td>
<td>1.00</td>
<td>5.92</td>
<td>2.58</td>
</tr>
</tbody>
</table>

TOTAL FTE'S REQUIRED: 12.90
which were calculated in Table 6.

The annual hours per FTE is 2080 hours for every full time equivalent. This number was obtained in the following manner:

The number of hours a FTE works per week = 40
The number of weeks per year = 52
Thus, annual hours per FTE = 40 X 52 = 2080 hours.

The number of productive FTE's was obtained by dividing the Annual earned hours by the Annual hours per FTE. For example, for the number of productive FTE's required at Mott/Women/Holden:

Annual Earned Hours = 4962.81
Annual Hours per FTE = 2080
Therefore, the number of productive FTE's required = 4962.81 / 2080 = 2.39.

To determine the number of FTE's required, an additional 10% allowance for vacation, holiday, and sick leaves (VHS) was made. For further information regarding the 10% allowance see the APPENDIX. Therefore, the number of productive FTE's was multiplied by the allowance factor of 1.10. For example, for the number of FTE's required at Mott/Women/Holden:

Number of productive FTE's = 2.39
Allowance Factor for VHS = 1.10
Therefore, the number of FTE's required is 2.39 X 1.10 = 2.62.

2) Centralization of most of the ANSOS related tasks:

All the ANSOS related tasks such as the using the Scheduler to print plan sheets (see Figure 4), using the Staffer Reporter to print all reports,
FIGURE 4. FLOW CHART FOR PRODUCING PLAN SHEETS.
and using the Controller to enter personnel information, should be done centrally. The only task which should remain decentralized is using the Scheduler to enter requests and create a finalized schedule. As seen in the flow chart of Figure 5, the Scheduler activities are rather complicated and defy delegation, in that they require double checking and making sure that the staffing is appropriate in quantitative and qualitative terms, before granting any requests. Clinical Nurse Managers (CNM) in each unit would be better familiar with their unit's employees, their working relationships and most importantly, their unit's staffing requirements. Therefore it is best that schedule finalization requests remain decentralized.

Regarding the centralization of time keeping activities using the Staffer module, there are two possible alternatives (see Figure 6 for the present method): Alternative A (Figure 7) would be to have every unit enter their own time card data decentrally, and to centralize the printing of the time cards. This would support a quicker process since in each unit, the CNM can immediately check and see if the actual time that the employee worked is equivalent to their scheduled time. However, this alternative requires every user to have consistent knowledge of contract and payroll interpretation.

A second alternative, Alternative B (Figure 8) would be to cross train the centralized ANSOS data terminal operators with payroll processing expertise. This would reduce CNM activity to verification that an employee worked specific hours on a specific date. The timesheet on which this would be recorded would be forwarded to nursing payroll/ANSOS where the proper pay code would be assigned each employee and entered to ANSOS. Investigation as to the feasibility of electronically transferring this data
FIGURE 5. FLOW CHART FOR SCHEDULING REQUESTS.
FIGURE 6. FLOWCHART FOR STAFFER MODULE (PRESENT APPROACH).

*NOTE: TO ENTER EVERYTHING DECENTRALLY, WILL REQUIRE EVERY USER TO HAVE CONSISTENT KNOWLEDGE IN CONTRACT AND PAYROLL INTERPRETATION.
EMPLOYEE WORKS SCHEDULED/REQUESTED SHIFTS AND RECORDS TIME WORKED.

DOES ACTUAL TIME WORKED = SCHEDULED TIME?

YES

PRINT TIMECARDS CENTRALLY.

NO

REVISE EMPLOYEE SCHEDULE TO REFLECT ACTUAL TIME WORKED *

FORWARD TIMECARDS TO NURSING PAYROLL

END

*NOTE: TO ENTER EVERYTHING DECENTRALLY, WILL REQUIRE EVERY USER TO HAVE CONSISTENT KNOWLEDGE IN CONTRACT AND PAYROLL INTERPRETATION.

FIGURE 7. FLOW CHART FOR STAFFER MODULE (ALTERNATIVE A).
EMPLOYEE WORKS SCHEDULED/REQUESTED SHIFTS AND RECORDS TIME WORKED.

CNM VERIFIES ACCURACY OF TIME WORKED.

TIME SHEET FORWARDED TO PAYROLL/ANSOS.

DTO WITH PAYROLL EXPERTISE ENTERS PROPER PAY CODES INTO ANSOS.

PRINT TIMECARD

FORWARD TIMECARDS TO NURSING PAYROLL FUTURE: ELECTRONICALLY TRANSFER TO UNIVERSITY PAYROLL.

END

FIGURE 8. FLOW CHART FOR STAFFER MODULE (ALTERNATIVE B).
to University Payroll should be conducted.

Further explanations of the resource requirements follow:

1) **Clerical duties:**

The clerks that would take over the ANSOS related tasks are required to be:

1) Efficient data terminal operators.
2) Familiar with the ANSOS modules.
3) Knowledgeable of Michigan Nurses Association (MNA) and the American Federation of State, County and Municipal Employees (AFSCME) contract interpretation.

In order to ensure these requirements, it is important to provide the necessary training. The clerks, however, must be fluent typists otherwise they will not be able to use ANSOS efficiently. The nurse managers that are well familiar with ANSOS can be of assistance in training the clerks. Extensive training in ANSOS may take a few weeks. Once the clerks are ready to use ANSOS, a central location should be chosen for the clerks to perform their ANSOS related activities. ANSOS file servers and printers should also be located at this office. If relocating the servers is not possible, the clerks should be positioned as close (in distance) to the servers as possible. If a number of line printers are available, it would be best if they were placed in a room nearby to where the clerks are stationed. This is because line printers tend to be noisy, and since the clerks would be printing up large number of reports, the noise level would become disturbing.
Once the rooms have been assigned, an effective method of distributing the plan sheets, reports, etc. to each of the ANSOS users must be installed to provide delivery on a regular orderly basis. The clerks will first need to classify each unit's information, perhaps by installing large filing shelves. These shelves would have slots for each of the users. Any time reports are printed, the clerks can periodically classify them. At the end of each work day these reports can be transferred to each unit's mailbox by a messenger, or a table can be designated such that each nurse manager can come to pick up the necessary reports.

The nurse managers can also be notified of personnel changes or new hires via the E-Mail system. The clerks could report daily any new hire information, schedule changes or personnel data changes that they made that day to the appropriate nurse managers using E-Mail.

2) Centralization of tasks:

The advantages that the centralization of the various ANSOS related tasks will have are numerous. First of all, the ANSOS system will be used as it was originally designed. (ANSOS was designed for central use). This means that the system will be functioning in its most efficient configuration. This will considerably shorten computer wait times. At present, access to the different modules is a function of the number of users on the system. The larger the number of users, the longer the wait time. This has significant effects on the actual time spent producing and printing reports. In addition, the time for assembling reports will be shortened significantly, because ANSOS reads in all the data from all the units before producing any one specific report. Assembling reports can
take up to 20 minutes at times. Once all the reports are centrally assembled and printed, the wait time will be shortened because all the reports can be printed out at one time in a systematic manner. It will no longer be necessary for each user to wait while ANSOS reads in all the units individually every single time a report needs to be accessed or printed. More importantly, however, is the fact that in total the current ANSOS users will save a conservative minimum of 24,000 hours yearly.

OUTCOME AND RELATED IMPACT:

As previously described, the aim of this project was the determination of the resources needed to perform ANSOS related activities at the University of Michigan Hospitals. Having done so, the student engineers met their clients' request. In conclusion, the student engineers hope to have provided the clients and nurse managers with information they need to reduce the amount of their valuable time performing tasks using ANSOS.
REFERENCES:


Benjamin, Gail, “ANSOS Related Tasks Performed by Managers”, University of Michigan Hospitals, Ann Arbor, MI, February 8, 1990.


“Nurse Staffing Activity Report by Unit/Department”, The University of Michigan, Medical Campus Personnel Office, February 1990.
APPENDIX:

Calculations for the allowance factors are made in this section:

1. To calculate the 15% allowance for personal, fatigue and delay, data was obtained from Table 16-3, of the text: *Motion and Time Study* by Niebel. The following allowances were then made accordingly:

   A. Constant Allowances
      1. Personal Allowance ............... 5
      2. Basic Fatigue Allowance ........... 4

   B. Variable Allowances
      1. Close attention for fine
         or extracting work .................. 2
      2. Mental Strain for a fairly
         complex process ..................... 1
      3. Medium Monotony ................... 1
      4. Tedious Work ....................... 2

   Therefore, the total allowance is $5 + 4 + 2 + 1 + 1 + 2 = 15\%$, and the allowance factor will be 1.15.

2. To calculate the 10% allowance for vacation, holiday, and sick leaves (VHS):

   The number of work days per year are 260 (365 days minus weekends).

   Subtracting off 11 days for holidays, 10 vacation days and 5 sick days,
gives you 239 actual work days. And:

\[
\frac{239}{260} = 0.90 = 90\%
\]

Therefore, the actual number of work days is 90%. Thus, the allowance will be 10% and the allowance factor will be 1.10.