PENNINGTON COUNTY IDEF$_0$ PROCESS MAPPING PROJECT

Project Sponsor / Client: Pennington County (South Dakota) Board of Supervisors

Client Contact Information: Supervisors Ken Davis, Nancy Troutman and Don Holloway
c/o Holly
Pennington County Court House
Kansas City Street
Rapid City SD 57701
(605) 394 – 2171

Project Term: Spring 2012 – Fall 2011

SDSM&T Project Program: Industrial Engineering & Engineering Management

SDSM&T Project Instructor: Dr. Dean H. Jensen
Associate Professor
Industrial Engineering Dept./520 Kansas City Street
South Dakota School of Mines & Technology
501 E. St. Patrick Street
Rapid City SD 57701
(605) 394 – 1278

Project Overview:

Pennington County is preparing to move several of its operations to a new facility. The county board of supervisors would like to identify how the current information system connects the public service functions provided by the various departments by identifying (graphically) the software processes (programs run), trained personnel and data processing equipment needed. The recommended project deliverable is an IDEF$_0$ diagram document (see below) that has been annotated with the value-added information commonly derived from a value-stream mapping. This document is anticipated to be utilized in the following ways:

- as documentation of currently provided service processes for trouble-shooting the office move
- as a baseline method to identify provided service improvements going forward
- as a document to identify opportunities for cross-training county employees and replacing/upgrading software and hardware to relieve service bottlenecks and reduced risk in providing critical services
- as a tool for identifying potential data processing access points for network security testing

Student project team members will interview the current county staff for each required department, document the functions and processes, and report to the county supervisors identified above.

Project Background:

IDEF$_0$ is a federal information processing standard FIPS) adopted by the National Institute of Standards and Technology (NIST) in 1983. It was developed from the Structured Analysis and Design Technique (SADT) first implemented by the Softech Corporation for the U.S. Air Force ICAM program during a software development contract in 1969 - 1973. (IDEF = ICAM Definitions; ICAM = Integrated Computer Aided Manufacturing) The mapping process allows the reader to follow the production processes in increasing detail, beginning at the highest (A0) level and drilling down to increasing lower level views (See Figure 1, below).

Figure 1. IDEF$_0$ Decomposition Structure. (NIST, 1993 Dec.) *FIPS Publication 183.* Computer Systems Laboratory of the National Institute of Standards and Technology, adopted 21 DEC 1993. itl.nist.gov
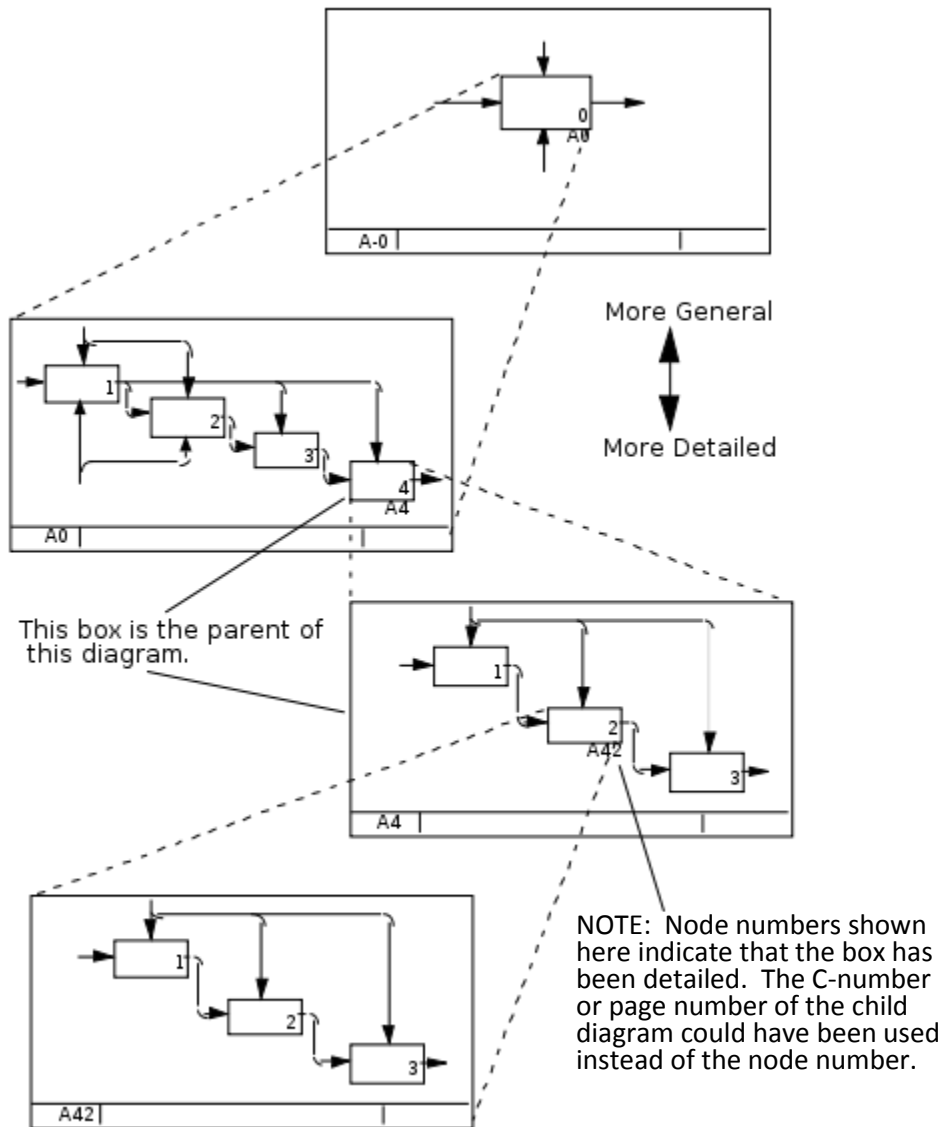
Each of these individual views identifies the following information:
- sequencing of sub-functions to be performed and information flows (see Figure 2)
- functional inputs (see Figure 3)
- functional outputs (see Figure 3)
- required mechanisms to perform function (see Figure 3)
- controls to the performance of the function (see Figure 3)
- cross referenced dictionary defining this information (not shown)

Figure 2. IDEF$_0$ Diagram Example. (DAU, 2001 Jan.) *Systems Engineering Fundamentals.* Defense Acquisition University Press, 2001. [Image: PD-USGOV.]

Node:	Title:	Number:
A0F	Maintain Reparable Spares	pg. 4–5
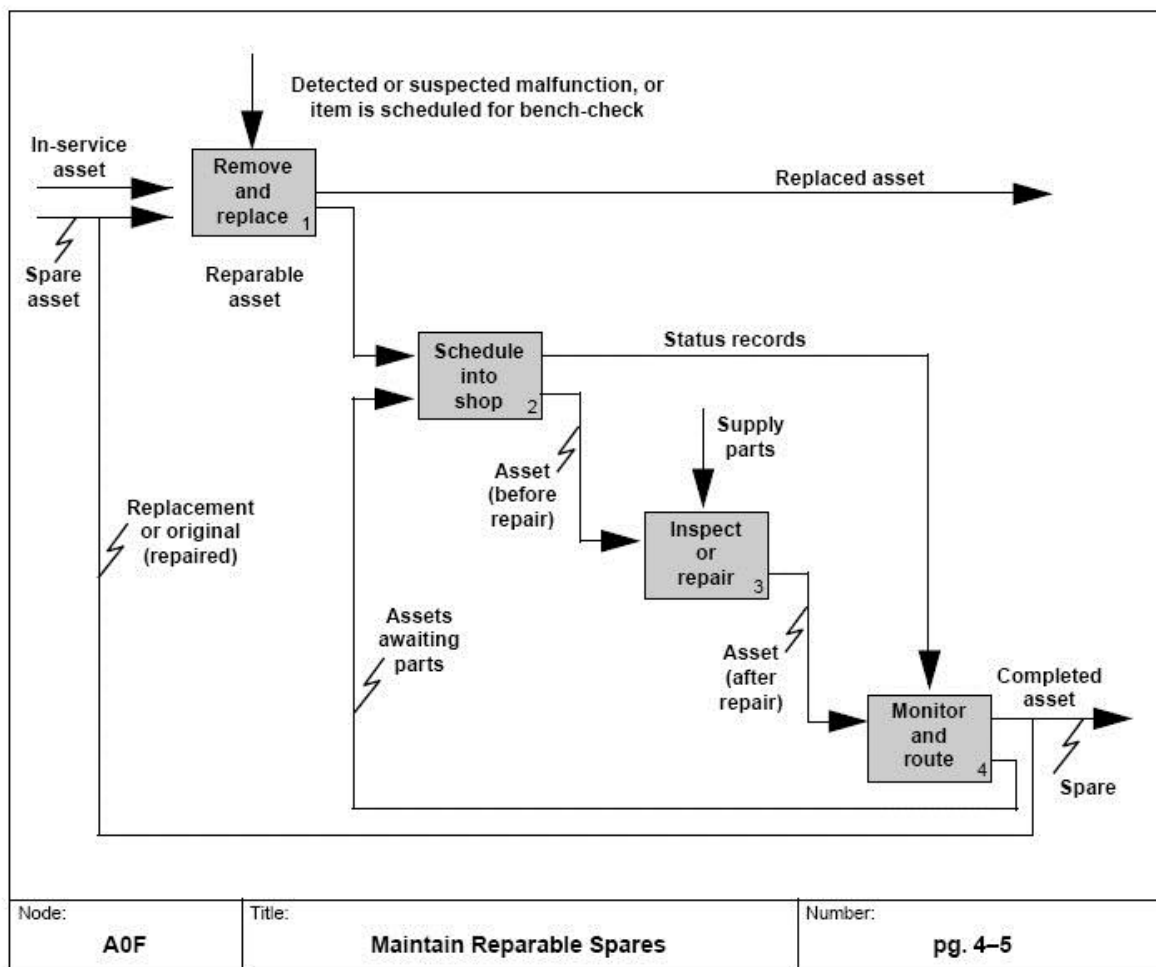
Figure 3. Integration Definition for Function Modeling (IDEF$_0$) Box Format. (DAU, 2001 Jan.) *Systems Engineering Fundamentals.* Defense Acquisition University Press, 2001. [Image: PD-USGOV.]
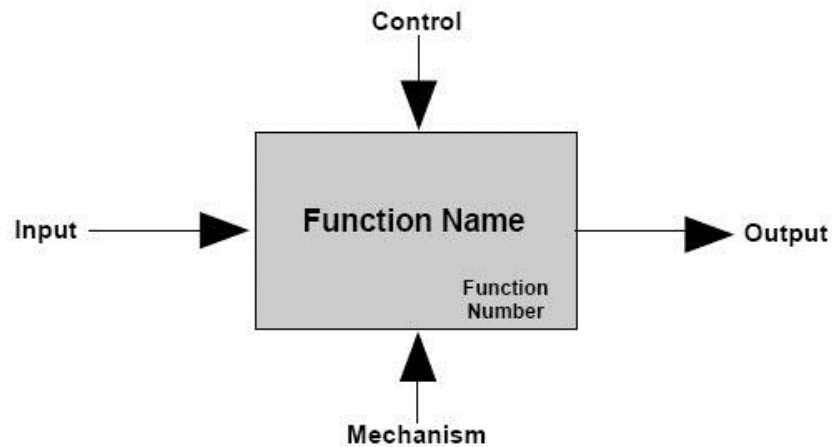
Project Team Requirements and Deliverables Description:

This project will require a team of approximately four senior design students. Students selected for this team will need to meet with Dr. Jensen for one class period (scheduled early in September) for IDEF author training. Software to document this process will be selected by the student team, and may include MS Excel or Visio, and/or commercial packages specific to IDEF modeling.

This project may be completed (potentially) in one term, dependent on the needs of the Pennington County client. If so completed, the course instructor will work with the team members to complete the curricular requirements during the second term by preparing and presenting a paper for the IIE Student Regional Conference Competition.

The following deliverable items are expected for this project:

AS-IS IDEF$_0$ Process Map – identifying the personnel , data base files, and data processing programs controlling the information processing functions of the county systems, the specific machines and their locations used for entering/storing/printing work orders and data, and the input and output information and documents as the processes currently operate.

Value Stream Mapping Augmentation – Along the bottom of each IDEF$_0$ Node Diagram, the best case, expected, and worst case processing times will be noted for each (sub-) function. Additionally, the baseline value-added, auxiliary, and non-value-added times will be estimated to allow for the tracking of process improvement.

These items are expected within the time frames and along with the other deliverables described in the Industrial Engineering and Engineering Management Senior Design Projects document. That document provides a more complete description of the process, deliverables, and timing of SDSM&T IEEM Senior Design Projects.