

**Discipline-Specific Software Subcommittee**  
College of Engineering, North Carolina State University  
**2003-2004 Academic Year Report**

## Introduction

In preparation for the transition from the current Eos computing infrastructure to the student-owned computing (SOC) model (Eos2), our subcommittee was assigned the task of developing a list of essential discipline-specific software (DSS) for engineering education (covering each department and program within the COE) and proposing a strategy to coordinate delivery of this software to students at the time of matriculation. We were also directed to propose requirements (and identify the associated resources) for discipline-specific faculty information technology (IT) training and support.

## Presuppositions

- Each engineering student will bring a computer to NC State (98% do now) and most will have laptops (52% now).
- Students will receive basic IT training (computer use, anti-virus, network security, copyright and IP issues) in E115.
- Open platform model for SOC (WIN XP, Mac OSX, Linux).
- Microsoft Office (Word, Excel, PowerPoint, Access) and Matlab installed on laptops.
- Instructors will have access to similar (compatible) hardware and software.

## Survey of Discipline-Specific Software

In January 2004, the DSS subcommittee conducted a college-wide survey of essential discipline-specific software applications. Respondents from each department and program within the COE were asked to identify software applications that were considered essential to the undergraduate teaching mission. The complete results are available at <http://www.eos.ncsu.edu/docs/coe-dss-detailed.pdf>.

The following table provides a listing of software applications requested by multiple departments.

<b>Application</b>	<b># Depts Requesting</b>	<b>Departments</b>
Matlab	9	BAE, CHE, CSC, ECE, IE, MAE, NE, OR, TE
Maple	6	CSC, ECE, MAE, MSE, NE, OR
MS Office	6	CHE, CSC, ECE, IE, MSE, TE
Fortran	5	CSC, MAE, MSE, NE, OR
C/C++	5	CSC, ECE, MSE, OR, TE
Ansys	4	BAE, BME, MAE, TE
Java SDK	4	CE, CSC, OR, TE

SAS	4	BAE, CSC, IE, TE
SolidWorks/Cosmos	4	GC, IE, MAE, TE
Acrobat Writer	3	BAE, CHE, CSC
AutoCAD	3	CE, IE, MAE
Dreamweaver	3	BAE, CSC, TE
Lindo/Lingo	3	CE, IE, OR
MS Project	3	BAE, CHE, ECE
Photoshop	3	BME, CSC, IE
Visio	3	IE, TE, ECE
Adams	2	BAE, BME
Arena	2	IE, OR
CPLEX/AMPL	2	IE, OR
gcc	2	CSC, ECE
Jmp	2	ECE, IE
Labview	2	BAE, ECE
Mathematica	2	CSC, MAE
Opnet	2	CSC, ECE
Pro/E Wildfire	2	BAE, MAE
Visual Studio.NET	2	ECE, TE
X-Win32	2	CSC, ECE

### Proposed Software Delivery Strategy

Software applications were classified into three categories: Freshman core, ITECS core, and DSS. A proposed breakdown of Freshman and ITECS core software applications (based on current applications) is given in the following table.

Freshman core	ITECS core
Microsoft Office	Matlab
Maple	Fortran
Java 2 Software Dev. Kit	C/C++
Adobe Acrobat Reader	SAS
Web browser (Netscape, Explorer, etc.)	Ansys
Symantec AntiVirus	SolidWorks/Cosmos
Utilities (WinZip, X-Win32, PuTTY, Wolfcall, pdf PrintFactory, etc.)	AutoCAD
	MS Project
	Lindo/Lingo
	Dreamweaver
	Adobe Photoshop

Students will receive instruction in the Freshman core applications (productivity software, web browser, utilities, and anti-virus software) in E115. Core engineering applications used by several departments/programs across the COE will comprise the ITECS core applications.

Increasing software costs will require ITECS to prioritize and take advantage of economies of scale whenever possible/practical. Recommendations regarding ITECS core software:

- Organize faculty forums to explore software options for next-generation Eos.
- Standardize on Matlab/Mathematica, a FORTRAN compiler, a scientific plotting package (TecPlot, Origin, SigmaPlot, IGOR Pro, Kaleidagraph), and a web authoring tool (e.g., Dreamweaver).
- Avoid supporting applications with overlapping capabilities, e.g., Matlab, Maple, and Mathematica.
- Specialized software identified as essential by one or two departments will be accessible through targeted labs. Some highly subscribed applications in targeted labs will be supported by Eos fees, and others will require support from departmental funds.

A three-tier software delivery strategy is proposed:

Applications	User Loaded	Remote Access	Targeted Labs
Freshman Core	X		
ITECS Core	X <sup>a</sup>	X	X
DSS	X <sup>b</sup>		X

<sup>a</sup>A limited number of generic applications, e.g., Matlab, Dreamweaver, and a scientific plotting package.

<sup>b</sup>DSS for individual courses (e.g., bundled with textbook).

- User loaded software (student/faculty-owned machines)
  - limited number of core applications to avoid software conflicts and overburdening IT support services.
  - student-purchased software (e.g., bundled with textbook)
  - **challenge:** vast majority of DSS software is for WIN platform
- Remote access software
  - facilitates an open platform SOC model (WIN, Mac, Linux)
  - works currently (more or less) for Solaris and Linux applications
  - explores “thin client mode” delivery
  - **challenge:** remote access to WIN applications
- Targeted (departmental) computing labs
  - DSS applications used by only one or two departments/programs
  - graphics intensive applications that perform poorly via remote access
  - short-term use software (available for limited time for specific course requirements).
  - **challenge:** coordination of timely software delivery for courses

Essential to the proposed software delivery strategy is “just-in-time” delivery of software for students and teaching faculty. This will require close coordination between teaching faculty, ITECS, and departmental support staff.

### **IT Support Strategy**

- Student instruction on computer use, virus protection, network security, and file maintenance (backup) included in E115.
- ITECS faculty workshops will address similar issues. Software tutorials/workshops provided for new software titles.
- Targeted IT support personnel (familiar with the DSS for each department/program) to coordinate software delivery.
- On-line help/tutorials for core applications.

### **Resources for Faculty Computing**

*Faculty laptop program.* The DSS subcommittee was also asked to propose a process whereby teaching faculty obtain computers and software equivalent to those of their students. In the interim, a plan “Proposal for Instructional Laptop Computers for COE Faculty” was developed and approved by the Dean. The first phase of the plan (Fall 2004) funded the purchase of 40 faculty laptop computers for use in teaching. The faculty participants are required to attend a 1-day IT workshop (hosted by ITECS) and provide teaching/learning assessment data. Full funding of the faculty laptop plan (on a 3-year replacement/upgrade cycle) would put equivalent IT in the hands of teaching faculty and students in the COE.

*Faculty IT training and support.* The diversity of platforms, applications, and delivery methods envisioned for the next-generation Eos will require additional IT training and support. ITECS should have primary responsibility for providing IT instruction and support to COE faculty. If sufficient resources are not provided by the current Eos fee, then a fee increase should be considered.