Outline

Welcome & Background

Project Overview

Break

SME ProAM Experiences

Wrap-Up

- ◆ Summary of Accomplishments
- ◆ Post-Project Plans
- ◆ Technology Transfer:
  – Eagle Engineering - Jim Thaxton
  – EPS - Dirk Zwemer
- ◆ Collaboration Opportunities
- ◆ Summary of Benefits

Discussion - All

Overview of Afternoon Sessions

Handout 1c

Georgia Institute of Technology

Summary of Accomplishments

Mature Prototype State

- **General techniques:**
  - Internet-based engineering service bureau (ESB)
  - X-analysis integration (XAI)
    - Product data-driven plug-and-play analysis modules
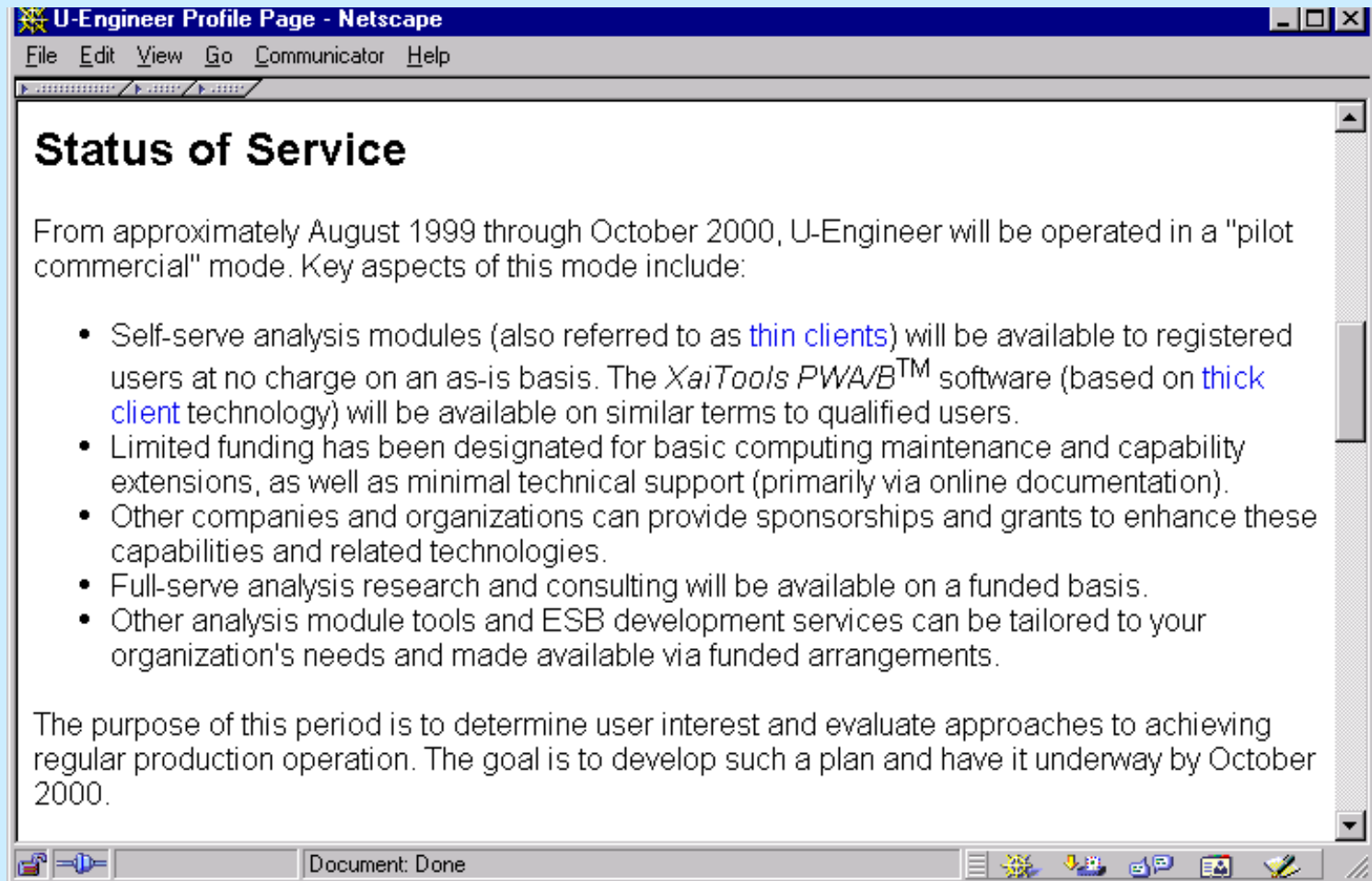   - General purpose XAI toolkit
- **Applications in specific AMCOM context:**

Early Pilot State

  - U-Engineer.com pilot commercial ESB with Internet-based PWA/B-specific analysis modules & toolkit
  - Usage by SMEs in AMCOM supply chain:
    - Full-serve and self-serve missile examples

Post-ProAM Plans

Thru 8/99: Limited audience alpha pilot usage
Thru 10/99: Broader audience beta pilot usage
Thru 10/00: General audience pilot usage

Status of Service

From approximately August 1999 through October 2000, U-Engineer will be operated in a "pilot commercial" mode. Key aspects of this mode include:

- Self-serve analysis modules (also referred to as thin clients) will be available to registered users at no charge on an as-is basis. The *XaiTools PWA/B*^{TM} software (based on thick client technology) will be available on similar terms to qualified users.
- Limited funding has been designated for basic computing maintenance and capability extensions, as well as minimal technical support (primarily via online documentation).
- Other companies and organizations can provide sponsorships and grants to enhance these capabilities and related technologies.
- Full-serve analysis research and consulting will be available on a funded basis.
- Other analysis module tools and ESB development services can be tailored to your organization's needs and made available via funded arrangements.

The purpose of this period is to determine user interest and evaluate approaches to achieving regular production operation. The goal is to develop such a plan and have it underway by October 2000.

Other Technology Transfer

◆ Participation in STEP & GenCAM standards activities

◆ Conferences, workshops, etc.
  – DLA Conference (1997)
  – NIST Internet Commerce for Mfg. (ICM) Workshop (1998)
  – UCE-SBA Workshop (1998)
  – ASME Design Engr. Technical Conference (1999)
  – CALS Expo (1999)

Other Technology Transfer
(continued)

- Engineering service bureau (ESB) concepts:
  - *Eagle Engineering:* Machined parts design-for-mfg. (DFM)
  - *Automata Design, Inc. (ADI):* PWA/B DFM & electrical test
  - *Electronic Packaging Services, Ltd. Co.(EPS):* EP analysis

- Selected proposals:
  - *ATP (EPS, GIT):* Warpage validation & ESB development
  - *PMTEC (AMCOM, Boeing, CEI, Crane, EPS, GIT):* Warpage validation & analysis module development
  - *PMTEC (GIT, IPC, NIST, RSI):* GenCAM/GenX XML development
  - *Prime:* In-house ESB development

TIGER/ProAM Influence on Eagle Engineering, Inc.

Presentation by Jim Thaxton

Electronic Packaging Services, Ltd. Co.

http://www.warpfinder.com/

Presentation by Dirk Zwemer

- Provides Measurement Services and Equipment to Electronic Manufacturers in the area of Thermomechanical Performance and Warpage

- Four-Year-Old Spin-off of Georgia Tech

- ~ 1M Annual Sales (85% Commercial)

3M   ASE   AMD   AlliedSignal   Amkor   Cabletron   Celestica   Chrysler   Compaq   Ford   Hadco   Hewlett-Packard   IBM   ITT   Intel   LSI Logic   Lucent Technologies   Motorola   NEC   Raytheon   Rockwell   Samsung   Sematech   Siemens   Silicon Graphics   Solectron   Sun Microsystems   Texas Instruments   Toshiba   Universal Instruments   VLSI Technology   Viasystems   Xilinx
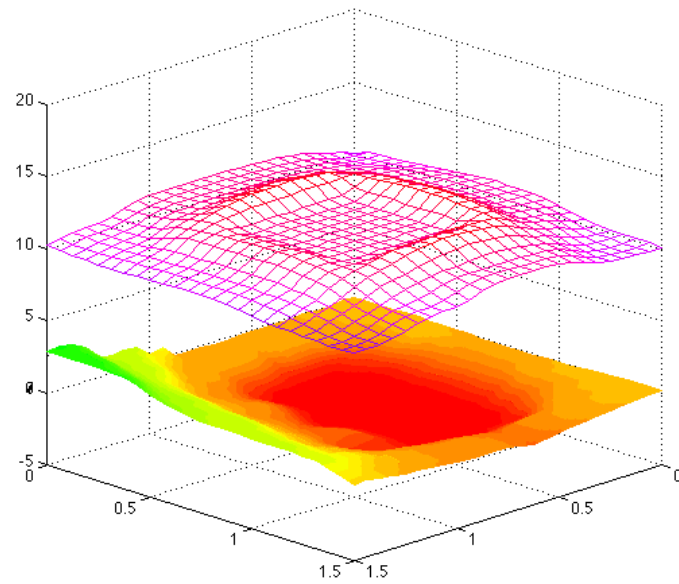
ELECTRONIC PACKAGING SERVICES, LTD., CO.

PWB/BGA INTERFACE ANALYSIS

T = 225 °C at Peak
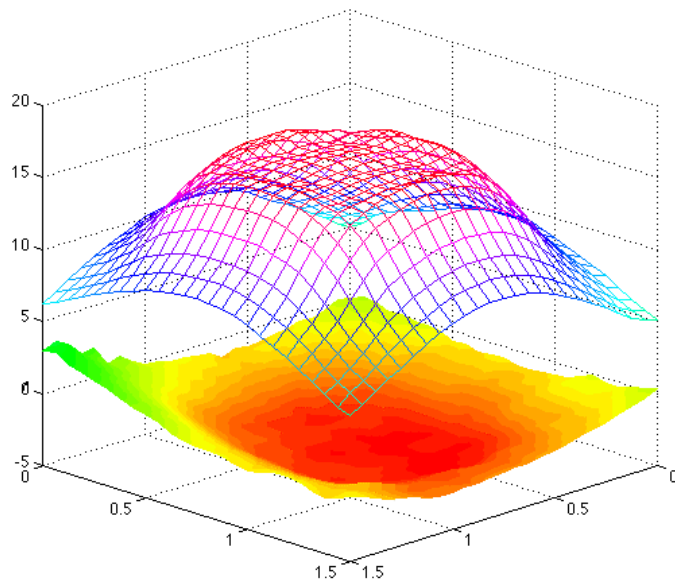
T = 183 °C Cooling

EPS ESB Objectives

- Predictive Warpage Models Deliver Experimental Results in the Most Useful Form

- ***First Step -*** EPS Sponsors Engineering Service Bureau (ESB) Web Page on Georgia Tech EIS Lab Server

- ***Further Steps -*** EPS works with EIS Lab and Others to Validate Models and Create Materials Properties Databases

- ***Future -*** EPS becomes an ESB for Mechanical Performance and Reliability of Electronic Packages

Collaboration Opportunities

◆ Company-tailored supply chain pilots

◆ Other applications:

» Company-specific analysis modules

» Intranet/Extranet-based engineering service bureaus

◆ Further extensions:

» Catalogs with multi-fidelity "drive-before-buy" simulations

» Other domains: control systems, propulsion, etc.

◆ U-Engineer sponsorship

◆ Commercialization of U-Engineer-like ESBs

Summary of Benefits

- Internet-based engineering service bureaus (ESBs)

  → *A key step towards affordable SME analysis*

- Product data-driven analysis technology

- Analysis integration toolkit

- AMCOM missile supply chain application

  → *U-Engineer & electronic packaging analysis*

- Exemplar usage of electronic data files like STEP

- Applicability to other product industries

- Framework for automated analysis

  → *Improved product performance, reliability, and manufacturability*