CROSS-TRAINING TECHNICIANS & ENGINEERS FOR SEMICONDUCTOR MANUFACTURING

NSF ATE PROJECT #98-50310/01-01311   01.JULY.1998 – 30.JUNE.2004

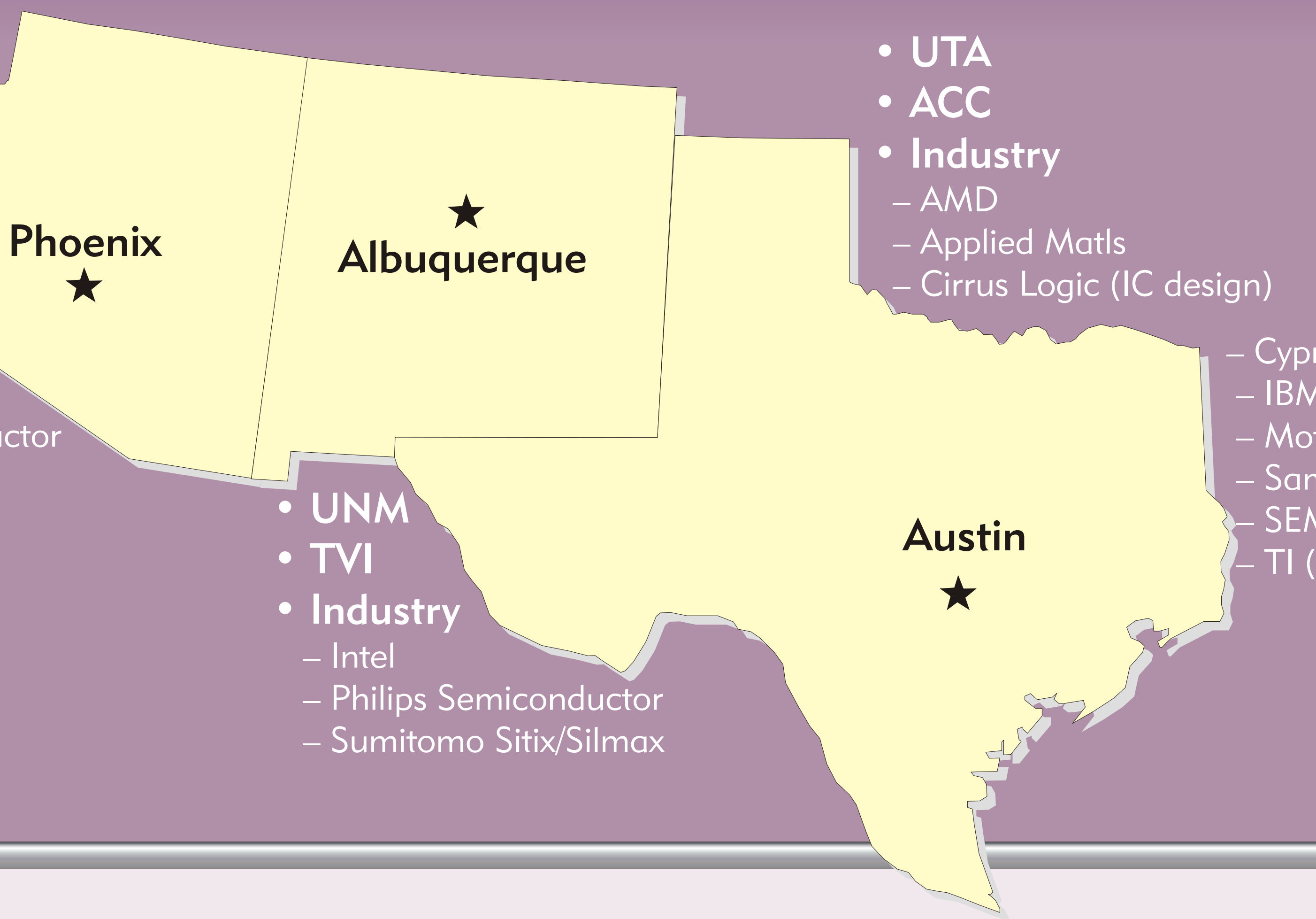
PROJECT PREMISE

Observe: Technicians and Engineers in semiconductor factories (fabs) **work together** as team members, but they are **not trained together** as team members.

Premise: Co-training technicians and engineers in teaching factories and virtual factories will **better prepare** them for real, interactive fab duties.

Goal: Cross-training technicians and engineers, such that they better understand the roles and skill sets of the other, will enhance their **effectiveness** as team members (less "in-plant" training)

- Technicians will get more exposure to math and science
- Engineers will get more exposure to machine (tool) operations.



- ASU
- MCCCD
- Industry
  - Intel
  - Microchip
  - MicroRel
  - Motorola
  - SG Thompson
  - ON Semiconductor
  - SITIX

- UNM
- TVI
- Industry
  - Intel
  - Philips Semiconductor
  - Sumitomo Sitix/Silmax

- UTA
- ACC
- Industry
  - AMD
  - Applied Matls
  - Cirrus Logic (IC design)
  - Cypress
  - IBM (IC design)
  - Motorola
  - Samsung
  - SEMATECH
  - TI (Dallas)

PROJECT SUMMARY

Team members will **develop and evaluate** computer-aided **lab/curriculum modules** to be integrated into factory-like labs and related courses:

- X-training labs (techs/engrs)
- SMT labs
- Engr labs
- Conventional courses

The multi-media **modules**:

- will cover S/C unit processes, and their facility demands, from both technician and engineering perspectives.
- can serve training needs in real, mock or virtual factory-like labs.
- CD used by 140 technicians and 490 engineering students

SOFTWARE PANELS

Generally speaking, there are 3 steps involved in the photolithography process:
1. Spin/Coat
2. Align/Expose
3. Develop

Click on one of the 3 steps on the right to learn more.

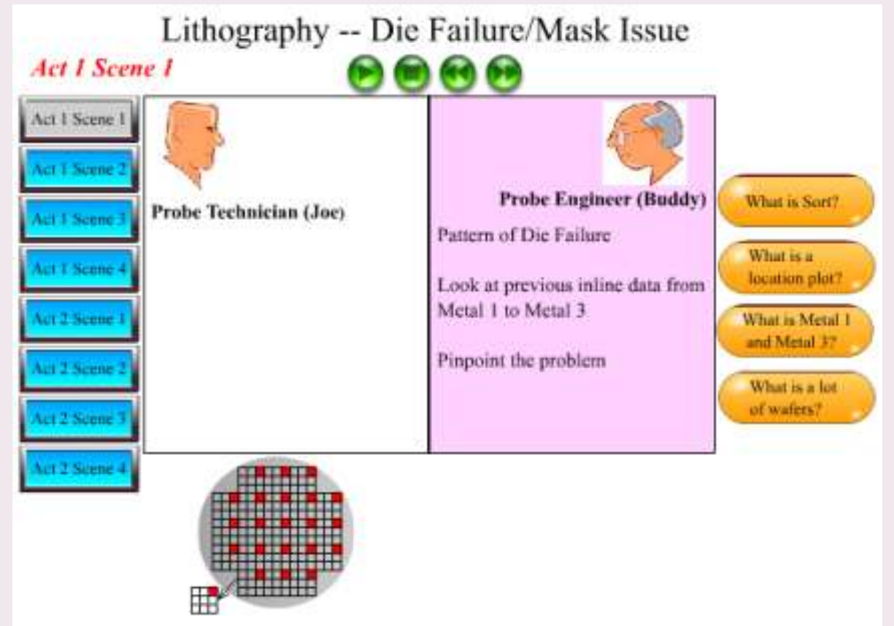
Technician Responsibilities

The job of the photolithography technician is to understand the process and equipment functionality and determine the various factors that might affect the materials, process, and equipment that are used to perform the lithography operation.

Engineer Responsibilities

The job of the lithography engineer is to understand and determine the various interactions between the materials, equipment, and processes used to perform the lithography operation. The goal is to achieve the necessary resolution and registration for each level while maximizing the throughput.

Tech–Engr



Lithography -- Die Failure/Mask Issue

Act 1 Scene 1

Probe Technician (Joe)

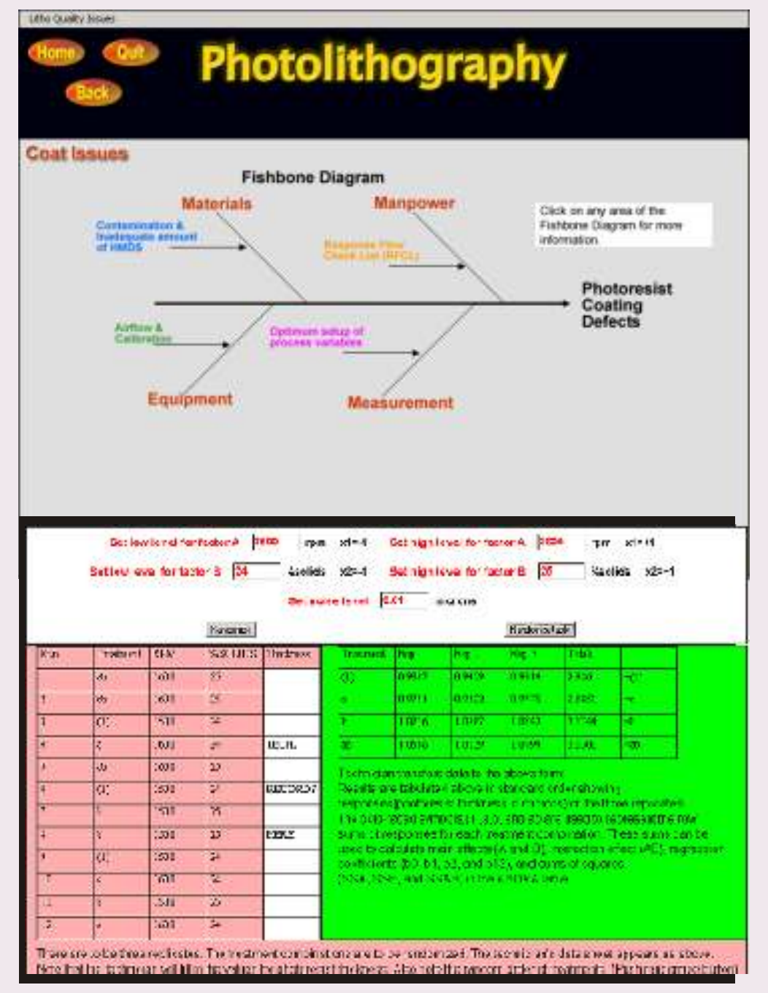
Probe Engineer (Buddy)

Pattern of Die Failure

Look at previous inline data from Metal 1 to Metal 3

Pinpoint the problem

X-Training Loop



MODULE CONTENT & LEADS

Cross-training curriculum modules, and their computer implementations, cover unit processes, and factory-level operations.

Unit processes

Yr 1 – Lithography (contact, optical, e-beam) (MCCCD, UTA)

Yr 1 – Sputter & Metalization (evap, sputter) (TVI, UNM)

Yr 2 – Thin-Film Deposition (oxides, nitrides, epi, CVD) (TVI, UNM)

Yr 2 – Etch (wet, plasma) (ACC, UTA)

Yr 3 – Oxidation (growth) (MCCCD, UNM)

Yr 3 – Diffusion, Implant and Thermal Processing (ACC, UTA)

Factory Operations

Yr 1 – Design of Experiments (DOE) (MCCCD, ASU)

Yr 2 – Characterization & Control (SPC) (MCCCD, ASU)

Yr 3 – Factory Dynamics (MCCCD, ASU)

CLEANROOM VENUES




UNM MTTC

TVI

UTA MRC

ACC

ASU

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