Designing an On-line Certificate Program in Microelectronics Manufacturing

Agenda

- Background and Context
- Role and Goals of Certificate Program
- Design Process
- Status
- Next Steps

Background and Context

- Proposition 301 (The Funding)
- Arizona Regents' University (The Vehicle)
- Arizona Master's of Engineering Degree Program (The Prototype)

Proposition 301

- Approved as ballot proposition in November 2000 statewide general election
- Targeted to improve Arizona public education
- Incremental statewide sales tax projected to raise $500 M/yr
- 12% allocated to Technology and Research Initiative Fund to be administered by ABOR

TRIF Funding Targets

- Promote university research, development and technology transfer related to the knowledge-based economy
- Expand access to education for time-bound and place-bound students
- Implement recommendations from Governor's Task Force on Higher Education
- Develop programs that prepare students to contribute in Arizona High Tech industries

Governor's Task Force Key Strategies

❶ Increase Participation

Raise the level of participation for traditional and continuing learners in higher ed

❷ Increase Research and Business Development

Increase amount of targeted research, technology transfer and business development provided by higher ed

❸ Increase Capacity and Productivity

Enhance the human, physical, and technological capacity of institutions of higher ed

Arizona Regents' University

- Virtual University
- Managed by Project Management Team and Board of Regents' ARU subcommittee
- $2M budgeted annually from Prop 301
- Framework for expanding access to university education via technology

Vision

ARU will provide highly accessible educational opportunities that will result in a continuously improving, better-educated workforce, and that will lead, thereby, to personal prosperity for our citizens and to a strong economy for Arizona.

Mission

ARU's mission is to raise the overall level of educational attainment in the state by collaborating to provide access to university education for time-bound and place-bound students of the state.

ARU Foundations

Infrastructure

Internet

Strong statewide connectivity via ASPIN, NAUNet, AZTelemedicine

Baseline Programs

Spring 2001: 165 web-delivered and 150 interactive TV courses

12 degree programs and 7 certificates offered in business, education, engineering, nursing, and technology

Over 40 new or expanded programs proposed under 301

Services

All student services migrating to web for on- and off-campus students

Possibility of centrally provided services and/or better coordination

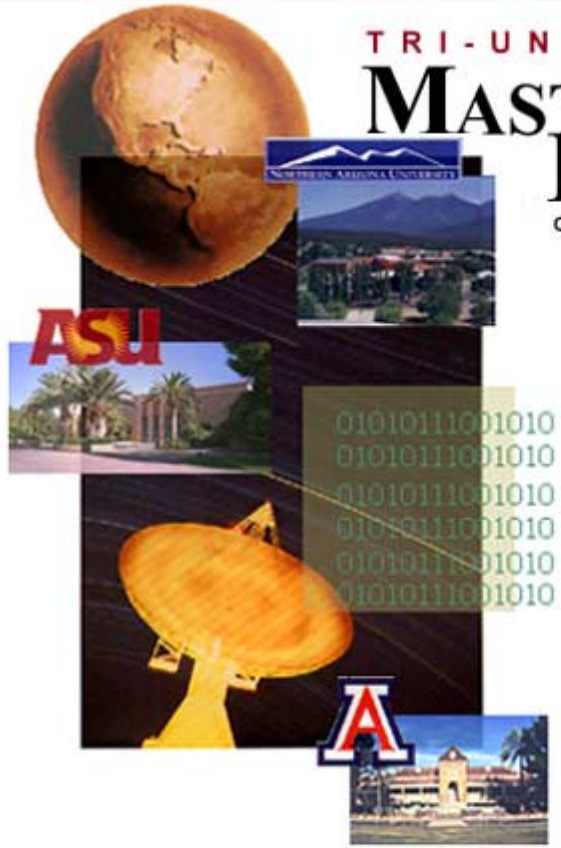
ARU Logistics

- Each degree-seeking student selects a “Home” university
- Student is admitted to the Home University
- Home Catalog lists courses from other partners
- Home University handles registration, financial aid, tuition & fee collections
- Revenue shared using negotiated formula

ARU – The Primary Challenge

How do the universities coordinate and communicate so that:

- services and processes are “seamless” from a student point-of-view
- course offerings are optimal from a market and scheduling viewpoint



TRI-UNIVERSITY MASTER OF ENGINEERING

Offered in collaboration by Arizona's three state universities

PROGRAM OVERVIEW | COURSE OFFERINGS

CURRICULAR TRACKS | ADMISSION

COURSE REGISTRATION | FOR MORE INFORMATION

FREQUENTLY ASKED QUESTIONS

NATURE OF THE PROGRAM

Arizona's three state universities, **Arizona State University**, **Northern Arizona University**, and **University of Arizona**, are collaborating to offer the Tri-University Master of Engineering program. This graduate degree program is designed to meet the educational needs of practicing engineers by offering courses via distance delivery. With input from industry professionals, the three universities are offering courses that develop the skills, fundamental knowledge and understanding that are critical to today's practicing engineers.

http://www.TriUniv.engr.arizona.edu/

NORTHERN ARIZONA UNIVERSITY

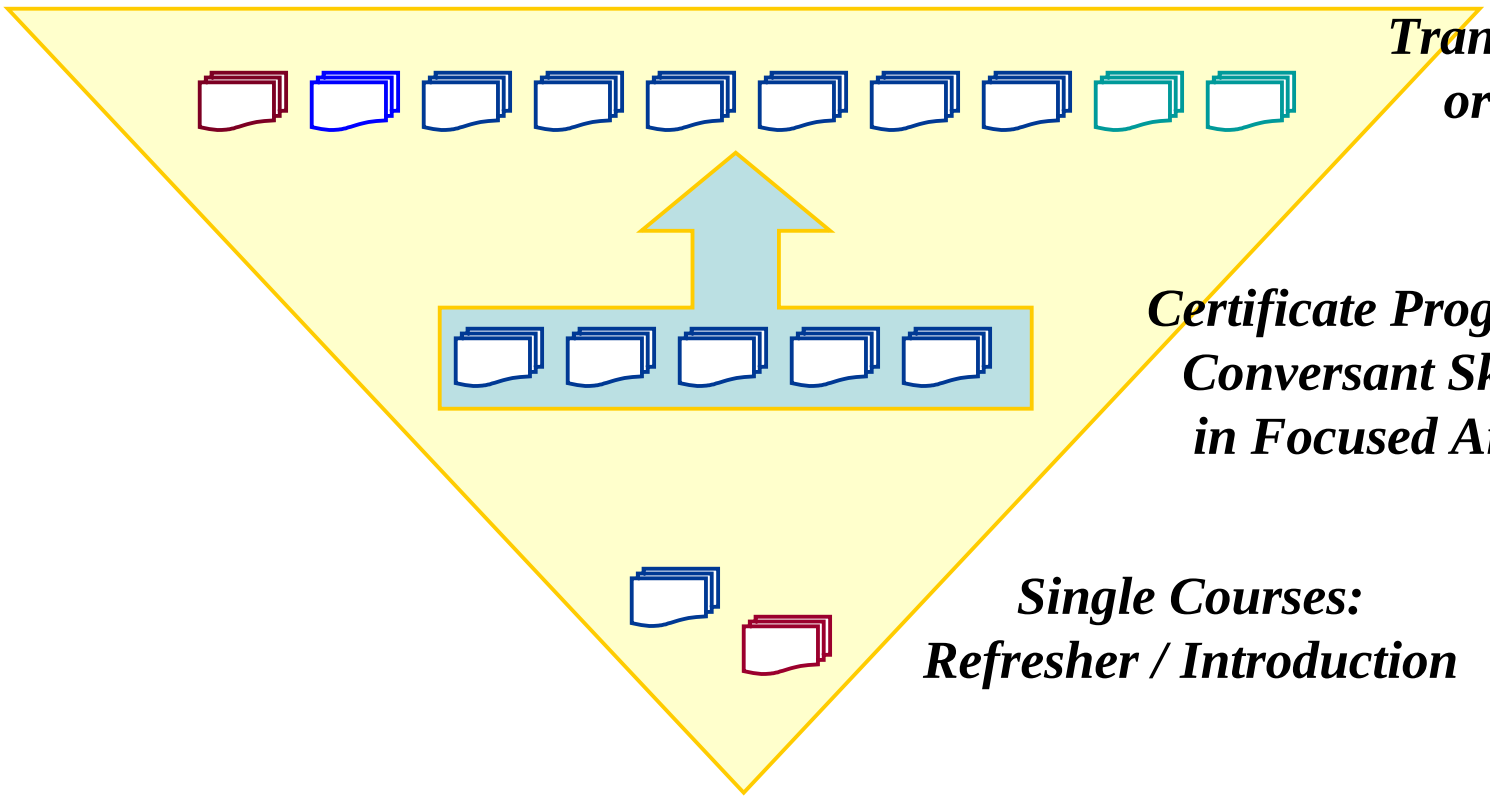
ASU

Degree Requirements

*Category**	*Credits*
• Applied Engineering Mathematics	3
• Engineering Management / Business	3
• Major requirements and electives	18-24
• Practice-oriented Project	0-6
• Total	30
• Final examination as determined by the advisory committee	

**specific curricular tracks or unique program of study*

Role of Certificate Program



Transformational or Advanced Degree

Certificate Program: Conversant Skills in Focused Area

Single Courses: Refresher / Introduction

Certificate Program Goals

- Target Microelectronics Manufacturing
- Design to be:
  - responsive to industry needs
  - fluid to meet changing technology and edu needs
  - flexible to create tailored topical areas
  - aligned with continuing edu market
  - dovetailed into MEng Degree Program

Modular courses (1-2 semester unit each)

Certificate Program Key Players

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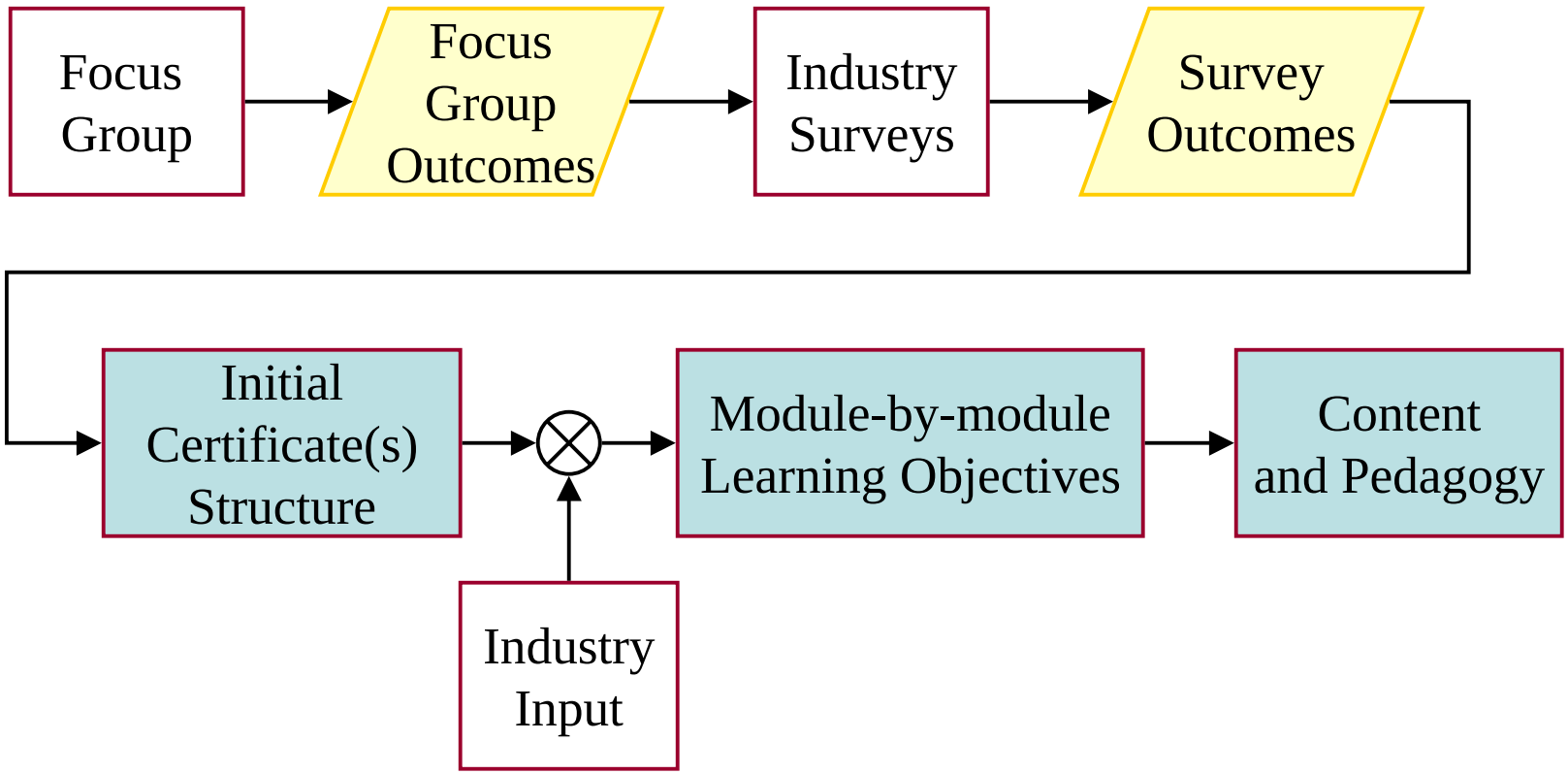
Program Design
Industry Input Process



Focus Group

- Systematic questioning of many individuals from a cross-section of the industry in an informal setting
- Single session identified multiple perspectives of participants as well as commonalities
- Revealed participants' perceptions of the "ideal" education for their employees

Focus Group Findings:
What are we doing right?

- Cutting edge research, problem solving, exposure to industry problems, practical training (*e.g.*, Cleanroom, Safety)
- Strong semiconductor / microelectronics focus
- Collaboration with industry
- Engaging / communicating to understand needs

Focus Group Findings:
Principal Issues & Recommendations

- Focus on convenient, flexible, delivery methods
- Ability to time-shift classes/learning to your own time most critical (although university semester structure is acceptable)
- Educational "business" success factors:
  - Customer service orientation key differentiator
  - Competitive Cost-for-Value
  - Niche technical areas blended with practical skills
  - Technically current, relevant, leading edge
  - State-of-the-art distance learning pedagogy

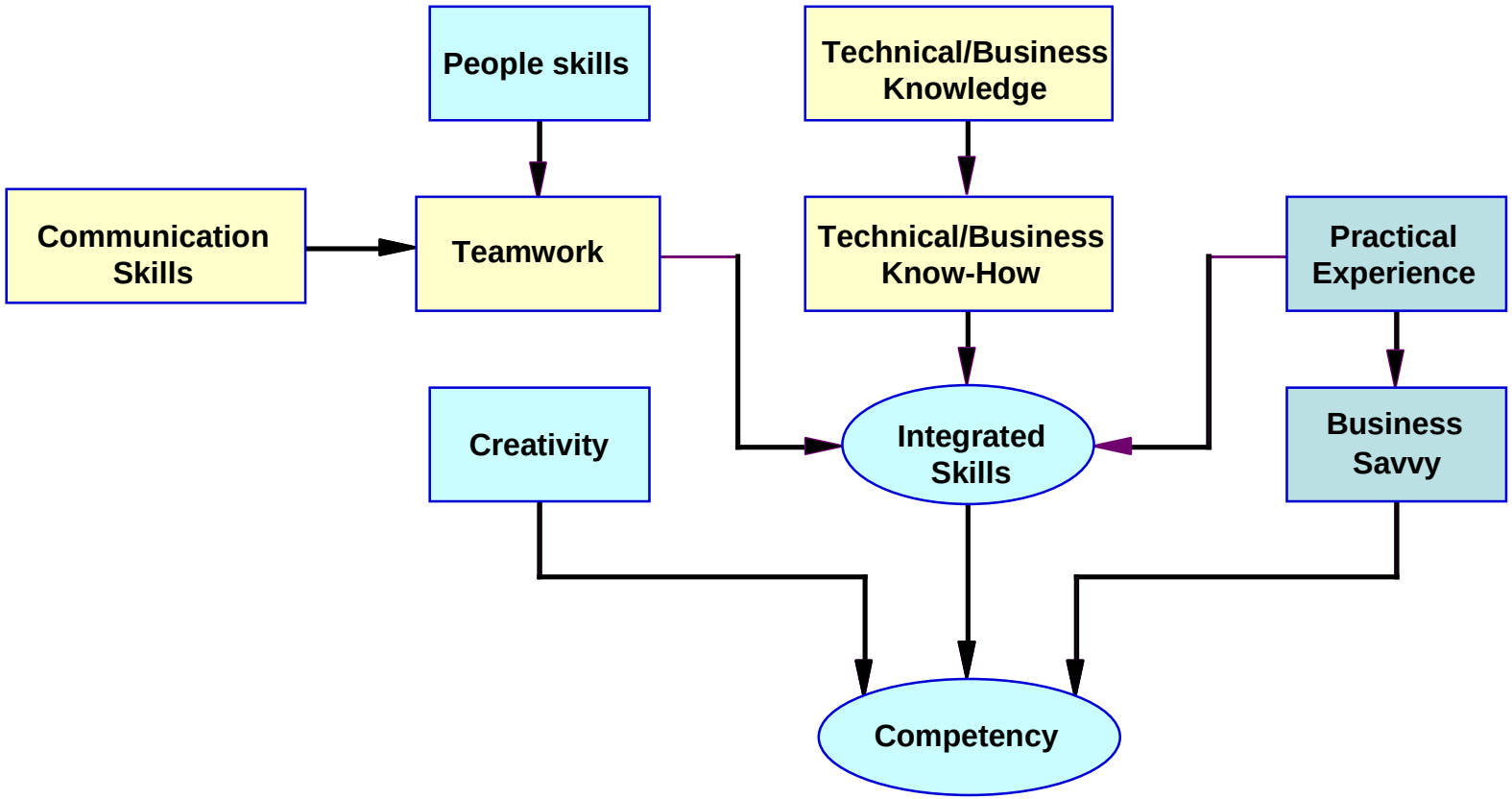
Focus Group Findings:
Customer Service Recommendations

- "Under-promise and Over-deliver – make it easy, slick. Do it right."
- Logistics:
  - Ease of entry (application/admission)
  - Ease of enrollment (registration)
  - Ease of payment
  - Responsive advising
  - Responsive Tech Support

Focus Group Findings:
Key Unmet Educational Needs

- Technical Communication
- Teamwork
- Business Knowledge
- Global Understanding
- “Hot” Topics (*e.g.*, optoelectonics, molecular electronics, MEMS)

Attributes of the Master Practitioner



Industry Surveys

- Two parallel versions:
  - Manager https://intraweb.eas.asu.edu/forms/manager_survey/
  - Engineer https://intraweb.eas.asu.edu/forms/engineer_survey/
- Web accessed / data-based
- Sent to 22 CTOs/VPs/Managers at 17 companies

Survey Question Areas

- Perceived reasons for continuing education
- Delivery issues
- Content Areas
  - Processing: fundamentals, processes, fab tools
  - Process flow, process integration and manufacturing
  - Materials Issues
  - Semiconductor devices: theory, simulation, modeling
  - Cross-cutting technical issues (*e.g.*, EHS, metrology, Cleanroom)
  - Global Context (*e.g.*, Markets, Supply Chain, ROI, EHS, IP)
  - Hot Topics
  - Professional skills (*e.g.*, communication, teamwork, ethics)
- Certificate Areas

Survey Response Rate Low

Solutions?

Increase response rate:

- Identify champions
- Send surveys directly to current/past students
- Include monetary incentive
- ?

Obtain information by alternative paths:

- Meetings with key industry reps
- Available independent industry needs assessment studies
- ?

Future Input Needs

What:

- Learning objectives
- Relevant problems
- Case Studies

How:

- Competency and Learning Teams (CLTs)
- Industry co-Instructors
- ?