September 15 and 16, 2005

Report of Summit Proceedings

November 15, 2005

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OPAS Summit 2005
Report of Summit Findings

Executive Summary

Preface

A two-day Strategic Planning Summit was held in Portland, Oregon on September 15 and 16, 2005. The Summit brought together leaders from throughout the state to share information and insights and begin to craft a strategy for enhancing pre-engineering and applied science education. The delegates at the Summit developed a set of recommendations that will be used by a follow-up task force to craft a cohesive strategy statement. In addition, a set of subcommittees and task forces will develop implementation plans and follow through on these plans.

This report describes the goals and themes of the summit, the vision and mission of the summit delegates, and the recommendations developed by these delegates. In addition, it outlines steps that will be used to assure the maximum impact of the summit.

Goals of the Summit

- Consider all grade levels from kindergarten through the first two years of college;
- Set measurable goals including those that address increasing the motivation and academic preparedness of students who are pursuing or might pursue engineering or technology careers;
- Improve coordination and cooperation among organizations;
- Make better use of limited resources;
- Identify ways of recruiting more resources and more effectively competing for these resources;
- Promote efficient and seamless transfer of credit among education sectors;
- Provide input to the Engineering & Technology Industry Council (ETIC) including criteria for possible future funding of pre-engineering and pre-college grants; and
- Complement the work of the State Board of Education and the State Board of Higher Education and its Excellence in Delivery and Productivity Workgroup.

Keynotes, Vision, Mission, Goals

Each day began with a keynote presentation. The first day, Cary Sneider, Vice President for Educator Programs from the Museum of Science in Boston, spoke to the group about supporting engineering education for all students as an essential literacy in a modern democracy. On the second day, Steve Pawlowski, Senior Fellow and CTO from Intel Corporation spoke about the challenges of recruiting engineers and the lack of engineering recruits from within Oregon.

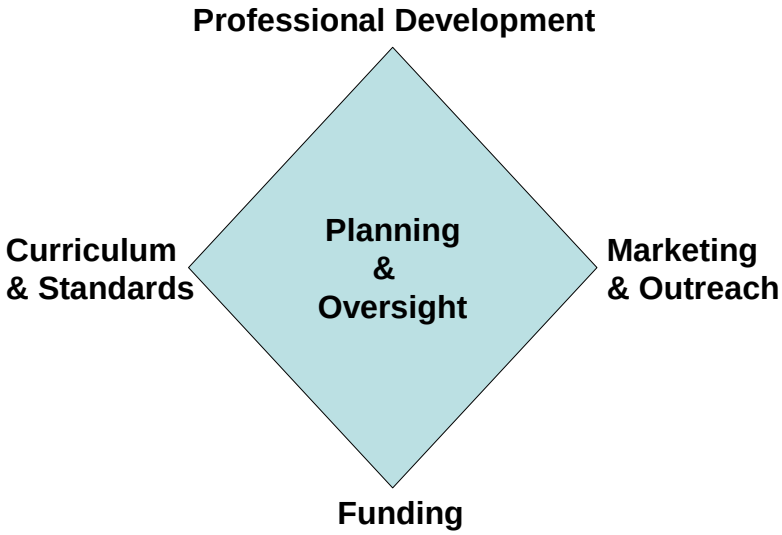
A draft vision and goals statement was presented and delegates were asked to comment on the statement. Delegates wanted to see more explicit connections with industry, such as active

industry partnerships to provide careers, and industry input into curriculum. Other concerns included the learning environment and non-traditional students. Some groups thought motivation should be emphasized, including recognition of the role of informal science education and recognition of social supports that are needed.

Suggested changes included some re-writing of vision elements, some additional goals, and some suggested reconfiguration of the framework and format. Some comments focused on the educational process. Others emphasized flexibility and transferability in the educational pathway.

Theme Discussions

Delegates discussed the five overarching themes for the conference – motivation, preparation, transfer, retention, and diversity – identifying what was working in each area and what was needed**.** One insight gained from this activity was that some of the things identified as working well were the very things that were needed — in greater quantity, with broader geographic reach, and providing opportunities for more students to participate.



Focus Area Discussions and Recommendations

Delegates chose one focus area in which to work and spent a significant amount of time at the summit developing goals and strategies for this focus area. Initially, they discussed the current situation and status. Then, they developed key goals. From the goals, they identified possible strategies. Finally, they chose one or more priority strategies and developed action plans for each strategy. As shown in the diagram above and the table on page 6, the groups' recommendations generally fell in five general categories:

- Establish **strategic and tactical councils, committees, and task forces** to further develop Summit recommendations and coordinate their implementation

- Initiate and enhance **marketing and outreach efforts** to assure that all students and their parents understand the opportunities available to them and the steps required to reach them
- Enhance **curriculum and standards** to include engineering & technology to achieve several overlapping goals: enhance problem solving skills of all students; motivate students in traditional disciplines including math and science; provide technical literacy to all students; and impart insights on wide variety of career opportunities and possible pathways to these careers.
- Grow and enhance **professional development** programs that allow K12 and college faculty to more effectively deliver STEM[1] curricula and assure consistency between the outcomes of courses and the prerequisites of subsequent courses.
- Enhance **funding** to achieve these goals from federal, state, and private sources through collaboration among stake holders.

Alignment and Coordination: System-wide

The primary strategy from this group was to create a statewide council that has both strategic and tactical levels. This council would be tasked to develop policy recommendations, and coordinate existing and new engineering and applied science programs. A supporting strategy was to immediately restart and expand a dormant "Engineered Community" group to take on skill set development, career pathways, and other recommendations of the Summit. This latter group may become the tactical level of the statewide council once the council is up and running.

Alignment and Coordination: Curricula and Co-Curricula

The key strategy of this group was to improve coordination and funding of co-curricular activities in order to assure that all students in Oregon have the opportunity to participate in co-curricular activities.

Career Pathways

The three priority strategies that emerged from this group were to create a customizable pathway framework (building on existing efforts), create strategic multi-faceted marketing of the common framework, and assess and evaluate the framework model.

Diversity

In order to raise the participation and performance of under-represented groups at all levels, this group's priority strategy was work through parents, providing them the information and insights required to overcome cultural barriers to engineering and related careers.

Instructional Professional Development

The three priority strategies in this focus area were to develop pooled resources for teaching engineering and applied science projects, elucidate the role of engineering in supporting core curriculum, and improve the relevance and quality of teaching at the post-secondary level.

[1] Science Technology Engineering & Mathematics

Marketing Engineering & Applied Science Careers

The overarching goal is to assure that every student entering high school has been exposed to engineering and has the resources available to make an informed choice about STEM[2] educational opportunities. The group identified three priority strategies: Create a multi-tiered program to build awareness of opportunities and career options, leverage and/or replicate existing models and best practices, and enhance state/industry/education/association partnerships.

Standards, Courses and Curricula

The two priority strategies were to develop standard outcomes and pre-requisite knowledge and skills for core 100-200 level engineering science; and develop assessments based on standard outcomes and rubrics.

Student Success: Access, Motivation and Retention

The two priority strategies were to form a stakeholder team to rethink standards and develop a problem solving, inquiry-based model**;** and create a statewide council for resource coordination and planning.

[2] Science, Techology, Engineering and Mathematics.

Next Steps

Many of the recommendations developed by the Summit delegates will require follow-up work by committees and task forces. Since the Summit was held, a survey of the delegates has been conducted to assess the level and types of interest in follow-up activities. 60% of the delegates responded to the survey. Of those that responded, 82% said they wanted to participate in follow-up committees or task forces. These delegates and others will be contacted regarding such follow-up as described below.

To maximize the impact of the Summit and its recommendations there will be two major types of follow-up:

(1) We will form a Strategic Planning Task Force to integrate the recommendations from the Summit into a cohesive strategy statement. This Task Force will also develop a communications plan for this strategy statement including a list of organizations that should be informed about the strategy and a timeline for these communications. We expect these organizations to include relevant councils, boards, and committees that should be informed about the strategy, such as the Oregon state boards of Education and Higher Education, Engineering & Technology Industry Council, Oregon Business Plan Steering Committee and relevant legislative committees.

(2) We will form a set of subcommittees or task forces that will

a. Refine the recommendations developed at the Summit.
b. Develop implementation plans.
c. Identify and recruit resources required for these plans.
d. Oversee the actual implementation of these plans.

The Summit recommendations will also be used as

- a source of criteria for requests for proposals by ETIC and other organizations; and
- a starting point for proposals to federal agencies and other sources of funding.

A post-summit review meeting will be held in approximately six months to compare the results of the summit to its goals and consider scheduling a second annual summit or other appropriate planning events.

Complete Report

The complete OPAS Summit Report is available at opas.ous.edu/report.htm

Focus Area	Follow-up Organization	Marketing / Outreach	Curriculum / Standards	Professional Development	Funding
Alignment & Coordination: System-wide	Create Strategic & Tactical Councils	Review recommendations, advocate & coordinate	Review recommendations, advocate & coordinate	Review recommendations, advocate & coordinate	Review recommendations, advocate & coordinate
Alignment & Coordination: Curricula and Co-curricula	Summit of teachers & administrators	Make co-curricular programs available to all students	Share among organizations		Jointly explore
Career Pathways	Create Statewide Engineering Pathways Task Force	Inform all stakeholders	Create customizable pathway framework		
Diversity	Champions that promote strategy	Work through parents educating them on opportunities & pathways.		Use internships and industry mentors	
Instructional Professional Development	Coordinate development and implementation of recommendations		Pool resources including project kits, elucidate of engineering in teaching science & math. Improve relevance of college teaching	Deliver presentations to teachers via teacher associations. Use industry / university / community college partnership	
Marketing Engineering & Applied Science Careers	OPAS Committee or other follow-up organization	Multi-tiered awareness program, grow existing programs, enhance partnerships. Grow outreach programs, e.g. ORTOP, ISEF. Establish industry speakers & mentor.		Short-term teacher training, e.g. SuperQuest. Develop Teacher internships	Seek industry funding
Standards, Courses and Curricula	Advisory Committee of academic and industry.		Standardize pre-requisites & outcomes of lower division courses and develop assessments.	Focus on course outcomes.	
Students Success: Access, Motivation and Retention	Statewide Council for resource coordination and planning		Enhanced science/math standards to assure both inquiry and problem solving models are included.		

Summary of Recommendations

Vision, Mission & Goals

Summit delegates were asked to comment on the vision and goals statement:

- **What is missing?**
- **What suggestions do you have to improve it?**

DRAFT STATEMENT

Vision – What we'd like to see in 20 years

Private and public entities in Oregon work in concert to ensure that all Oregon students understand the role of engineers and scientists in creating a great society, and are provided with educational opportunities that prepare them for the rigors of collegiate study and for careers in engineering and technology. In particular,

- All students will have access to high-quality courses that prepare them for collegiate study in engineering and applied science.
- Educational pathways will be well coordinated and clearly articulated, allowing students to successfully plan their education and efficiently achieve the education they need, and successfully transition among Oregon educational institutions.
- Public and private schools, community colleges, and universities will use a common set of achievement and preparation standards for measuring program improvement, efficiency, enhanced learning, and accountability.
- Curricular and co-curricular programs will work closely together assuring students have strong combination of theory and hands-on education.
- All Oregonians will have the opportunity to pursue advanced technical education regardless of ethnicity, gender or financial means.

Mission of the Summit Delegates

- Create a statewide strategy that includes a set of measurable goals that will lead to doubling the number and expanding the diversity of Oregonians receiving two-year, four-year, and graduate degrees in engineering and applied science.
- Secure the commitments and resources needed to implement this strategy.
- Leverage the expertise of all sectors to assure the efficient use of resources and a high-quality educational experience for all students.

Goals of the Summit

Create a strategy that will

- Increase the motivation and academic preparedness of students who are pursuing or might pursue engineering or applied sciences careers;
- Adopt and expand the use of best practices, improve coordination and cooperation among organizations and leverage existing resources and technical expertise to increase the impact of existing programs;
- Identify methods for securing additional financial resources to support Oregon's statewide strategic plan;
- Promote efficient and seamless transfer of credit among education sectors;
- Set measurable goals that measure our progress and assure accountability;

- Provide input to the Engineering & Technology Industry Council (ETIC) including criteria for possible future funding of pre-engineering and pre-college grants; and
- Complement the work of the State Board of Education, the State Board of Higher Education, and the Joint Boards of Education.

Delegate Comments

What's Missing?
For a complete list, see Appendix A

Some items dealt with the overall document format, such as **"**Goals should better define a recommended program/ strategy", consider short term as well as long term timeline and **"**Who determines our progress and how?" Some groups wanted greater mention of institutional support. They wanted to know how the results of conference would be communicated with Superintendent of Public Instruction and people necessary to carry it out, and who would be responsible for state level advocacy for engineering.

A strong theme was business and industry involvement. Delegates wanted to see more explicit connections with industry, such as active industry partnerships to provide careers, and industry input into curriculum.

Another theme was the learning environment and skill sets, for example**, c**reating an inquiry-based environment, developing "problem solvers", and emphasizing to students the value of their education experience to their futures

Engaging non-traditional students was another theme: "Greater diversity of students… explicitly stated", allowing for different points of entry, and family engagement in education process. Some groups thought motivation should be emphasized, including recognition of the role of informal science education and recognition of social supports that are needed.

SUGGESTIONS FOR IMPROVEMENT

Many of the same themes were also mentioned in the suggestions. The complete list from the conference is included below.

- **Vision Elements**
  - "Oregon will be recognized as a national leader in motivational and graduating highly qualified engineering students at all levels of the educational system."
  - Work to INSPIRE students to study science and engineering
  - Educate/ elevate contribution of engineers to society
  - Vision: include that we want Oregon companies to be hiring the well-prepared graduates
  - Vision: (1st bullet revise) "that prepare them for collegiate study." (Eliminate "engineering and applied science.")
  - "advanced technical education" is too narrow -> "Problem solvers"
  - Vision bullet #3 – include "flexible" and adaptive

  - Vision: the well-prepared graduates are entrepreneurs and create companies and jobs
  - Mission: Create an environment in which students will
    - "see"
    - "grasp"
    - "execute" engineering opportunities because of an educational system which meets the needs of all students

- **Educational Process**
  - Our goal of education to hit specific results (testing) may not be the best approach for engineering where process is what matters.
  - Elevate the value of "hands on" learning/experiences (K-14)
  - Clear set of :
    - Skills
    - Attitudes
    - Experiences
  - Integrated model provided to the student with respect to science and engineering
  - Imbedding versus segregating learning
  - Focus on starting earlier – "enlightenment"
  - K-12: foundational, solid education that students apply to science & engineering

- **Flexibility/Transferability**
  - Add flexibility in the educational pathway
  - K-12 (all levels?) prep that allows students to continue when they change goals

- **Institutional Support**
  - Strategy to include federal government
  - State boards should receive input from institutions (not send information to)
  -
- **Additions to the Goals**
  - Engage and enhance industry involvement
  - Industry connected to the classroom
  - Bring best engineers and scientists into the schools
  - Add diversity to stated goals
  - Link the goals to enhancing economic prosperity in the state
  - Identify weaknesses in the engineering education pipeline

- **Document Framework and Format**
  - Separate out the individual goals (example: 1st has motivation and preparedness)
  - Add outcomes
  - Guiding role of standards
  - Clarify breadth -> includes tech pathways?
  - Too many bullets; narrow it down
  - Add "timeline" to goals bullet #5

- **Other**
  - Embellish work samples – add engineering work samples

- Make engineering degrees tuition-free
- Available studies in motivating students
- Take initiative to "grass root" this at our institution.

Theme Discussions

Attendees were asked to participate in discussions about the five overarching themes for the conference, and to identify what was working in each area and what was needed**.** Listed below are the items that delegates thought were needed. The list of "What's Working" items are included in Appendix B.

Preparation

Helping students prepare for advanced work in engineering by assuring the right high-quality courses and facilities are available to them.

What's Needed:

- More math at <u>every</u> level
- Applied math rather than.math for math's sake
- More funding for summer institutes at university campuses for teachers and students
- Teacher preparation and professional development
- Expand applied sciences courses
- Change instructional practices, cognitively guided
- Higher levels of graduation requirements at K-12 level (for all? Some?)… for appropriate students
- More holistic definition of preparation needed
- Broader definition of math preparation
- Statewide exposure of science and engineering at the elementary level
- Dissemination of co-curricular activities/ programs, statewide
- Professional development for facilitators of programs
- Math training every year in high school prep and make a case for it to students <u>and</u> parents
- Applied physics for all students
- Focused curriculum with built-in motivation
- Soft skills development
- More math/ science certified teachers
- More federal funding for summer institutes for teachers and students on university campuses
- Beginning in K-6 must engage students on path to succeed in math (a higher percentage of advanced math students)
- : More attention to transition years with math instruction to avoid"flame out" in middle school,
- Change way instruction is delivered, cognitively guided instruction
- Getting engineering into consciousness of teacher certification program
- More collaboration needed between high school and community college curriculum

- Expand applied science courses
- More funding for pre-engineering
- At university level – more recognition for excellence in teaching
- On-demand learning in math
- Require math in senior year to avoid gaps
- Application of math concepts to other areas
- Integration of math with other subjects
- Increase capacity of ALL schools
- Distance learning targeted at high school students including teacher training
- More "generalists" in K-8 (e. g., learning math from science teachers)

Diversity

Assuring that opportunities are available to students regardless of gender, race, or economic background.

What's Needed:

- Include persons with disabilities in definition of diversity
- Clear definition of diversity, including culture
- Educate families about engineering
- Remove stigma that math is the gatekeeper to enter engineering
- Opportunities for students to change their perceptions of science/math
- Dispel the stereotype that technologists are second-class citizens
- Measure of community college student success
- Relevant role models – gender, ethnicity, cultural
- Catch girls before 10 years of age
- Exposure to Engineering subjects/application
    - Hands-on tinkering/exploration
    - Don't label engineering
- Provide resources, mentors, tools, opportunities
- Smaller school environments
- Focus on today's girls
- Professional Development for Teachers K-20
- Update media – texts, pictures, language
- Financial support for the student who is part-time or needs more time to complete
- Find way to increase participation of students of diverse backgrounds--connect community resources, families, etc.
- Separate gender learning at elementary school in math/science/engineering.
- More than lip service
- More role models available in each field
- More opportunity to learn about possible careers
- More women & minorities choosing engineering, applied science
- Parental involvement …
- Start early: elementary school, middle school.
- Acknowledgement of different ways of learning
- Improvement of learning climate/culture

- Better understanding of advantages of diversity among working engineers
- More effective methods available to teachers and others
- More mentoring
- Industry structuring jobs that work for women (e.g. part-time encouraged, rewarded, communicate the attractiveness of roles)
- More information to support informed choice
- More proactive outreach to minority groups at OUS level.

Motivation

Motivating students to become interested in technical careers and take the courses required to prepare for these careers.

What's Needed:

- Common dialogue
- State funding
- More partnerships
- Corporate leadership
- Right people to represent industry to students ;consider mentor/presenter training
- State level advocacy
- Clear definition of engineering at K-12
- Teachers don't know what engineers do
- No focused voice on Oregon Business Council
- Greater knowledge of engineering as a whole
- Engineering kits for elementary and middle school
- Corporate leadership – better marketing to K-12
- Personal connection to engineering outside of the classroom
- Relevance to students (student's perception of relevance)
    - In class, out of class
    - Systematic change to reach all kids – "Engineering for all"
- Science News publication for classrooms
- Self-efficacy in terms of math and science
- Informal / co-curricular connections with classrooms
- Reduce intimidation
- Cultural change
- Marketing
- Project Based Learning
- Recognition
- Community involvement
    - Mentoring, recognition
    - Involve non-engineering parents
    - Support infrastructure
- Non-competitive/ collaborative learning
- Fun, problem solving, engaging, service-based learning, relevant, fulfilling
- Tinkering – teach young kids to tinker
- Variety to appeal to all students

- Engineering as a way of thinking/ life skill
- Role models
- Peer groups
- Professional development for teachers
- Analysis of teacher effectiveness based on teacher preparation/ training
- What works is also what's missing
- Math instructors don't talk about engineering in context of teaching problem solving
- Teachers have a major influence on students
- Too much content to cover to have time to deal with application – high stakes testing drives out application

Retention

Assisting students in succeeding at each level and remaining motivated to continue with the path they have chosen

What's Needed:

- Define retention target
- Clear guidance about engineering – definitions
- More preparation
- Incentives identified
- More talented instructors
- Student support systems
- Finances
- Clear Pathway K-16 in Engineering and Science
- Standard "bar" for each transition Oregon-wide (process
- Flexibility at all levels
- Flexibility in applying standards
- Leverage resources
- Mentoring and job experiences
- Cohorts and relationships
- Industry engagement
- One voice
- Clear expectations
- Reduce breadth, increase depth
- Eliminate the "weed-out" mentality
- Better tutoring/ mentoring
- Multiple entry points
- Identify success of students throughout program
- Informed advisors – supportive, empathetic, knowledgeable
- Freshman/ Sophomore internship
- Rewards/ recognition

Transfer

Increasing the ease of moving from one level to another and one institution to another while retaining credit for courses taken and making continuous progress towards well-paying jobs that contribute to Oregon's economy.

What's Needed:

- Better advising of students on transfer between institutions
- Statewide engineering degree
- ASOT degree in engineering/computer science
- Transfer agreements need to be with all institutions and programs
- More articulation agreements
- Articulation, standardization of course outcomes
- Common course numbering
- Reduction of territorial issues
- More institutional collaboration
- OUS/CC/K12 needs to behave as one entity
- CC-university interaction – improve 'cultural' preparation of student
- Faculty needs to be included in transfer articulation
- Increased flexibility within engineering programs
- Student tracking system to evaluate what's working and what's not for students
- Funding to support student transfer interests
- How do we address the needs of the non-traditional learners?
- We make it too hard for students to get an education
- Recruitment assistance - Awareness
- Sophomore level engineering courses
- Measuring success (transfer metrics)
- Systemic development of high school curriculum to prepare through high school to university/community college (not just senior year)
- Increased career counseling in high school career info in the curriculum
- Engineering Tech/ Engineering Transfer
- Better Advising – for program vs. courses
- Systemic advising
- Peer mentoring (high school and university)

Focus Area Discussions

Delegates chose a focus area to work on and spent the bulk of the time at the summit developing goals and strategies for this focus area. In this section, we present the summary of priority strategies for each area. Supporting documentation and notes from each group's work can be found in Appendix C. Because each group chose to tackle this work in somewhat different ways, each section also looks somewhat different from the others.

Alignment and Coordination: System-wide

Developing policies and practices throughout the educational system that increase the consistency between standards and assessment at one level with the prerequisites for the next level. Assuring that credit can be transferred regardless of whether the student plans on an associate degree or a four-year degree.

Main Strategy: Create (K-20) statewide council that has both strategic and tactical levels, tasked to develop policy, recommendations, and coordinate existing and new engineering and applied science programs.

Key Actions	**Lead**	**Timeline**

• Check with ETIC to see if it wants to own this:
  o If no, take to Joint Boards
  o If yes, have them ask Joint Boards for charter
	Bruce Schafer	9/23 – 11/14

• Create model/ charter – both levels	?	?
• Take to Joint Boards and Governor, include WFTF, Superintendent of Public Instruction	?	?
• Members appointed	?	?
• Strategy group develops recommendations	?	?
• Tactical group develops tactical plans	?	?
• Coordination group has initial meeting	?	?

Measures:

- Funding increase
- Twofold increase in freshman Engineering/Applied Science students
- Increase in successful transfers
- Twofold increase in graduates – 2X
- Decrease in redundant credits
- Increased hiring of Oregon graduates
- Increased stature of Oregon engineering education

- Decreased developmental/ remedial instruction
- Increased high school strand/ equivalent in EAS

Supporting Strategy: Utilize statewide coordination group that takes on

- Skill set development
- Discussion of career pathways
- Discussion of OPAS summit
- Based on "Engineered Community" group that has met in the past.

Key Actions	**Lead**	**Timeline**
• ≥ ½ day meeting	Nicki	Jan 2006
• Additional meeting	TBA	2006

Alignment and Coordination: Curricula and Co-Curricula

Using best practices from the co-curricular world in classroom instruction and vice versa. Identifying ways that the two learning environments can complement each other and address the gaps in each system.

Goal: All Students involved in Co-Curricular Activities (CCA)

Strategy: Coordinate and fund co-curricular activities.

Key Actions	**Lead**	**Timeline**
• CCA Summit: teachers and administrators and CCA (NSF funding and in kind contributions)	OMSI + OUS Ray Vandiver	By 8/06 (coterminant with action below)
• Create CCA network/ virtual ecosystem	OMSI + Microsoft + WOU	By 8/06 (coterminant with above)
• Share resources and curriculum	OMSI	8/06
• Jointly explore funding options	Summit	8/06

Measure: Attendance, virtual ecosystem exists, number of students participating in CCA

Resources: National Science Foundation, corporate in-kind, foundations

Best Practices

Adapting and leveraging ideas from other states. Mapping the models and methods from successful programs in other states to address Oregon's challenges and needs.

Note: This group met Thursday afternoon only, with the task of identifying best practices that might apply to Oregon.

In this group's review of the literature, best practices shared the following components:

- Hands-on learning
- Role models
- Relevant to students' lives
- Internships
- Parent involvement
- Student choice
- Open-ended inquiry
- Industry participation
- Field trips and site visits
- In-depth learning
- Contests and challenges
- Small classes
- Simulation/ role play
- Near-peer mentoring
- Girls-only groups
- Toys and tinkering
- Recruitment
- Starting young
- Support groups/ relationships
- Scholarships
- Interactive web sites
- Showcasing student work
- Clear articulation of engineering as a career (marketing)

Co-Curricular Best Practices – Exemplary National Programs

- Women in Engineering (doc 6.10)
- National Engineers Week (doc. 6.8)
- Lemelson/MIT InvenTeam (doc. 6.6)
- Girls Go Tech (doc. 6.3)
- Girl Power 21st Century (doc. 6.2)

Career Pathways

Describing the relationship of educational programs and integrated work experiences to careers. Effectively communicating this information to students to allow them to make informed and productive decisions. Pathways may provide multiple entry and exit points for students who cannot complete all their educational goals at one time and thus join the workforce after completing one or more levels with the possibility of returning to an educational program later.

Goal #1: Consistency within state education levels (common framework, local customization)
Strategy #1: Create a customizable pathway framework. (See draft model next page)
Action #1: Continue current Pathways to Advancement efforts statewide (adopt best models and research best practices from other states.)
Who: Statewide Engineering Pathways Task Force (SEPT)

Goal #2: Improve communications and educate our consumers
Strategy #2: Create strategic multi-faceted marketing of common framework to inform all stakeholders (connect to marketing group)
Action #2: Identify and convene representatives from Pathways stakeholder group
Who: SEPT.

Goal #3: Evaluate Framework Model
Strategy #3: Assess what works well and eliminate the rest
Action #3: Develop valid process with SEPT and implement assessment.
Who: SEPT

SEPT: Statewide Engineering Pathways Task Force

Transition from an ad hoc group to an officially-sanctioned group to accomplish the work above.
Suggested Members:

- CCWD
- ODE
- OUS
- ETIC
- Engineering Associations
- Regional Coordinator/ Pro-Tech Deans
- Other Professional Societies
- K-12
- Other (Consult with other pathways initiatives groups)
- OACTE representative

Diversity

Increasing the ethnic and gender diversity in technical fields. Developing new strategies to attract diverse students. Enhancing and growing existing programs and methods to increase the diversity of students preparing for and succeeding in applied science and engineering education.

Goal: Raise performance of under-represented groups at all levels:

Strategy: Implement parent education to break down cultural barriers to engineering and related careers.

Key Actions	**Lead**	**Timeline**
Provide champions that promote the strategy	Industry – ETIC	Initiate within 6 months / run for 5 years
Building Learning Communities	Headstart	6 months planning, 1 year implementation
Internships	Partnership – schools and industry	Ongoing, enhance
Industry mentors	Industry	See above TISA by champion
Personal Testimonies	Engineers, students	Ongoing

Key Measures of Progress:

- 9th grade education plan written by students (exploit existing)
  - Tally
- Surveys at younger levels
- Increase in co-curricular participation, …
  - Including ORTOP, ISEF, …
- Goal is positive change
- Change+ Applications, 1st year retention, graduates progress to engineering and CS …
- Increase in parent participation – PTO, P-T conferences, …
- Number of at-risk parents personally touched by parent education program

Resources: - Parent Education

Existing	**Additional**
Parent Teacher Organizations (PTOs)	Industry leadership to champion OPAS with organizations
Community liaisons (in some schools) - include Native American education	$$ for internships, learning communities, … (see action list)
ASPIRE program (HS)	Personnel time
GEAR UP (6-8)	
Girl Scouts and Campfire	

Instructional Professional Development

Increasing the capacity of teachers and faculty to deliver learning experiences that inspire and prepare students. Identifying and providing professional development programs and strategies that enhance their knowledge, skills, and mastery.

Goals:

1) Give teachers and counselors tools and training needed to excite students about problem-solving and engineering/ applied science.
2) Teachers will value engineering applications in delivering their subject matter.
3) Improve the relevance and quality of teaching at post-secondary level.

Goal 1 Strategy:

Develop pooled resources for teaching engineering/ applied science projects.

Actions	**Lead**	**Timeline**
Identify/coalesce resources (Including industry and professional groups)	OSU – Larry Flick; U of O (GK12)- Dean Livelybrooks	1.5 years
Beta test project kits in 3 Education Service Districts (ESD)	ESD's – Megan Helzerman, High Desert-Kathy Emerson Lane ESD- Bob Curtis.	1.5 years
Expand the above as they are developed		

Resources: 0.5 FTE

Goal 2 Strategy:
Elucidate engineering role in supporting core curriculum

Actions	**Lead**	**Timeline**
Provide concrete examples of curricula	Professional organizations: ASEE; OSTA; OCTM – Winnie Miller-lead	Piloted by May
Deliver OSTA/OCTM presentations	Larry Flick, Dean Livelybrooks, Winnie Miller, others	Report by pilot fall of 2006
Document meeting existing core standards & requirements	ODE- Jim Schoelkopf	Fall 2007

Resources: 1) 0.1 FTE

Goal 3 Strategy
Improve the relevance and quality of teaching at post-secondary level

Actions	Lead	Timeline
Develop industry/ university/community college partnerships to reform curriculum thru professional development	U of O- Ginny Lo	2 years

Marketing Engineering & Applied Science Careers

Strategies for raising awareness of and interest in engineering and applied science careers. Increasing the number of Oregonians interested in pursuing engineering and applied science as a career and gaining the education they need to successfully do so.

Overarching Goal: Within 5 years, every student entering high school has been exposed to engineering and has the resources available to make an informed choice about a STEM path.

Strategy 1: Create a multi-tiered program to build awareness of opportunities and career options

Key Actions	**Lead**	**Timeline**
Engage a professional firm	OPAS	3 months
Create and promote co-curricular guide	OPAS	3 months

Measures:

- Sustainable marketing plan in effect
- Guide is online/ available in print/ being used (web hits)

Resources:

- Industry-funded
- Web-host, coordinator, and "ongoing owner"

Strategy 2: Leverage and/or replicate existing models and best practices

Key Actions	**Lead**	**Timeline**
Promote short-term teacher trainings, such as SuperQuest	SAOF	ongoing
Promote outreach opportunities/ competitions such as ORTOP, ISEF	Varied (foundations, outreach organizations, industry, marketing firm)	Begin promotion today; measure in 1 year

Measures:

- Every school has a STEM/ co-curricular program

Resources:

- Varied (supplies, materials, teacher training, volunteers)

Strategy 3: State/ Industry/ Education/ Association System Partnership(s)

Key Actions	Lead	Timeline
Create clearinghouse to facilitate mentors and speakers as resources	SAO	Jan. 2006
Establish teacher-business mentorship program ranging from short-term to full-year sabbaticals	ETIC and others, OR Business Council, and B.E.C.	Kick off within 3 months

Measures:

- Track hits and successful pairings
- Track numbers of teachers and businesses participating

Resources:

- SAO
- Presenters to pitch to businesses/ ETIC and others

Standards, Courses and Curricula

Improving standards and aligning courses to standards. Identifying gaps in curricula and course content to fill them. Continuous improvement to curriculum to assure the highest quality courses.

Goal #1: Develop standard outcomes and pre-requisite knowledge and skills for core 100-200 level engineering science at a statewide level.

Key Action Ideas	Lead	Timelines
Create/ bring together an inter-disciplinary, sector and industry curriculum advisory committee	JBAC coordination, support, endorsement, delegate facilitator, faculty K-20/ Industry	May 2006
Establish common and consistent course numbers	"	May 2007
Professional development for group around outcomes	"	On-going
Groups continue to meet to provide on-going review and dissemination	"	On-going

Measures:

1) Outcomes have been written.
2) Common and consistent course numbers established.
3) Group agreement on professional development.

Resources:

- Release time
- Travel reimbursements
- Incentives to participate

Goal #2: Design and/or develop assessments based on standard outcomes and rubrics

Key Action Ideas	Lead	Timelines
Identify existing models (e.g. AAAS Benchmarks, Oregon standards)	JBAC coordination, support, endorsement, delegate facilitator, faculty K-20/ Industry	2005
Apply to a single course in STEM as a prototype and assess	"	2006
Extend to core courses	"	2007

Measures:

1) Models identified
2) Prototype complete
3) Core courses complete

Resources:

- Release time
- Travel reimbursements
- Incentives to participate

Student Success: Access, Motivation and Retention

Identifying perceived barriers to access and developing strategies to increase student confidence in their ability to succeed. Identifying motivational and retention strategies that will inspire students to pursue engineering & applied science education and support these students in completing this education.

Strategy 1: Standards and Classroom Delivery

Owner: Steve Day

Rethink Standards**:** Form stakeholder team for development of problem solving, inquiry-based model

Actions/Measures	**Timeline**	**$ and Resources**
New model developed	2005/06	Existing and Incidental
New model adapted	2007/08	ODE
Evaluate impact	Annual	ODE

Strategy 2: Co-Curricular and Integrated Programs

Owner: ETIC

- Create Council for resource coordination and planning state-wide

Actions	**Timeline**
Comprehensive map of resources (web accessible)	Spring 2006
Identify gaps across State Benchmark measures	Summer 2006
Advocate for appointing coordinator	Start fall 2006

Measures:

- Number of students, number of experiences
- Number entering CC, University, EAS

Epilogue Thoughts

Delegates were asked to write individual comments on their reflections on the focus area recommendations or any other aspect of the Summit. Comments that were received are grouped thematically below.

Networking

- Needed more networking opportunities – it happened but during the summit
- This was an outstanding opportunity to network and meet others with similar interests and concerns
- Most important aspect of the summit is the networking among stake holders
- Meeting and networking with K-12, community college, OUS counterparts and near counterparts was most valuable to me

Organization

- Coordinating existing efforts is essential. There are a lot of good efforts going on and we should take advantage of them.
- Well organized, maybe too much so
- Good process – lots of involvement – good next steps
- ETIC seems to be a key driver for a lot of this effort. They may be the key governance group for OPAS
- Very good 2 days complimenting the past 3 years of engineering education work. Keep going, much time and money invested to get this far. Don't lose momentum. Extraordinarily well run event! Thank you.

Focus Area and Stakeholder Comments

- Curriculum and Standards should emphasize problem-solving and assessments should measure this. Assess fundamental skills, rather than highly specialized knowledge and skills. Take advantage of measures that have already been developed at the national and state levels. Some of the assessments that have already been developed for K-12 could apply with minimal change at somewhat higher levels. This is especially true if assessment emphasizes the basics. Good meeting. Thank you!
- Parent education (diversity) could support Student success and Curricula and co-curricula groups' efforts
- Marketing effort will support parent education (diversity) effort.
- Really want to focus on – Industry wants the best engineers. Best engineers want the best professors. Best professors want what?. ←OUS needs to wrestle with this.
- EXCELLENT summit and great beginning to an important conversation. However, the summit highlighted for me the disconnect among the stakeholders, especially within the K-12 system: math and science vs. PTE/CTE

Overall Next Setps

- Good <u>incremental</u> recommendations by the teams, however, substantial progress will ultimately require financial investment

- Please don't let today be the end of this process. We put too much effort into coming up with these ideas. This was an interesting and useful process but someone has to take ownership for the results.
- Thank you for all of your hard work and leadership. We have a lot of work ahead and it will require lots of communication- Please keep the momentum. Please share findings/strategies with key stake holder groups.
- Going from here is hard
- Note: In the NSF TPC (teacher professional continuum) grants is a 3rd category of funding (in addition to 1) research and 2) curriculum and resource development) – This category can be used to sponsor a major conference or symposium (statewide or regional or national). Competition for funds in this category is relatively light. Could be a good source of funding for a much larger summit than this one, especially if it included a significant number of K-12 teachers.
- It looks like we have some great next steps and plans

Other Comments:

- Case was not well-made that Oregon job environment will require a 2x increase in engineering grads. It should but the economic development strategy may be as weak as or weaker than the education system.
- Good discussion. I would have liked more insight into system causes, system diagram.
- I trust that Oregon doesn't stop at the Cascades in terms of these summit outcomes.
- Unfortunately lost movers and shakers early especially by Friday afternoon.

Next Steps

Many of the recommendations developed by the Summit delegates will require follow-up work by committees and task forces. Since the Summit was held, a survey of the delegates has been conducted to assess the level and types of interest in follow-up activities. 60% of the delegates responded to the survey. Of those that responded, 82% said they wanted to participate in follow-up committees or task forces. These delegates and others will be contacted regarding such follow-up as described below.

To maximize the impact of the Summit and its recommendations there will be two major types of follow-up:

(3) We will form a Strategic Planning Task Force to integrate the recommendations from the Summit into a cohesive strategy statement. This Task Force will also develop a communications plan for this strategy statement including a list of organizations that should be informed about the strategy and a timeline for these communications. We expect these organizations to include relevant councils, boards, and committees that should be informed about the strategy, such as the Oregon state boards of Education and Higher Education, Engineering & Technology Industry Council, Oregon Business Plan Steering Committee and relevant legislative committees.

(4) We will form a set of subcommittees or task forces that will

a. Refine the recommendations developed at the Summit.
b. Develop implementation plans.
c. Identify and recruit resources required for these plans.
d. Oversee the actual implementation of these plans.

The Summit recommendations will also be used as

- a source of criteria for requests for proposals by ETIC and other organizations; and
- a starting point for proposals to federal agencies and other sources of funding.

A post-summit review meeting will be held in approximately six months to compare the results of the summit to its goals and consider scheduling a second annual summit or other appropriate planning events.

Appendix A: Vision Statement--What's Missing?

- **Overall document format**
  - Goals should better define a recommended program/ strategy
  - Use action Words – Experiences, not just opportunity
  - First sentence of vision should include "engineers, technologists, and scientists in creating …"
  - Why 20 years? (*Inertia)*
  - Short term timeline / Long term timeline
  - Vision is too specific
  - Monitoring to ensure results
  - Who determines our progress and how?

- **Business and industry involvement**
  - Connections with industry, job placement, career opportunity
  - Assertion of industry relevance
  - Inclusion of professional societies, to build relevance
  - Industry piece, Co-op programs, Applied internships, feedback from industry, how to successfully bridge this gap
  - One industry mentor can impact 180 students through one visit a quarter
  - Active industry partnerships to provide careers… and include hands-on exposure for students early on.
  - Industry input into curriculum (science and engineering is missing)
  - Include in goals: engage and enhance industry involvement

- **Learning environment and skill sets**
  - Create an inquiry-based environment
  - Students should not be asked to choose between science and engineering
  - Articulating based on necessary knowledge and skills
  - Projects should specifically mentioned, opportunities for students to participate in projects, capture parent's involvement
  - "Relevancy" - emphasis to kids of the value of their education experience to their futures
  - Develop problem solvers
  - Writing, literacy, oral communication skills are also part of engineering
  - Increase training in math and science – best practice
  - Connection to the broader efforts to increase student success overall (the whole educational experience)
  - Linkage of awareness of career opportunities and the stage at which curriculum choices need to be made
  - Educate ALL students in technical career options AND curriculum choices in how to prepare themselves to pursue a technical CAREER

- **Educators:**
  - Teacher-centered goals
  - Intense, ongoing professional development of teachers on what engineering is

- **Non-Traditional Students:**
  - Explicitly stated … greater diversity of students
  - Allowing for different points of entry
  - Identify strategies for connecting with underrepresented groups
  - Is there one model that will fit all students? – bullet 3 under vision
  - What about homeschoolers? – How do they fit into these goals?
  - Girls in Manufacturing Engineering
  - Understanding of how people learn to include impoverished population
  - Family engagement in education process

- **Motivation and Social Supports:**
  - Role of motivation
  - Recognition of the role of informal science education
  - Recognition of social supports that are needed
  - Joy of problem solving
  - Engagement and continuous support piece is missing. Females/ underrepresented groups need an invitation and community wide support.

- **Institutional support:**
  - Wonder about authority and government or official support. – How will results of conference be communicated with superintendent of Public Instruction and people necessary to carry it out (governor)?
  - Goal: securing funding to accomplish goals
  - Active participation by higher education partners with K-12 system
  - Required (state) Engineering Programs
  - Centralized (state level?) advocacy for engineering
  - How do recommendations of OPAS relate to state standards?
  - Leadership structure for OPAS efforts

- **Other:**
  - What's a "great society"?
  - Evolve with trends
  - Tied to culture
  - Keeping students in Oregon: attract students to stay
  - Recruit and prepare are two different things.
  - Bridge "all students" to "all Oregonians"

Appendix B: Themes Discussion—What's Working

Preparation

- Top/ best students are globally competitive (e.g. science fairs/ competitions)
- Where industry collaborations exist they work (internships, co-op programs, etc.)
- Industry collaborations where they exist (ex. Zoom into Engineering, Saturday Academy/ ASE internships, co-ops) are working
- In combination with community college the right math/ science courses are available
- Growing effort to address instruction at university level
- Transfer from community college to university
- Collaboration between high school and community college teachers and impact on curriculum
- Best students are globally competitive
- Right math/ science courses are available
- Parents (especially of immigrants) are motivating students to continue and succeed
- Growing collaboration between high school and community college teachers around instruction and curriculum
- Access to early planning and counseling in some schools

Diversity

- Targeted associations
- Recruitment efforts
- Strong Entry level community college system for transfer to 4 year Engineering
- Relevant role models – gender, ethnicity, cultural
- A few role models available in each field
- Engaging middle school students
- Student centered recruiting
- Targeted scholarships
- Awareness of the need
- Existing organizations, programs
    - SWE
    - WITI
    - AWSEM
    - MESA
    - SMILE
- Female retention rate pretty good (NSF study).
- Hands on program help with UREM (URM?) students

Motivation

- Contests
- Small class size
- Professional development for teachers
- Younger role models – near peer
- Greater in school, out of school connections

- "Girls only" classes
- Software industry working with teachers for professional development
- Toys
- Hands-on
- Relevant to real life
- Apprenticeships/ internship choices
- Parental involvement
- Industry in the classroom
- Field trips
- Intense immersion – in-depth, week long
- Science Olympics (sp?), ISEF, ORTOP – FIRST Lego Robotics, early ages, Superquest – Software Association Oregon
- Competition and Events – University involvement, recognition
- Outreach – Academic, Corporate – MESA, mentoring
- Star Trek – Media, CSI, etc.
- Support/ Relationships - teachers, clubs, mentors
- NSF Cascading Mentor Programs

Retention

- Prior preparation
- Motivation
- Relevance
- Hands-on (experiential) learning
- Students seeing their successes
- Career and academic preparation
- Cohort and relationships
- Small classes
- Multiple teaching methods
- Support in freshman year
- Early engineering experience
- Early access to transitional opportunities
- Student competitions
- Sample engineering experiences, internships
- Membership in professional society
- Purdue program, EPICS
    - Service learning
    - Connections to community

Transfer

- Transfer agreements
- Common course numbers
- Collaboration between institutions
- Course by course outcome agreements
- 2+2, dual credits
- Pavtec

- Dual Enrollment Programs community colleges and University
- College Now
- HS to CC/University
- CC /University articulation agreements –where they exist
- Distance education
- Distance education working to alleviate problems with cultural transition
- Cooperative work experience
- Job placement

Appendix C: Supporting Documentation

Alignment and Coordination: System-wide

Current Situation

- Articulated courses (CAD, etc.)
- Some HS/CC connection; not so much OUS (not same across the state)
- OUS (4-yr) institutions have their own agenda, CC's independent of that at times, possibly the same with HS
- Agreements between CC/OUS $/FTE oriented
- There isn't really a statewide program mentality
- Thinking in terms of "blocks" – 2 years at CC, transfers, etc.
- Degree "completer" issues
- Inconsistent assessment
- Problem about unknown outcomes – focus on courses, not about knowledge and skills
- Curriculum not consistent between courses with the same number
- Competing territory (even private schools)
- But we are not at the bottom of the barrel as a state
- "Local control" prevents systemic design
- Students need consistency (don't care about local control)
- Shortage of resources to provide systemic coordination
- Disconnect between 2 year technical and 2 year transfer – not communicated to students
- Professional technical are not transfer courses
- Much of disconnect is a communication problem

Five Year Goals

- Outcomes "system" (skill sets)
    - Career paths: HS→CC→OUS→Grad→Research Institution or Industry
- 1st step – communication – mechanism that facilitates other goals
- Student awareness of choices early on and opportunities to become more specific as they move on
- Robust system to assess "student success"
- Successful transfers within 2 years
- "Step out and return" provision
- Graduates are life-long learners with skill acquisition that discourages industry outsourcing/ off-shoring
- Advisory and industry input integral to program/ system design
- Consistent predictable funding
- Consistent policies, foci, initiatives

Strategy Statement prior to the Gallery Walk: Statewide K-20 Engineering and Applied Science Coordinating Group OR Commission or Council

- Develop policy recommendations

- Complete skill set development including relations to global conditions
- Implement Career Pathways model for program and system assessment (student success)
- Create "Engineering for All" systems – exposure, internships, job shadows, projects
- Analyze and communicate Engineering Career Paths, Identify decision points and appropriate curricular choices
- College level course coordination (C.S. example)
- Speak with a clear, unified Engineering and Applied Science voice to the Legislature, public, private systems – institutions

Debate over Coordinating Group vs. Commission or Council *(group later voted on this issue and came to the decision to include both strategic and tactical groups as part of their strategy; there was disagreement whether this would be handled by one larger group/ strategy or handled by two separate groups. Hence, the main strategy with supporting strategy)*

- Commission or Council
    - High level policy
    - Governors office
    - Could evolve from ETIC
    - Execs, Deans
- Coordinating Group
    - Policy recommendations to boards and governors
    - Budget recommendations to governor and legislature
    - Workforce development task force
    - Specific agencies at institutions
    - Faculty, engineers
- Trade off: High level execs vs. those who have specific expertise
    - Idea: specific expertise required
- Issue: Family Wage Jobs vs. High-level skills
    - Ideas: Study other states' best practices, Initial 5 year life
- Issue: What about other sectors (e.g. Tourism)?
    - Idea: Pilot

Comments from Gallery Walk:

- Muddled Voices K-12
- Existing Groups
- Maintain diversity
- Define partners – how is group organized, OMSI?
- Inclusive title (Math, Regional, Funding)
- Common Graduate Outcomes?
- Oregon Innovation Network
- Need Faculty
- Flexible
- Cultural Items
- Industry
- Community Partners
- Definitions
- Lessons of CIM/CAM levels

Discussion of Questions 6, 7 ,8 ,9 in guide

- Regional Consortia
  - Relationship to Statewide standards/ outcomes/ model/ processes?
  - Implementation within existing or new partnerships
- All groups seem to require or suggest some type of statewide coordination (marketing, standards, etc.)
- Coordinating group could ensure best practices
- Initially coordinating group work is short-term: 3-5 years?

Alignment and Coordination: Curricular and Co-Curricular

Current Situation

- (document 5.1, robotics conference., i.e.) academic/ organization – based "motivation" → +
  - Students do better on tests, class performance *(w/ caution)*
  - Team projects (i.e. MESA projects) part of proficiency assessments
  - Goal (?): contacts/ conferences need to be <u>assessed</u> and better communication/ marketing in schools
- Co-curricular organizers need to communicate with district teachers
- Co-curricular implies coherence without redundancy
  - Goal (?): field trips turn into projects
- Co-curricular curriculum enhancements

What's Underway

- Field trips/ projects as "incubators of ideas" for dissemination of pedagogy
  - Goal (?): correlate "access" students have to co-curricular opportunities in urban vs. rural communities
  - Goal (?): Partner with industry to fund pedagogical paradigm shift

What do we know?

- "Digital natives" – students, "Digital migrants" – teachers
  - Goal (?): student-centered and team-centered learning
- Educate, orient to transform system
  - Goal (?): systemic intervention needed to address data and attitudes- bring down barriers
- Could create disjunction in classroom between students who participate in co-curricular activities or who self-select
  - Goal (?): Industry could do better "marketing" to pull students/ teachers into shared experience
- What's required to move beyond where we are now, what we know now?
  - Goal (?): Answer: Why do students drop off (Engineering) radar in 4th grade? (See Apple Research, re: delivery as vehicle for engagement)

Summary of Current Situation

1) Co-curricular/ curricular → communication, participation
2) Systemic attitudes/ will → currently a barrier
3) Pedagogical/ Political/ Cultural shift is HUGE to coordinate
4) Funding follows vision and will
5) Assessment of current programs needed to provide data

Five year goals

1) All students should have opportunities to participate in STEM co-curricular activities with targeted invitations and intervention strategies at 4th grade
2) Coordinate and advocate for statewide co-curricular and curricular learning activities – project based and input with industry K-14
3) Create open-source model for sharing technology and information statewide
4) Ongoing OPAS data analysis of co-curricular and curricular alignment (also assess constraints)

Possible Strategies

1) Growth strategies of co-curricular agencies related to STEM curriculum and use of distance education technologies to connect communities of learners to applied co-curricular activities/ events/ expertise
2) a) Annual STEM summer institutes to bring educators (K-20) and co-curricular agencies together (ETIC funded or grant-funded.
   b) Provide info on co-curricular activities to participants
   c) Create network for exchange of information/ Best Practices including database "virtual ecosystem".
3) Systems change and support of student success and connect to professional development
4) Establish within K-14 AND teacher education STEM Curricula, higher visibility and use of co-curricular partnerships

Actions

- Strategy 1 and 2: Regional Consortia (accept responsibility for creating template model for making strategies work on a local scale)
  - Lead: OMSI and OSTA (Oregon Science Teacher's Assoc)
  - Who Involved: higher ed, K-12, Industry Reps
- Strategy 3: Statewide Consortium (P-16 Council Model, see Kentucky, Illinois, Washington)
  - Lead: Industry Sponsor (INTEL)
  - Who Involved: Morgan Anderson
- Involve K-20 Administration in coordination/ communication bridge in co-curricular activities in classroom
  - Lead: OMSI as initial LEAD prepared to promote other informal science ed opportunities
  - Who Involved: OMSI (Initially) and other leaders in co-curricular and K-20 administration and educators

Career Pathways

Goals/Strategies Considered:

- Clarify the variety of different pathways (confusing and disconnected)
- Clarify a focused pathway/s ← Take advantage of web-based connections
- Create a customizable pathway framework
- Common framework, local customization
- Allow for flexibility
- Continue current pathways efforts statewide. Adopt best model
- Research best practices from other states
- Create/build in sustainability
- Assess what works well – eliminate the rest (quality control
- Consistency within state/ ed levels ← Take advantage of web-based connections
- Improved communication/ educate our consumers
- Create strategic multi-faceted marketing of framework that informs all stakeholders :
    - Media
    - Web
    - Speakers
    - Networks
- Include business/ industry
- Assess what works well with stakeholders
- Start younger
- Advising improvements needed (whole system)
- Identify and convene reps from pathways stakeholders group

Diversity

Current Situation:

- OSU – 12% women undergrads, 25% women grads (Engineering only); includes international students, gross 10% among domestic students
- NSF study – 95% freshman women in engineering will graduate in engineering in 5 years (Some doubts expressed) => 50% retention
- OSU ~50% men & women
- Very low female participation at high school level
- OIT – full participation up to trigonometry, then big drop-off
- 10^{th} graders meeting math standards
    - African-American, Hispanic < 20%
    - About half the rate of whites
    - One third the rate of Asians
- Poverty culture is common point
- Boys get better test scores, girls get better grades
- SAT doesn't correlate, but sends a (discouraging) message
- Women through college and into career – less self-confidence

- Out-of-state tuition makes African-American recruiting harder
- Out-of-state schools are recruiting Portland minority students
- Minority students often have socioeconomic obstacles including high school preparation
- Qualified female and minorities do not choose engineering
- Different perception of school setting

Key Goals:

- Better understanding of role and effects of poverty in attracting, preparing, and retaining under-represented groups.
- Plentiful role models who don't appear to abandon culture or other life roles
- "Classroom" beyond the walls
- Face of engineering more like face of Oregon
- Narrow performance gap at al levels
- Engineering principles integrated across all levels and subjects P-20
- All Oregon students will have access to the pre-requisites necessary to pursue engineering as a career goal
- De-mystify engineering pathways (marketing)
- Allow multiple entry points and paths

Possible Strategies

Use models to target specific groups.

- How to encourage minority groups/ females/ more people:
    - Tuition (free)/ scholarships
    - Guarantee jobs for engineering majors
    - Mentor in community as payback (arrow from tuition)
    - Corporate tax breaks to provide jobs/scholarships
- Face of engineering more like face of Oregon (only 5 years)
    - Narrow performance gap, including instructors
    - De-mystify engineering pathways (*'d)
    - Active recruiting of minority students and faculty (includes female) – face of global market
    - Engineering instructors
    - School websites – promote inclusion of students with disabilities
    - Include female (50%)
- Reduce racist/ sexist undercurrents that exist in Oregon
    - Teaching acceptance (rather than tolerance)
    - Modeling
    - Promoting self awareness
    - Celebrate diversity
    - Professional development to train K-20 educators in cultural competence
    - Using nonformal education to support diversity
- All Oregon students have access to the pre-requisites necessary to pursue engineering as a career goal (course work)
    - Physics needed in high schools

    - Flexible
    - Multi-age learning groups
    - Distance learning
    - Support all students/students with disabilities
    - All HS have engineering track
    - Limit tracking → prohibits potential
- Narrow performance gap at all levels (by raising performance of under-represented groups)
    - Intervention strategies
    - Parent education
    - Mentoring (peer, professional)
    - Building relationships
    - Promoting cohorts/ advocacies
    - Maintain high expectations
    - Celebrating success/ incentives
    - Learning communities
    - After school programs/ supplemental programs

Parent Education (Action):

- Internships for students
    - Clause – parent involvement increases pay rate
    - Schools support parent education
- Learning communities for parents
    - Partnership with local organization (Boys and Girls Club, church, soccer fields …) go where parents are
- Parent Education at Back to School night
- Personal testimonies from engineers for encouragement, under-represented role models
- Industry mentor

Notes from the Gallery Walk:

- More emphasis on attracting females/ under-represented groups
- Who will ensure this all happens?
- Utilize community colleges and recognizing importance in role of diversity
- Cartoons
- Invent sitcom to exploit engineering – as CSI has done for forensic science
- Get males into K-* education
- Reality TV – "You're hired"
- Service – EPICS – to promote engineering
- Target "pre-school"
- Teacher preparation prior to license
- Middle level engineering awareness
    - Physical science into to engineering
    - Systems model to understand
- Christine Cunningham BMOS (Books) OMSIDistinguish between socioeconomic status

- Introduce engineering that is relevant to female/ under-represented groups

Instructional Professional Development

Goals Considered:

- Better model for professional development
- Ongoing – ideal 5-10 day summer workshop + 3-4 day/half-day in-services
- Accountability for in-service that provides professional development back to the district
- Regular state-wide in-service days, 3-5/years, distribute evenly
- District or regional focus
- More collaborations – K-12 schools ←→ post secondary
- More professional development/ resources for engineering and applied science integration
- Business model would support institutionalized professional development
- Improve teacher participation rates

Other Strategies considered:

- Problem-solving/ process standards replace some of the current content standards
- Develop concrete examples of curricular pieces – MESA, University, Co-curricular, engineers, professional organizations.
- Summer immersion experiences for teachers. Supported by industry/foundations
- More motivational (peer-driven) materials for students
- Involvement of professionals and industry partners in education
- Develop pooled resources for teaching engineering/ applied science
- Collaborative cross-discipline teaching
- Support marketing
- Provide NSTA and NCTM position statements to faculty/teachers
- Summer workshops and peer-led cadres (university and industry led)
- Engineering/ applied science instruction resource clearing house
- Software Association of Oregon (SAOF) (Super Quest)
- Professional development for counselors/advisors so they understand engineering/ applied science
- Cultural competence and diverse learning styles training for cadre leaders
- Mainstream Co-curricular Professional Development tools
- Provide k-8 pre-service project-oriented methods instruction

Marketing Engineering & Applied Science Careers

Current Situation:

- Promoting engineering education as a vehicle to get to do what you want with your life (not currently occurring in Oregon)
- Showing relevance of kids interests and how that can translate to careers
- Uncoordinated marketing efforts (no single "brand" – diffuse message)
- Recruiting: schools <u>outside</u> of Oregon are doing this
- Type of information – not understood by kids

- Competitions market to the kids

Problems

- Motivating students to be interested in science and technology
- Preparation so can pursue it (prepared with math and science)
- Stereotyping by media turns kids off
- Students aren't aware that there actually are engineering/ science and technology jobs in Oregon
- Understanding and awareness = don't know what engineers do/ how fun it is and need for them/ relevance to all people's lives

Key Strategy 1: Engage professional marketing firm to create a multi-tiered program for building awareness of opportunities and career possibilities *(side note: Group from OPAS approaches professional firm, such as Wieden and Kennedy to create plan)*

- Promote engineering/ science/ math in rural areas
- Target different markets (K-6, 7-9, 10-12, universities/colleges)
- Target especially underserved minorities/ girls
- Parents and teachers and counselors position engineering as relevant and as "cool" and as "heroes" or "idols"
- Develop co-curricular guide and website listing all available opportunities for parents and teachers and advisors
    - Must be intuitive/ not designed by engineers!
    - OPAS
    - Bilingual
    - Paper-based
- Under marketing: develop a web-based presentation about engineering opportunities (find existing and distribute it)

Key Strategy 2: Leverage and/or replicate existing models/ best practices (i.e. Junior Achievement)

- Explore in person and web-based "ongoing conversations" between practitioner and classroom
- Have highly successful teachers train other teachers in intensive 1-week summer course (i.e. SuperQuest, SAOF/CSTA)
- Role models and mentors connecting consistently with kids *relationships*

Key Strategy 3 (*notation suggests that this strategy was combined with 4 in final draft)*: Formalize state/ industry partnership to promote engineering/ science/ technology (and provide incentives to increase the number of kids pursuing these) *side note: Joint Industry-Advisory Boards*

- Invite them to join us in this statewide effort
- Identify the appropriate groups to engage
- Find a model to follow (what other states are doing)
- Invite practicing engineers (esp. women and minorities) to speak to classes/ engage students (Business-Education Compact) (*ETIC*)

- Teacher/ counselor/ administration visits to industry (*Regional Coordinators i.e. Pavtec, ETIC)*

Key Strategy 4 (*combined with 3 in final draft*): Establish seamless connection between education system and Oregon's network of industry clusters (associations)

- "Clearinghouse" – ask all associations to put up a page allowing teachers to request speakers/ mentors/ judges for events (and have a resource for the speakers to see how to engage with the kids) *side note: Jr. Achievement and OHSU models, SAO/CSTA*
- For teachers: restore sabbaticals and allow teachers to practice a job in the real world for one year
- Teacher-business mentorship program (also teacher internships) – consortium of companies/ ETIC/ follow IBM's model/ Bus-Ed Compact

Comments from Gallery Walk:

- Strategy 4: how to get teachers to return after 1 year sabbatical?
- Strategy 2: include a stipend for the 1-week training to incentivize the teacher
- Strategy 1: concerned/ maybe wrong group to be doing it
- Strategy 1: emphasize the earliest grades/ target those the most
    - Also market to the advisors
    - And focus on parents: so they become aware of the possibilities for their children
- ASEE has a list of the opportunities: focus on disseminating this
- See Dream it/ Do it campaign
- Get materials and info to kids/ parents at the key decision points
- ETIC C.S. taskforce (see web)
- Strategy 4: "Partners in Science" program sponsored by Murdock (real research experience)
- Middle school level – LEGO Robotics experience opens eyes
- Goal is right on
- Strategy 1: see BEC pdx.org for listing of activities/ resources
- Strategy 4: have sabbaticals gone away?
- Strategy 1: educating parents is critical
- Marketing language: needs to be kid-friendly
- Strategy 1: market to legislature and have lobbyist and policy makers for engineering
- Engineering is a springboard to other "non-engineering or tech" careers as in legal field/ medical/ sports
- Multi-disciplinary
- All HS math/science/engineering/music classrooms have an engineering poster/ brochures
- Educate
- Strategy 1: part for the Hispanic population – vehicles that are oral (not web/ paper)
- Marketing needs to serve the teachers needs
- Use EWB

De-mystifying engineering in marketing plan (Action)
→ Unified Oregon Marketing Campaign for Engineering/ Science

- Focus on diversity (ex. male nurse campaign)

- Who → ETIC
- Break current stereotype of engineers
- Target audiences
    - K-12 educators
        - Use OEA, OSTA, OCTM, OCATE
    - College math/physics/chemistry. institutions
        - Use AMATYC
        - Treat as gateway to multiple career choices
    - Parents/ students
        - Target demographic areas

Standards, Courses and Curricula

Current Status:

- K-10 Content knowledge and skills standards
- Community colleges/ 4-year institutions, faculty institutions, no standards
- Each department views courses as a handcrafted product
- ABET – 4yr-2yr program outcomes- general

Goal:

- By 2010, we will have a K-20 proficiency-based set of standard outcomes that is responsive to a changing world, a common assessment, and a vertical alignment for a focused/ thread/ pathway of engineering and applied sciences.

Underlying Assumptions

- Entire model involves K-20 participants
- Delivery of outcomes and skills can happen at any (K-20) appropriate stage of the career pathway
- Intend to separate issue of age of student from outcomes and skills achieved
- Includes industry partners
- Similar outcome development will take place in areas of related to engineering, science, and math
- Includes private sector education partners

Comments/ What's Missing

- Pre-service teachers
- Targeted to 1 segment of the pipeline
- HS "engineering graphics" course should use the same #, course, outcomes
    - K-12 needs more of a focus to change standards to process-based system
- Math core needed to list(?)
- Improve student/ parent knowledge to selection of courses
- Computer science, ASOT in Computer Science
- Who is going to lead, facilitate the group?
- How does this help the student?
- K-20, what does this mean?
- Standards are breakpoints along continuum

- Bringing industry into classroom a standard
- Where do you need to be at different points of the spectrum?
- Engineering advisory committees
- Science core
- Need to happen more times out of year
- ABET may have course standard- check?
    - EC 2000 – eng from EAC
    - TC 2000 – criteria eng tech 4yr
- Other HS engineering orientation (tech prep/ dual credit) credit that could be brought down onto HS.
- ABET accreditation for CC
- Industry input into the creation of outcomes ASEE, ACM, IEEE
- K-12 technology standards AAAS – project 2061, ITEA – grade level K-12

Student Success

Definition of Student Success

- Quantity of interested, qualified students
- Persistence and success

Current Situation

- Science Literacy – 40-50% drop out between Freshman and Sophomore college years
    - Reasons
        - different expectations
        - work load
        - math preparation
        - infrastructure of preparation, retention, access (socioeconomic)
        - family, community, culture
        - motivation – community, parental expectations
        - achievement gaps begin in 4^{th} – 6^{th} grades
        - teacher expectations
- When education is a priority at home students are motivated
- Engineers who teach are effective community mentors
- Good scientists = Good citizens
- 25% of adults in OR hold BA/BS – communities vary, some communities as low as 4%

Identifying perceived barriers to access

- The way science is taught
    - Teacher morale
    - Teacher resources
    - Class size
    - Teacher prep
    - 8 minutes a day at elementary level
    - ½ HS & MS math classes taught by teachers uncertified in these areas
- Motivation of women/ under-represented
- Rural/ urban access

- $$
- Student ability vs. K-12 preparation
- Perceptions of students confidence in ability
- Preparation (includes motivation, challenge, jobs)
- Goal: Preparation and Support will equip all students in math, science, and engineering

Five Year Goals

- Increase graduation numbers of underrepresented groups with degrees in Engineering and Applied Sciences
- All qualified applicants can afford to get a degree in Engineering or Applied Sciences
- Double the number of graduates in Engineering and Applied Sciences from Oregon Universities
- All high school graduatess are qualified to have an opportunity to enter engineering or applied sciences program
- Implement reforms that will affect all students.

Strategies

Identifying motivation strategies that will inspire students to pursue engineering and applied science education:

- Improve K-12 motivation about engineering
    - Provide co-curricular activities/ mentoring targeted at women and minorities
        - Role models
    - Implement academic, social, and cultural support programs for students from groups underrepresented in E &AS
    - Standardize freshman coursework
    - Make system work to keep and support students in pipeline
    - All-girl math and science in middle school
- Make engineering programs more attractive and relevant to the lives of students
    - Increase outreach activities by universities to motivate/ recruit
    - Attract qualified students to Oregon universities by providing unique experiences
        - Involve industry
    - Integrate project-based/ service-based learning activities into the classroom
    - Periodic mailing to students beginning in 8th grade to explain careers, programs, and what actions students can be taking to prepare
    - Oregon business community needs to support engineering education K-18 with $ and resources
    - Provide professional development opportunities for E&AS faculty and administrators to support reform in courses and retention services
    - Increase ETIC funding by a factor of 4.
    - Universities should increase program space
- Make engineering programs more attractive and relevant to the lives of students (2nd draft)
    - Financial & Scholarships
    - Co-curricular & Support
        - Quantity
        - Accessibility
        - Coordination

- Modify curricula to increase engagement
  - Need council – who?
- [On post-it notes surrounding above bullet points]
  - Increase mentors (engineering/ applied science) in K-12
  - Provide targeted co-curricular programs (contests, clubs, mentoring, camps, classes)
  - Provide all students with opportunity for mentoring and experiential activities in Engineering and Applied Science
  - Address cultural barriers
    - Family education
    - Adult role models
    - Co-curricular activity targeted at families
  - Oregon Industries Collaboration for Pre-Engineering and Applied Sciences Education
    - Sponsorship
    - Mentors
    - Access to resources
  - Increase the use of transitional learning communities in engineering
  - Separate genders for middle school math and science courses
  - Offer service based learning to make engineering relevant to more students
  - Provide scientific discovery activities at an early age
  - Build scholarship programs targeted at engineering/ applied sciences; involve industry foundations
  - Increase industry support of internship programs
  - Tax-credits for level and type of intervention
  - Business gets tax incentives to provide near-peer mentors to high schools that have low science/engineering college graduation rates

Identify strategies to increase student confidence in their ability to succeed

- Improve high school educational experience
  - Improve high school teacher skill to motivate students to learn the science/ math/ CS needs for science/ engineering success
  - Develop a consortium of partners to deliver high quality formal and informal learning experiences that build aspirations, preparation, and entrance into higher education.
  - Implement engineering/ applied science programs consistently from K-12
    - Math
    - Science
    - Require in curricula
    - Problem solving
- Raise high school math/ science requirements--communicate expectations of engineering schools
  - Clearer guidance to students on university expectations beginning early in high school
  - Further increase graduation requirements from Oregon high schools

- Schedule high school students with minimum requirements to be accepted into community college or university out of high schools
- Increase math and science requirements for all high school grads
- Require an engineering experience for graduation such as a capstone project or senior project
- Raise math and science requirements for graduation to better prepare students for rigor of college
- Make engineering a higher priority in middle and high schools – have more flexibility in curriculum and scheduling
- Make pre-engineering a requirement at the high school level instead of an elective

Identify retention strategies that will inspire students … and support these students in completing this education

- Raise the quality and level of high school education in preparing students for college engineering/ AS degree programs
  - Reduce class sizes
    - How to
    - Benchmarking
    - Look at RPI methods vs. class size experience
  - Standards and Classroom Delivery
  - Community Involvement
  - [On post-it notes surrounding above bullet points[
    - Expand number of high schools offering computer science classes
    - Reform K-12 standards from content to conceptual instruction
    - Review and comment on the proposed new high school graduation requirements proposed by the Oregon School Board
    - Train teachers in engineering or creative problem solving
    - Have more high school programs that will help define the engineering programs and make them more attractive
    - Create and expand programs that get parents with young children to participate in science exploration activities
    - Increase funding for schools
    - Increase parent awareness – parent education so they see the need for math and science
    - Reduce class sizes for all classes
    - Provide peer groups of students who plan to go to college
    - Create incentives for professionals in technical fields to become high schools and elementary teachers
    - Raise graduation requirements
- Improve foundation/ industry/ government funding for engineering/ AS students
  - Make cost of college more affordable by scholarships or paid tuition by potential employees
  - Provide double tax break for endowment gifts to E&AS scholarships
  - Increase Oregon Opportunity Grants
  - Work with foundations, agencies, and business/industry partners to develop an E&AS career assistance “fund”

- Create tax incentive for scholarship endowment funds from individuals and corporations
- Loan forgiveness programs when jobs occur – paid ½ by industry, ½ government
- Voluntary "bounty" on each OUS Oregon engineer hired
- Scholarships based on degree choice
- Help students make better financial choices
  - High school students see college financial impact of choices (high school classes, CC, Army, scholarships)

Learned in Gallery Walk – refinements

- Broad controversy – much cross-over
- Need: ongoing communication and coordination
- Goal: all to have option to choose EAS
- Goal: students to make informed choices
- Diversity: issues and solutions not very clear
- Lack of knowledge of existing systems and resources
- Training and tools for teachers

Resources Needed *(A=additional, E=existing)*

1a) Class size
- Funding (A)
- Quality education model
- Belief: OR is past limits for effectiveness

1b) Standards and Classroom delivery
- Stakeholders to work (E)
- Industry, K-20, STEM competency
- Could output (performance) goals shift discussion
- Who/What:
  - Need to create process for change (can deliver different result)
  - Output recommendations to ODE curriculum group for implementation
- Risk taking!
- PASS Standards: useful participant and model, IB also a useful model

1c) Community involvement (parents, mentors, …)
- Some districts using community advisory boards
- Families
  - Science nights and events
  - Need resources to facilitate (sometimes by universities)
  - Treat outreach like extension source: Example 4H tech wizards

2a) Scholarships/ Financial Support – not developed because of time limitations

2b) Co-curricular support
- Coordination initiative
- Small seed funds (A)

2c) Integrated Curriculum – 2b, 2c get worked together

Appendix D: Focus Area Group Participants

Diversity
Michal Young
Robert Thompson
Robert Dunton
Ellen Momsen
Nancy Wortman
Gayle Yamasaki
James Troisi
Shawna Blanchette
Carole Petersen

Instructional Professional Development
Winnie Miller
Van Eden
John Vinson (Thursday only)
Dan Arnold (Friday only)
Dean Livelybrooks
Sam Stern
Ginnie Lo
Megan Helzerman
Larry Flick
Doug Stuivenga
Ron McGuire

Career Pathways
Scott Giltz
Ron Olsen
John Shea
John Sweet
Timothy Brower
Mary Peterson
Ron Jantzi
Bill Lesh
Jeanne Yerkovich

Best Practices
Joyce Cresswell
John Marsaglia

Student Success
Morgan Anderson
Terrell Smith
Dick Knight
Eda Davis-Butts

David Mitchell
Jim Lundy
Joseph Waln
Eileen Boerger
Bill Becker
Steve Day
Kathy Hall
Wendy Powless
Diana LaBoy-Rush

Alignment and Coordination: System-wide
Marcia Fischer
Ron Dodge
Niki Schulz
Bruce Schafer
Dave Krumbein
Gary Kaleta
Peter Casey
David Conley – Friday only

Alignment and Coordination: Curricula/Co-curricula
Joyce Cresswell
Ray VanDiver
John Baggott
Fritz Reuhr
Carla Faini
Kent Foster
Sarah Witte
Patrick Keefe
Earl Potter

Standards, Curriculum, Courses
Camille Wainwright
Hyacinth Williams
Karen Sprague
Cary Sneider
Sam Tupou
Susan Boyanovsky
Fredrick Pratter
Bruce Emerson

Marketing
Kelly Kost
Hector Morales
Bill Manley
Don Domes
Sean Gallagher
Lonnie Ellingson

Celeste Baine
Joe Graf
Jim Ryan
John Tortorici
Robert Harder
Mike Kies

Appendix E: Summit Planning Team

Morgan Anderson, Intel Corporation
John Baggott, Oregon State University
Susan Boyanovsky, Oregon Dept of Community Colleges & Workforce Development
Cynthia Brown, Portland State University
Ken Cone, Oregon University System
Joyce Cresswell, Saturday Academy
Carla Faini, Oregon MESA, Portland State University
Fred Haynes, Linn Benton Community College
Ron Jantzi, Chemeketa Community College
Kelly Kost, Lemelson Foundation
Francie Lindner, Northwest Regional Educational Laboratory
James Lundy, Oregon State University
Ellen Momsen, Oregon State University
Ginger Redlinger, Oregon Department of Education
Skip Rochefort, Oregon State University
Diane Saunders, Oregon University System
Bruce Schafer, Oregon University System
Andrew Shakman, SAO Foundation
Cathy Swider, Oregon University System
John Tortorici, Software Association of Oregon
Gayle Yamasaki, Oregon Institute of Technology
Michal Young, University of Oregon

Summit Resource Staff

Anna Brozek, Oregon University System
Stephanie Bryan, Oregon University System
Ken Cone, Oregon University System
Erin Conlon, Lemelson Foundation
Beau Dickey, Oregon University System
Endi Hartigen, Oregon University System
Jo Oshiro, Oregon University System
Michele Vitali, Oregon University System

Appendix F: Those Who Attended Summit

First	Last	Affiliation	Title
Morgan	Anderson	Intel Corporation	Intel Oregon Education Manager
Dan	Arnold	IEEE -Oregon	President
John	Baggott	OSU Extension 4-H/BIT	Extension 4-H Youth Faculty
Celeste	Baine	Engineering Education Service Center	Director
Bill	Becker	PSU: Center for Science Education	Director, PSU Center for Science Education
Shawna	Blanchette	Phoenix-Talent School District	Mathematics/Wood Tech/AutoCAD Teacher
Eileen	Boerger	Agilis Solutions	Vice President & General Manager
Susan	Boyanovsky	Oregon Community College Workforce Development	Instructional Program Specialist
Timothy	Brower	Oregon Institute of Technology	Department Chair, Mechanical Engineering
Cynthia	Brown	PSU:Maseeh College of Engineering and Computer Science	Computer Science Department Chair, Maseeh College of Engineering and Computer Science
Peter	Casey	Central Oregon Community College	Computer and Information Systems Chair
David	Conley	University of Oregon	Professor of EDLD
Joyce	Cresswell	Saturday Academy	Executive Director
Eda	Davis-Butts	OSU: SMILE Program	Director
Steve	Day	Beaverton School District	District Science Specialist
Ron	Dodge	Oregon Department of Education	Business and Management Specialist
Don	Domes	Computer Science Teachers Association	President
Robert	Dunton	Corbett School District	Superintendent
Van	Eden	Microsoft Corportation	Academic Programs Manager
Lonnie	Ellingson	Electro Scientific Industries	Director of Global Supply
Bruce	Emerson	Central Oregon Community College	Science Department Chair
Carla	Faini	PSU: MESA	Executive Director
Marcia	Fischer	Portland State University	Assistant Dean for Enrollment and Outreach

First	Last	Affiliation	Title
Larry	Flick	Oregon State University	Chair, Dept. of Math and Science Education
Kent	Foster	Microsoft Corportation	Academic Programs Manager
Sean	Gallagher	Hermiston School District	Hermiston HS Principal
Scott	Giltz	Clackamas Community College	Dean, Technical Career Education Division
Joe	Graf	Southern Oregon University	Dean of Sciences
Kathy	Hall	Oregon Mathmatics Education Council	Chair
Robert	Harder	George Fox University	Professor and Chair of Engineering
Jeff	Hayen	Southwestern Oregon Community College	Professor, Engineering and Mathematics
Megan	Helzerman	Clackamas ESD	PTE Regional Coordinator - 15
Ron	Jantzi	Chemeketa Community College	Director of Engineering, Math and Science
Gary	Kaleta	Gunderson Inc.	Senior Vice President
Patrick	Keefe	Clatsop Community College	Dean of Learning
Mike	Kies	Portland Community College	Department Chair/Technology and Univeristy Transfer
Dick	Knight	PSU:Maseeh College of Engineering and Computer Science	Chair, Advisory Board of Maseeh College of Engineering and Computer Science
Kelly	Kost	The Lemelson Foundation	Project & Communications Coordinator
Dave	Krumbein	Blue Mountain Community College	Civil Engineering Instructor
Diana	LaBoy-Rush	Society of Women Engineers, Columbia River Chapter	President
Bill	Lesh	The Center for Advanced Learning	Director
Dean	Livelybrooks	University of Oregon	Physics, Senior Instructor
Ginnie	Lo	University of Oregon	Associate Professor, Computer & Information Science
Jim	Lundy	Oregon State University	Associate Dean of Engineering
Bill	Manley	Portland Community College/PAVTEC	PTE Regional Coordinator - 2A
John	Marsaglia	Western Oregon University	Computer Science Division Chair
Ron	McGuire	Roseburg School District	Drafting Teacher
Winnie	Miller	Oregon Council of Teachers of Mathmatics	President

First	Last	Affiliation	Title
David	Mitchell	North Clackamas School District	Manufacturing Instructor
Ellen	Momsen	Oregon State University	Program Director, Women and Minorities in Engineering
Hector	Morales	Beaverton School District	Technology Teacher
Ron	Olsen	Malheur ESD	PTE Regional Coordinator - 14
Stephen	Pawlowski	Intel Corporation	Intel Senior Fellow & Chief Technology Officer of EPG
Carole	Petersen	Society of Women Engineers - Willamette Valley Chapter	Chapter Member
Mary	Peterson	Hillsboro School District	Assistant Principal
Earl	Potter	Southern Oregon University	Provost
Wendy	Powless	Oregon Institute of Technology	Director Advance Credit Program and HS Transition Program
Fredrick	Pratter	Eastern Oregon University	Professor of Computer Science
Fritz	Reuhr	Willamette University	Department Chair/Computer Science
Jim	Ryan	Oregon Robotics Tournament and Outreach Program	Executive Planning Committee
Bruce	Schafer	Oregon University System	Director, Industry Affairs
Jim	Schoelkopf	Oregon Department of Education	Specialist, PTE & Perkins Grant Administration
Niki	Schulz	Mount Hood Community College	Instructor of Engineering Transfer
John	Shea	Oregon State University	Head Advisor, College of Engineering
Terrel	Smith	Sherwood School District	Technology Teacher
Cary	Sneider	Boston Museum of Science	VP for Educator Programs
Karen	Sprague	University of Oregon	Vice Provost of Undergrad Studies
Sam	Stern	Oregon State University	Dean, College of Education
Doug	Stuivenga	Salem-Keizer School District	Engineering Teacher
John	Sweet	Linn Benton Community College	Co-faculty Dept. Chair - Engineering
Robert	Thompson	Lane Community College	Faculty Coordinator Engineering Transfer Program
John	Tortorici	Software Association of Oregon	President

First	Last	Affiliation	Title
James	Troisi	IBM	Senior Software Manager
Sam	Tupou	Eugene School District	Director of Curriculum
Ray	Vandiver	OMSI	Vice President of Exhibits
John	Vinson	IEEE - Oregon	2005 PCA Chair
Camille	Wainwright	Pacific University	Project Director
Joseph	Waln	Engineering Without Borders - Portland Chapter	President
Hyacinth	Williams	Columbia Gorge Community College	Director of Math, Science, Business and Technology
Sarah	Witte	Eastern Oregon University	Associate Provost
Nancy	Wortman	Saturday Academy OSU	Director
Gayle	Yamasaki	Oregon Institute of Technology	Director of Pre-College Programs
Zia	Yamayee	University of Portland	Dean of Engineering
Jeanne	Yerkovich	Portland Public Schools	Pathway Development Coordinator
Michal	Young	University of Oregon	Associate Professor of Computer Science

Appendix G: Agenda

Day One: Thursday, September 15, 2005

7:30-8:30: Registration – coffee, tea and continental breakfast
8:30-12:00: Welcome, Keynote speakers, Opening Discussion
Keynote speakers

- Cary Sneider, Vice President, Educator Programs, Boston Museum of Science
- Steve Pawlowski, Senior Fellow and CTO, Enterprise Platforms Group, Intel Corporation

Pre-engineering & Applied Sciences education

- Vision
- Mission
- Overarching goals

Themes Discussion

- Motivation
- Preparation
- Transfer
- Retention
- Diversity

12:00-1:00: Hosted lunch - Greek Buffet
1:00-4:30: Work groups: strategic planning process focusing on strategic topics such as

- Alignment and Coordination: Curricula and Co-curricula
- Alignment and coordination: System wide
- Best Practices: Adapting and leveraging ideas from other states
- Degree pathways: Defining, implementing, and communication
- Diversity: Increasing the ethnic and gender diversity in technical fields
- Instructional Professional Development
- Marketing Engineering & Applied Science Careers
- Standards/courses/curricula
- Student Success: Access, motivation, retention

4:30-6:00: Hosted Reception – Appetizers, Wine and Non-Alcoholic Beverages

Day Two: Friday, September 16, 2005

8:00-12:00: Conference reconvenes:

- Workgroup reports
- Feedback
- Further development

12:00-1:00: Hosted lunch – Gourmet Box Lunches
1:00-2:30: Continue the work:

- Resources
- Metrics
- Assuring statewide impact
- Role of co-curricular programs

2:30-3:30: Final Recommendations and Next Steps
3:30: Conference adjourns

Appendix H: List of Materials Provided to Delegates

		EDUCATIONAL SECTOR					THEMES					FOCUS AREAS						
	Document Number	Elementary	Middle	High School	Community College	Universities	Motivation	Preparation	Transfer	Retention	Diversity	Align & Coordinate	Standards & Curricula	Instructional Prof. Devel.	Student Success	Degree Pathways	Co-curricular	Best Practices	Diversity
Agenda	1.1																		
Keynote Speakers Bios	1.2																		
Details	1.3																		
Resource Binder	1.4																		
Vision/Mission/Goals	1.5																		
Glossary	1.6																		
Overview Presentation	1.7																		
Organizations	1.8																		
Planning Committee	1.9																		
Delegates	1.10																		
CRT -In order of appearance	1.11	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
CRT-Alphabetical	1.12	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Focus Table- Align and Coordinate	1.13											x							
Focus Table- Standards & Curricula	1.14												x						
Focus Table- Instructional Prof. Development	1.15													x					
Focus Table-Focus-Student Success	1.16														x				
Focus Table-Degree Pathways	1.17															x			
Focus Table-Co-Curricular	1.18																x		

		EDUCATIONAL SECTOR					THEMES							FOCUS AREAS					
	Document Number	Elementary	Middle	High School	Community College	Universities	Motivation	Preparation	Transfer	Retention	Diversity	Align & Coordinate	Standards & Curricula	Instructional Prof. Devel.	Student Success	Degree Pathways	Co-curricular	Best Practices	Diversity
Focus Table-Best Practices	1.19																	x	
Focus Table- Diversity	1.20																		x
Presentation By Cary Sneider	1.21	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Briefing on Academic Excellence and Economic Development Working Group (AEED)	2.1			x	x	x		x	x	x		x			x	x			
Briefing on Access and Affordability Working Group (AAWG)	2.2			x	x	x				x	x				x	x			x
Briefing on Excellence in Delivery and Productivity Working Group (EDP)	2.3			x	x	x		x	x	x	x	x			x	x		x	x
Engineering and Technology Industry Council (ETIC)	2.4	x	x	x	x	x	x	x		x	x	x			x	x			x
OMEC - Oregon Mathematics Education Council	2.5	x	x	x	x	x		x	x			x	x	x	x				
Oregon Council for Knowledge and Economic Development (OCKED)	2.6	x	x	x	x	x		x					x		x	x			
Oregon State Board of Education Logic Model	2.7	x	x	x	x	x		x	x	x		x	x	x	x				
OSEC - Oregon Science Education Council	2.8	x	x	x	x	x		x	x			x	x	x	x				
OSBHE 05-06 Goals	2.9			x	x	x		x	x			x	x	x	x	x			
100 - 200 Level Engineering Science Course Crosswalk	3.1				x	x		x	x			x			x	x			
2+2/Tech Prep Headcount 2003-4	3.2			x	x			x	x			x			x	x			
2002-2003 Tech Prep & Dual Credit Student Enrollment Data	3.3			x	x			x	x			x			x	x			
2003-04 OUS Engineering/Computer Science Degrees	3.4					x				x	x				x				x
Canby High School	3.5			x			x	x					x		x	x			
Compressed Work Week (CWW) @ PSU	3.6					x		x	x	x	x	x			x			x	x

		EDUCATIONAL SECTOR					THEMES								FOCUS AREAS					
	Document Number	Elementary	Middle	High School	Community College	Universities	Motivation	Preparation	Transfer	Retention	Diversity	Align & Coordinate	Standards & Curricula	Instructional Prof. Devel.	Student Success	Degree Pathways	Co-curricular	Best Practices	Diversity
Computer Science and Computer Information Systems Course Crosswalk	3.7				x	x		x	x			x			x	x			
Degrees Offered at Oregon Institutions	3.8				x	x		x	x			x			x	x			
Dual Credit Course Section by Subject 2003-04	3.9				x	x			x			x			x	x			
Dual Credit Headcount by Subject 2003-04	3.10				x	x			x			x			x	x			
Dual Enrollment Between Oregon Community Colleges and Oregon University System Campuses	3.11				x	x			x			x			x	x			
Facts About Tech Prep in Oregon	3.12			x	x			x	x			x			x	x			
High School - Community College Transitions in Oregon	3.13			x	x			x	x	x		x	x	x	x	x			
Hillsboro High School	3.14			x				x	x	x					x	x	x	x	
How is IB treated at Oregon Community Colleges?	3.15			x	x			x	x			x			x	x			
How is IB treated at OUS Institutions?	3.16			x		x		x	x			x			x	x			
Capital Center High School Technology Institute	3.17			x			x	x	x		x	x	x		x	x			x
STARS - Students Taking Authentic Routes to Success College and Career Exploration Program, David Douglas High School	3.18			x			x	x	x	x		x	x		x	x			
The Center for Advanced Learning	3.19			x			x	x	x			x			x	x			
Mapping of OSU Courses to Availability at Oregon Community Colleges	3.20				x	x			x			x			x	x			
North Salem High School	3.21			x			x	x					x		x	x	x		
Oregon Small Schools Initiative	3.22			x				x			x			x	x			x	x
PCC Engineering Courses - University Equivalencies: 2005-2006	3.23				x	x			x			x			x	x			
Roseburg High School	3.24			x			x	x					x		x	x			

		EDUCATIONAL SECTOR					THEMES					FOCUS AREAS							
	Document Number	Elementary	Middle	High School	Community College	Universities	Motivation	Preparation	Transfer	Retention	Diversity	Align & Coordinate	Standards & Curricula	Instructional Prof. Devel.	Student Success	Degree Pathways	Co-curricular	Best Practices	Diversity
Sherwood High School (SHS)	3.25			x			x	x			x				x				x
SuperQuest - SAOF	3.26		x	x				x	x					x					
Survey Results of Oregon Professional Technical Education (PTE) Regional Coordinators	3.27			x				x					x	x	x				
Survey Results of Oregon Secondary School Teachers - Focus on Math, Science, & Technology Teachers	3.28			x			x	x					x	x	x				
Advanced Placement Program (AP)	4.1			x				x	x			x	x		x	x		x	
AMATROL	4.2			x	x	x	x	x	x			x	x	x	x	x		x	
Autodesk Design Academy	4.3			x				x					x		x		x	x	
Center for Engineering Educational Outreach (CEEO)	4.4	x	x	x	x		x	x	x	x	x		x	x	x		x	x	x
Infinity Project	4.5			x	x	x	x	x					x	x	x	x		x	
International Baccalaureate Program (IB)	4.6			x				x	x			x	x		x	x		x	
JASON Foundation for Education	4.7	x	x				x	x					x	x	x	x	x	x	
Project Lead The Way	4.8		x	x				x	x	x	x	x	x	x	x	x		x	x
Strategies for Engineering Education K-16 Summit (SEEK-16)	4.9	x	x	x	x	x	x	x	x	x		x	x		x			x	
Washington MESA (Mathematics, Engineering, Science Achievement)	4.10	x	x	x			x	x		x	x		x	x	x			x	x
ACCESS (Alternative Career Choices for Equitable Student Success)	5.1				x		x	x	x	x	x				x	x			x
CASE (Creating Avenues, Support and Equity for Women and Minorities in Advanced Technologies) at PCC	5.2				x		x	x	x	x	x				x	x			x
Design and Discovery	5.3		x	x			x	x	x	x	x		x		x	x			x

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EXITE - Exploring Interestes in Technology and Engineering, IBM	5.4		x				x	x		x	x				x	x			x
GATEWay to Engineering, SWE Columbia River	5.5	x	x				x	x			x				x	x	x		x
Intel NWSE (NorthWest Science Expo)/ ISEF (International Science and Engineering Fair)	5.6		x	x			x	x	x	x	x				x	x	x		x
Oregon MESA (Mathematics, Engineering, Science Achievement - PSU	5.7		x	x			x	x	x	x	x	x	x	x	x	x	x	x	x
ORTOP (Oregon Robotics Tournament Outreach Program)	5.8	x	x	x			x	x	x		x				x	x	x	x	x
Saturday Academy - PSU/OHSU	5.9	x	x	x			x	x		x	x			x	x	x	x		x
SMILE (Science and Mathe Investigative Learning Experiences) - OSU	5.10	x	x	x			x	x	x	x	x		x	x	x	x			x
STARBASE (Science and Technology Academies Reinforcing Basic Aviation and Space Exploration)	5.11	x	x	x			x	x							x	x	x	x	x
Willamette-SAOF High School Programming Contest	5.12			x			x	x							x				
Youth Exploring Science - YES	5.13		x	x			x	x	x	x	x				x	x	x		x
Dream It. Do It. Campaign	6.1			x	x	x	x								x	x			
Girl Power 21st Century	6.2		x				x				x				x	x	x		x
Girls Go Tech	6.3	x	x				x				x				x	x			x
Girls Research Our World	6.4		x				x			x	x				x	x	x		x
Graduates Linking with Undergraduates in Engineering (GLUE) at UT Austin	6.5				x	x				x	x				x	x		x	x
Lemelson-MIT InvenTeams	6.6			x			x	x							x	x	x		
MATHCOUNTS	6.7		x				x	x							x		x		

		EDUCATIONAL SECTOR					THEMES					FOCUS AREAS							
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National Engineers Week	6.8	x	x	x	x	x	x	x		x	x		x	x	x	x			x
The Texas Pre-freshman Engineering Program (TexPREP & SAPREP)	6.9		x	x			x	x	x	x	x		x		x	x	x	x	x
Women in Engineering Programs & Advocates Network K-12 Program: Making the Connection	6.10	x	x	x			x			x	x			x	x	x			x
Women in Science and Engineering (WISE) at UW	6.11				x	x				x	x				x				x
Certificate of Advanced Mastery (CAM)	7.1			x				x	x			x	x		x				
Certificate of Initial Mastery (CIM)	7.2			x				x	x			x	x		x				
High School Graduation Requirements	7.3			x				x	x			x	x		x				
Oregon Assessment System	7.4	x	x	x				x	x			x	x		x				
PASS (The Proficiency Based Admissions System)	7.5			x	x	x		x	x			x	x		x				
Comparison of the 2006-07 Diploma and CAM Completion	7.6			x				x	x			x	x		x			x	
Certificate of Advanced Mastery (CAM) and Diploma	7.7			x				x	x			x	x		x			x	
Program Brief on Professional Technical Education	7.8		x	x	x		x	x	x			x			x	x		x	
Closing the Achievement Gap	7.9	x	x	x	x	x	x	x	x	x	x			x	x			x	x
Academic Content Standards	7.10	x	x	x				x	x			x	x	x	x			x	
Preparing Each Student for Successful Transitions	7.11			x	x	x		x	x	x		x	x		x			x	
American Board for Engineering Technology (ABET)	8.1					x		x	x			x							
Science & Technology/Engineering Curriculum Framework - State of Massachusetts	8.2	x	x	x				x	x			x	x	x	x			x	
4H Technology Education, OSU Extension	9.1	x	x	x			x	x		x	x				x	x	x	x	x
BEC (Business Education Compact)	9.2	x	x	x	x	x	x	x	x					x	x	x			x

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CSE - Center for Science Education at PSU	9.3	x	x	x		x	x	x			x			x			x		
CSTA (Computer Science Teachers Association)	9.4	x	x	x	x	x		x	x					x				x	
E3 - Employers for Education Excellence	9.5	x	x	x				x			x				x	x		x	
EESC - Engineering Education Service Center	9.6		x	x	x	x	x	x	x	x	x			x	x	x			x
George Fox University Science Outreach	9.7	x	x	x				x						x	x				
NWREL (Northwest Regional Education Laboratory)	9.8	x	x	x				x		x	x	x	x	x	x		x	x	x
OCTM (Oregon Council of Teachers of Mathematics)	9.9	x	x	x	x	x	x	x			x			x				x	x
OIT - Oregon Institute of Technology, including Pre-College and Outreach programs	9.10	x	x	x	x	x	x	x	x	x	x				x	x		x	x
OMSI - Oregon Museum of Science and Industry	9.11	x	x	x			x	x		x	x		x	x	x		x		x
OSTA (Oregon Science Teachers Association)	9.12	x	x	x				x	x				x	x			x		
OSU - Oregon State University, including Pre-College & Outreach Programs	9.13	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
SOU - Southern Oregon University	9.14	x	x	x	x	x	x	x	x		x			x	x	x	x		x
TEO (Technology Educators of Oregon)	9.15			x									x	x				x	
WOU (Western Oregon University)	9.16					x	x							x				x	
PSU (Portland State University)	9.17					x	x	x	x	x	x	x	x		x	x		x	x
EOU (Eastern Oregon University)	9.18	x	x	x		x		x	x						x	x		x	
UO (University of Oregon)	9.19	x	x	x		x		x	x	x					x	x		x	
OHSU (Oregon Health Sciences University)	9.20	x	x	x		x		x	x	x				x	x	x		x	
American Society for Engineering Education (ASEE)	10.1	x	x	x	x	x	x	x	x	x	x	x		x	x	x			x

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Center for Innovation in Engineering and Science Education (CIESE)	10.2	x	x	x			x	x					x	x	x			x	
International Technology Education Association (ITEA)	10.3	x	x	x	x	x		x	x			x	x	x					
Junior Engineering Technical Society (JETS)	10.4			x			x	x		x	x		x		x	x	x	x	x
National Action Council for Minorities in Engineering (NACME)	10.5		x	x	x	x		x		x	x				x	x			x
National Society of Black Engineers (NSBE)	10.6			x	x	x				x	x				x	x			x
SECME, Inc	10.7	x	x	x			x			x	x				x	x	x	x	x
Society of Hispanic Professional Engineers (SHPE)	10.8				x	x				x	x				x	x			x
Women @ SCS (the School of Computer Science), Carnegie Mellon University	10.9				x	x	x			x	x			x	x	x			x
Institute of Electrical and Electronics Engineers, Inc (IEEE)	10.10				x	x		x	x	x	x			x	x	x			x
ACM K-12 Taskforce	11.1	x	x	x				x	x			x	x		x	x		x	x
Computer Science Fighting for Time	11.2	x	x	x				x					x		x				
Engagement, Capacity & Continuity:An Overview of a Trilogy for Student Success	11.3		x	x				x		x					x				
EngineeringK12 Center	11.4	x	x	x			x	x	x	x	x	x	x		x	x	x	x	x
Engineers Don't Get Enough Respect	11.5	x	x	x	x	x	x	x					x		x	x		x	
Highlights-The Road Ahead for IT Occupations: A Road Map for Oregon	11.6			x	x	x	x									x			
Latino Sudents and the Educational Pipeline	11.7		x	x	x	x	x	x		x	x				x	x		x	x
Losing the Competitive Edge (a report by the AeA)	11.8	x	x	x	x	x		x							x	x			

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Museum of Science's Education Resource Center (MoS ERC)	11.9	x	x	x	x	x		x				x	x					x	
Oregon Occupational Projection-selected pages	11.10				x	x			x							x			
TeachEngineering Digital Library	11.11	x	x	x			x	x					x	x	x				
Unlocking the Clubhouse, Women in Computing	11.12			x	x	x	x			x	x			x	x	x			x
Summary of Book: College Knowledge	11.13			x	x	x		x	x	x		x			x	x		x	
SB 300-A	12.1			x	x	x			x		x	x			x	x			x
SB 342-B	12.2				x	x			x			x			x	x			
SB 364-A	12.3		x	x	x	x		x	x			x	x	x	x				
SB 838-A	12.4	x	x	x	x	x		x					x		x	x			

Appendix I: Results of Survey of Delegates Critiquing Summit

1. Do you agree or disagree with the following statements regarding the summit's organization and communication?

The top percentage indicates total respondent ratio; the bottom number represents actual number of respondents selecting the option	1 Strongly Disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
1. The purpose of the summit was clearly articulated to me prior to attending	8% 3	8% 3	13% 5	56% 22	15% 6
2. The purpose of the summit was relevant to education in Oregon.	0% 0	5% 2	3% 1	44% 17	49% 19
3. My role in the summit was clear to me prior to attending.	3% 1	21% 8	28% 11	36% 14	13% 5
4. It was clear to me how to access and use the resources during the summit.	0% 0	10% 4	18% 7	33% 13	38% 15
5. I used the resources provided to me during the summit.	3% 1	21% 8	36% 14	28% 11	13% 5
6. My role during the summit was clear and well articulated.	0% 0	8% 3	26% 10	49% 19	18% 7
7. I know what actions I will take to continue the work started by this summit.	0% 0	23% 9	38% 15	36% 14	3% 1
8. I have continued to use the summit resources since attending.	3% 1	26% 10	41% 16	23% 9	8% 3

2. How would you rate the following as they pertain to the mission of the summit?

The top percentage indicates total respondent ratio; the bottom number represents actual number of respondents selecting the option	1 No benefit to the mission of the summit	2 Little benefit	3 Some benefit	4 Very beneficial	5 Essential to the mission of the summit
1. Resource Binder	0% 0	8% 3	44% 17	36% 14	13% 5
2. Resource Desk	13% 5	21% 8	44% 17	18% 7	5% 2
3. Agenda and Group Guide	3% 1	5% 2	21% 8	53% 20	18% 7
4. Cary Sneider's Keynote Address	0% 0	5% 2	11% 4	61% 23	24% 9
5. Steve Pawlowski's Keynote Address	0% 0	11% 4	13% 5	45% 17	32% 12

3. How would you rate the focus areas that were considered at the summit relative to the mission of the summit?

The top percentage indicates total respondent ratio; the bottom number represents actual number of respondents selecting the option	1 No benefit to the mission of the summit	2 Little benefit	3 Some benefit	4 Very beneficial	5 Essential to the mission of the summit
1. Alignment and Coordination: Systemwide	0% 0	8% 3	19% 7	49% 18	24% 9
2. Standards, Courses, and Curricula	0% 0	8% 3	16% 6	50% 19	26% 10
3. Instructional Professional Development	0% 0	3% 1	29% 11	45% 17	24% 9
4. Student Success	3% 1	0% 0	19% 7	41% 15	38% 14
5. Career Pathways	0% 0	5% 2	29% 11	45% 17	21% 8
6. Alignment and Coordination: Curricula and Co-curricula	0% 0	8% 3	24% 9	41% 15	27% 10
7. Best Practices	0% 0	8% 3	33% 12	44% 16	14% 5
8. Diversity	0% 0	5% 2	32% 12	30% 11	32% 12
9. Marketing Engineering & Applied Science Careers	0% 0	3% 1	19% 7	41% 15	38% 14

4. Are there any additional focus areas that you feel should have been included?

1 Inclusion of K-12 schools of all sizes, rural and urban.
2 Business and Industry Partnerships
3 No
4 Best practices didn't fit, but still was important. Needed higher level decision makers in the room.
5 As a group, what's the next step?
6 It would have been useful to have area concentration meetings with instructors of like interest. e.g: Welding Instructors
7 ASOT Degree in Engineering (for Transfer Purposes)

5. How would you rate the process and agenda of the summit?

The top percentage indicates total respondent ratio; the bottom number represents actual number of respondents selecting the option	1 No benefit to the mission of the summit	2 Little benefit	3 Some benefit	4 Very beneficial	5 Essential to the mission of the summit
1. Vision, Mission, and Goals Discussion	0% 0	5% 2	29% 11	55% 21	11% 4
2. Themes Discussion	0% 0	5% 2	27% 10	62% 23	5% 2
3. Day 1 Focus Area Workgroup Discussion	0% 0	3% 1	28% 10	50% 18	19% 7
4. Gallery Walk	0% 0	3% 1	26% 10	55% 21	16% 6
5. Day 2 Focus Area Workgroup Discussion	0% 0	3% 1	24% 9	53% 20	21% 8
6. Focus Area Final Recommendations	0% 0	8% 3	28% 11	49% 19	15% 6
7. Next Steps	3% 1	8% 3	42% 16	29% 11	18% 7

6. Do you agree or disagree with the following statements about the OPAS Summit facilitators?

The top percentage indicates total respondent ratio; the bottom number represents actual number of respondents selecting the option	1 Strongly Disagree	2 Disagree	3 Neither Agree nor Disagree	4 Agree	5 Strongly Agree
1. The facilitators did a very good job of transitioning from one activity to the next.	3% 1	0% 0	10% 4	59% 23	28% 11
2. The facilitators clearly articulated the procedures for each task.	0% 0	5% 2	5% 2	56% 22	33% 13
3. Adequate time was available for each discussion.	3% 1	21% 8	21% 8	49% 19	8% 3
4. The overall process was appropriate for the mission and goals of the summit.	0% 0	8% 3	26% 10	51% 20	15% 6

7. Do you have any additional comments regarding the facilitation of the summit?

1 Facilitators seemed more interested in process than product

2 There is never enough time for discussion on some of the topics since they are so complex, but the alloted time was appropriate for the goals of the summit

3 no

4 The facilitators did a great job in moving us from task to task. My big question is will anything change or come from the suggestions made at the summit. I don't believe enough time was spent on next steps nor do I think the process enabled change/follow up to occur.

5 Should have foreseen that "best practices" didn't fit with the rest and arranged a different treatment.

6 You might want to assign good facilitators with an interest in the topic to each breakout session

7 Very well done - good guidance but not obtrusive.

8 One facilitator seemed to talk too much and was a "bit bossy." The other one was very good.

9 Needed more time and opportunities for networking.

10 Even though the facilitators did their job, which was difficult considering the attendees different backgrounds, I felt they were not as warm and friendly as they could have been.

11 I'm not sure how to handle this any better than it was, but clearly more time was needed...probably many months of work to develop a really cogent plan.

12 I did not join a focus group. After attending the morning sessions on Thursday, I quickly discovered that this summit was not to be what I anticipated, so I quietly excused myself following lunch. I had expected the summit to be more in line with the Engineered Community conferences of the mid-to-late 1990s, which were hosted by the Sylvania Campus of Portland Community College and very well received by actual engineering instructors.

8. Do you agree or disagree with the following statements about your particular focus-area workgroup?

The top percentage indicates total respondent ratio; the bottom number represents actual number of respondents selecting the option	1 Strongly Disagree	2 Disagree	3 Neither Agree nor Disagree	4 Agree	5 Strongly Agree
1. My focus area workgroup contained a balance of perspectives and opinions.	0% 0	13% 5	13% 5	44% 17	31% 12
2. I agree with the final strategies presented and feel that these will make a difference in my focus area.	0% 0	8% 3	26% 10	44% 17	23% 9
3. The timekeeper for my workgroup was effective at informing the	0%	8%	37%	42%	13%

group about the time available to complete each task.	0	3	14	16	5
4. The recorder effectively recorded the group's ideas.	0% 0	3% 1	13% 5	54% 21	31% 12
5. The reporter effectively organized and presented the group's final report.	0% 0	3% 1	15% 6	51% 20	31% 12
6. My workgroup facilitator effectively kept the group focused and encouraged balanced participation from everyone.	0% 0	3% 1	32% 12	50% 19	16% 6

9. How would you rate the following aspects of the summit?

The top percentage indicates total respondent ratio; the bottom number represents actual number of respondents selecting the option	1 Unacceptable	2 Poor	3 Fair	4 Good	5 Excellent
1. Location of the Facility	0% 0	0% 0	13% 5	38% 15	49% 19
2. Quality of the Facility	0% 0	0% 0	3% 1	49% 19	49% 19
3. Quality of Food	0% 0	0% 0	15% 6	41% 16	44% 17
4. Quantity of Food	0% 0	3% 1	10% 4	46% 18	41% 16