

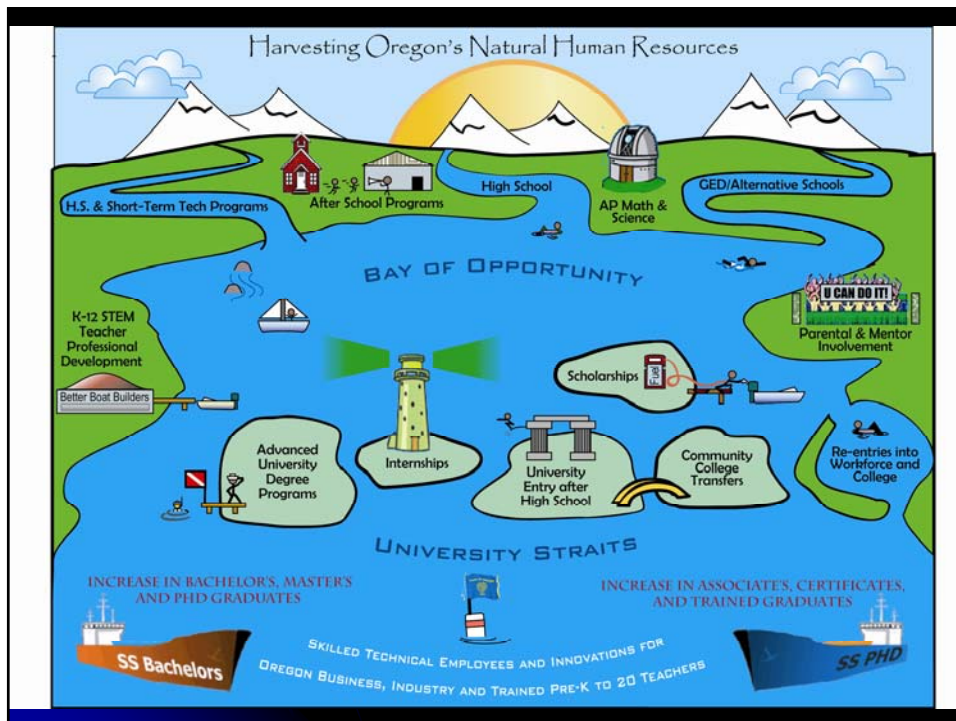
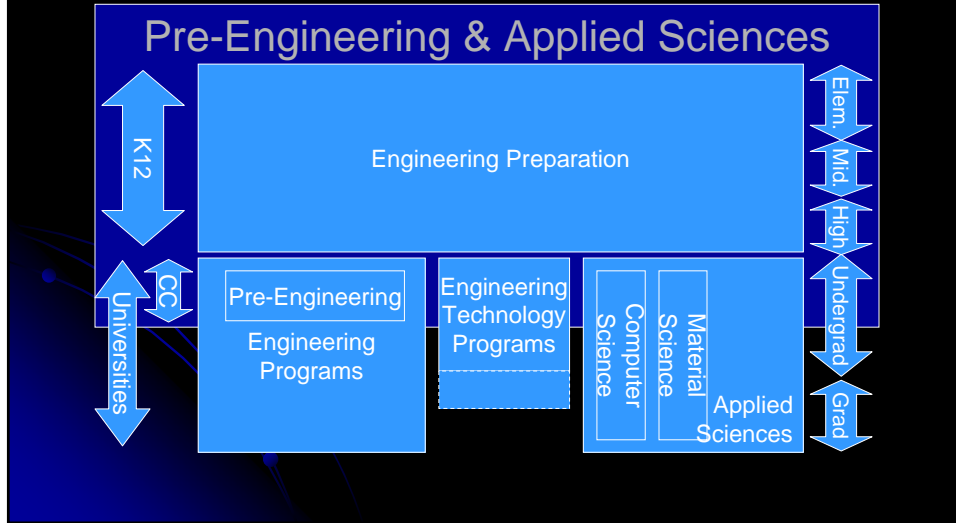
OPAS Workshop

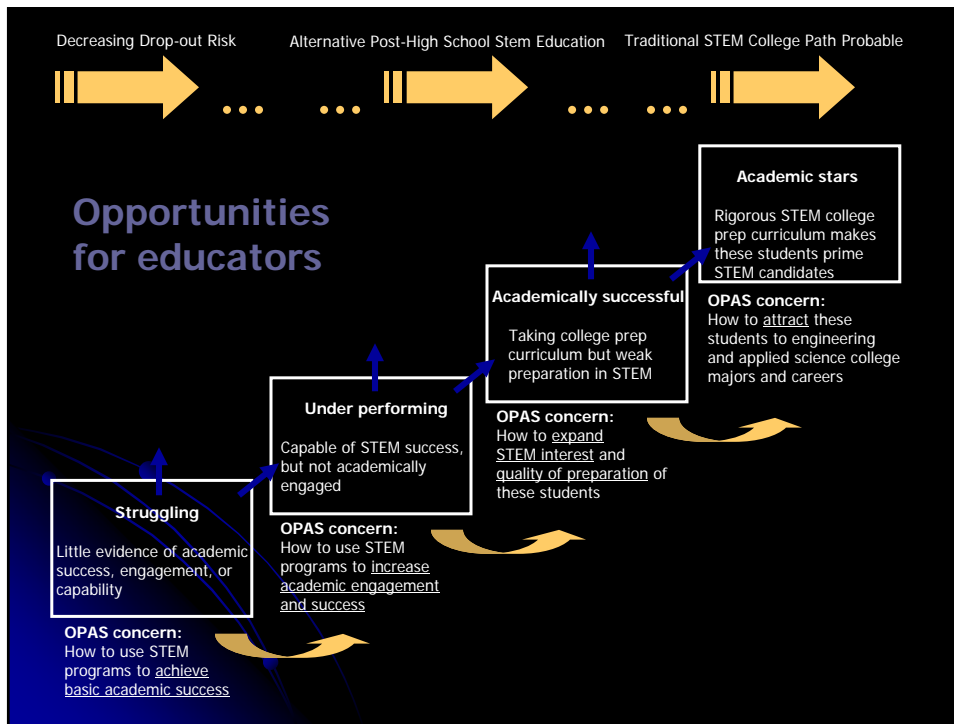
November 17, 2006

Goals of Workshop

- **Accelerate** the pace of the OPAS Initiative;
- **Prioritize** existing OPAS strategies to identify the top three to six strategies on which to focus our time and energy for the coming year and guide resource allocation in the upcoming biennium.
- Identify strategies for **increasing resources** available to OPAS; and
- **Update** all members on OPAS activities, recommendations, data, and resources.

Education Levels and Disciplines





- **Vision:** All Oregonians have the opportunity to choose and successfully pursue engineering or applied science as their field of study and career, thereby helping Oregon's industries contribute to state economic needs, and innovate and prosper in the global economy.
- **Mission:** To increase the number of work-ready engineers and applied scientists in Oregon through collaboration of education sectors, industry, and government stakeholders that ensures that all K-12 students have access to high quality education and career exploration opportunities that prepare them for postsecondary and workplace opportunities and success.
- **Goals:** See top-level strategies.

- **Strategy:** Allocation of resources towards a particular goal at the possible expense of other goals.
- **Method:** General approach to implementing a strategy.
- **Sub-strategy:** A choice of one or more methods for implementing a particular strategy together with interpretations of the chosen methods in the context of the strategy.
- **Tactic:** A specific action associated with a plan to implement a strategy or sub-strategy.

Some possible Methods

- **Policy:** Work with boards, councils, and governmental staff, and others to establish common goal and allocate resources to achieving that goal.
- **Funding:** Obtain funding for strategy, establish process for distributing funds to best suited to implement the strategy, implement this process, and monitor the results.
- **Collaboration:** Identify organizations with common goals, develop joint plans, and implement these plans.
- **Professional development:** Offer workshops and courses to those already working with students to enhance their knowledge and effectiveness.
- **Formal education:** Enhance what is taught to students in the classroom and students labs and how it is taught.
- **Informal education:** Augment what is available in formal classrooms with extra-curricular programs and activities in a variety of settings.
- **Grass roots:** Pull together small groups of people with the latitude and motivation to take independent action, develop and deploy prototype solutions, and grow the best.

Criteria

- How well does this choice **align with OPAS' vision, mission and goals**? Does this strategy serve to increase the number of work-ready engineers and applied scientists in Oregon?
- How much potential does this choice have to **reduce obstacles to student success**, which might include, but are not limited to access, preparation, appropriate habits of mind, socio-cultural factors, and awareness of options?
- What is the **breadth of impact** of this choice? How many students would be affected?
- What is the **depth of impact** of this choice? To what extent will the strategy engage students or others in a way that will cause depth of understanding or long-term change in behavior?
- Is this strategy a **prerequisite** for other high-priority strategies?
- Are the **resources** required to implement this choice of strategy **available**? How readily? Is there risk associated with acquiring those resources?
- Does this strategy **leverage** the work of others or present opportunities for synergistic collaboration? Or, is this choice something that is **already** being adequately **addressed** by others?
- How well does this match the **expertise, connections, and passions** of OPAS members? Is this strategy exciting enough to encourage the recruitment of new members?
- Is this strategy **short-term or long-term**? Is it change that requires a short effort to produce significant results? Or, is it something that justifies sustained effort to produce a major benefit? In either case, are the benefits lasting?

Strategy Categories

- Motivation
- Preparation
- Success

Motivation

Enhance students' knowledge of degree and career opportunities and increase their motivation to pursue these opportunities.

M1: Document and communicate a variety of pre-engineering and applied science degree and career pathways.

M2: Enhance the ability of STEM education programs to increase students' interest and knowledge of engineering and applied science opportunities

M3: Improve number and diversity of students participating in informal STEM programs.

Strategy M1: Document and communicate a variety of pre-engineering and applied science degree and career pathways.

- **Policy:** Work with Boards and others to establish pre-engineering and applied science as pathways covered high school career planning and counseling.
- **Funding:** Obtain federal, state, or private funding for marketing campaigns.
- **Collaboration:** Work with colleges, universities, and employers to document pathways and develop communication programs about them.
- **Professional Development:** Increase the knowledge of high school teachers about these pathways.
- **Formal education:** Integrate pre-engineering & applied science career information into curriculum materials.
- **Informal education:** Offer after school programs that provide insight into careers.
- **Grass roots:** Identify successful programs that provide insights into career pathways and help spread them more broadly.

Strategy M2: Enhance the ability of STEM education programs to increase students' interest and knowledge of engineering and applied science opportunities.

- **Policy:** Work with boards and others to establish better connections between formal and informal education programs.
- **Funding:** Obtain federal, state, or private funding for growing and enhancing Oregon's STEM programs.
- **Collaboration:** Facilitate greater collaborations between informal STEM programs via conferences, websites, etc.
- **Professional Development:** Increase the knowledge of teachers and others of engineering and applied science.
- **Formal education:** Use a combination of policy, funding, and professional development to enhance the motivational impact of formal education programs.
- **Informal education:** Enhance collaboration and funding to increase the impact of informal education programs.
- **Grass roots:** Identify a particularly effective STEM education program and work to offer it in other parts of the state.

Strategy M3: Improve number and diversity of students participating in informal STEM programs.

- **Policy:** Work with policy makers to establish role of informal programs.
- **Funding:** Obtain grants to extend reach of informal programs.
- **Collaboration:** Enhance collaboration between informal education programs.
- **Professional Development:** Enhance knowledge of informal educators of pre-engineering and applied science.
- **Formal education:** N/A?
- **Informal education:** Improve policies, funding and collaboration of informal education programs.
- **Grass roots:** Identify small successful informal education programs and facilitate their growth.

Preparation

Increase the number of students prepared for college-level work in engineering and applied science as well as the depth of that preparation.

P1: Enhance Oregon's STEM standards and assessments, especially in regards to engineering and applied science.

P2: Increase the number of schools that provide high-quality opportunities for students to learn about and prepare for further study in pre-engineering and applied science.

P3: Increase the use of improved teaching methods: active learning, student inquiry, engineering problem solving, and creative teamwork.

Strategy P1: Enhance Oregon's STEM standards and assessments, especially in regards to engineering and applied science.

- **Policy:** Work with boards and others to enhance connections between STEM standards and assessments and preparation for college programs in engineering & applied science.
- **Funding:** Obtain federal, state, or private funding to develop stronger standards and assessments.
- **Collaboration:** Work with state and regional committees to develop improved standards and assessments.
- **Professional Development:** Increase the knowledge of teachers of enhanced standards and how to implement them.
- **Formal education:** Identify and disseminate high-quality textbooks and other teaching materials that match enhanced standards.
- **Informal education:** N/A?
- **Grass roots:** Identify teachers who are successfully teaching to enhanced standards and work with them to help other teachers to use deploy the successful methods.

Strategy P2: Increase the number of schools that provide high-quality opportunities for students to learn about pre-engineering and applied science

- **Policy:** Work with policy makers to integrate this strategy with ongoing improvements to standards & curricula.
- **Funding:** Obtain state, federal, or foundation grants to implement pre-engineering and applied science offerings in more schools.
- **Collaboration:** Work with districts and schools to increase the availability of high-quality courses in pre-engineering and applied science in middle schools and high schools.
- **Collaboration:** Work with professional associations and others to integrate pre-engineering and applied science into mathematics and science curricula.
- **Professional Development:** Increase the number of teachers with expertise in teaching pre-engineering and applied science.
 - Sample tactic: Offer summer workshops.
- **Formal education:** Improve the availability and use of textbooks and other teaching materials that feature pre-engineering and applied science.
- **Informal education:** Offer an after-school program that features hands-on learning that uses mathematics and science to solve miniature engineering problems.
- **Grass roots:** Document successful pre-engineering courses and work with teachers and their principals to help them deploy them.

Strategy P3: Increase the use of improved teaching methods: active learning, student inquiry, engineering problem solving, and creative teamwork

- **Policy:** Work with boards and others establish statewide standards in effective teaching methods.
- **Funding:** Obtain federal, state, or private funding to disseminate enhanced teaching methods throughout Oregon.
- **Collaboration:** Work with schools and school districts to document and communicate best practices in teaching.
- **Professional Development:** Increase knowledge and skills of teachers and instructors in improved teaching methods.
- **Formal education:** Work with school administrations to obtain commitment to increasing the use of improved teaching methods.
- **Informal education:** Offer classes outside the regular school day that feature improved teaching methods.
- **Grass roots:** Identify teachers who are already using improved teaching methods and help them work with other teachers.

Success: Diversity, Retention, Transition

Increase diversity of students participating in STEM programs, enhance retention rates in engineering & applied science programs and increase alignment between STEM educational levels.

S1: Increase the enrollment and successful completion of STEM courses by young women, minorities and economically disadvantaged students.

S2: Improve retention rates of college programs, both generally and in specific underrepresented populations.

S3: Assure that the outcomes of courses are aligned with the prerequisites of more advanced courses.

Strategy S1: Increase the enrollment and successful completion of STEM courses by young women, minorities and economically disadvantaged students

- **Policy:** Work with policy makers to allocate more resources to meeting the needs of under-represented populations.
- **Funding:** Obtain federal, state, and private grants to grow programs serving under-represented populations.
- **Collaboration:** Work with professional societies and industry associations to develop marketing and outreach programs targeted at under-represented populations.
- **Professional development:** Increase the skills of teachers and instructors in teaching STEM to under-represented populations.
- **Formal education:** Assist STEM faculty in marketing their classes to under-represented students.
- **Informal education:** Increase availability of high quality informal education to under-represented populations.
- **Grass roots:** Identify STEM programs successfully serving under-represented populations and work to grow these programs.

Strategy S2: Improve retention rates of college programs, both generally and in specific underrepresented populations.

- **Policy:** Work with policy makers to increase the priority of retention programs at public and private colleges
- **Funding:** Obtain state, federal, or foundation grants to implement best-practice retention programs at colleges throughout Oregon.
- **Collaboration:** Establish task force with representatives from public and private campuses to identify best retention practices and implement them at all campuses.
- **Professional development:** Increase knowledge of best retention practices among high school and college faculty.
- **Formal education:** Integrate successful retention practices into classroom instruction.
 - Tactic: Include research projects as part of lower division curricula.
- **Informal education:** Grow informal courses covering keys to college success.
- **Grass roots:** Clone best practices.
 - Tactic: Grow peer mentoring programs.

Strategy S3: Assure that the outcomes of courses are aligned with the prerequisites of more advanced courses.

- **Policy:** Work with policy makers to establish goals regarding alignment between STEM courses.
- **Funding:** Obtain grants to invest in developing well aligned curricula.
- **Collaboration:** Work with teachers' associations and others to identify alignment issues and resolutions.
- **Professional development:** Increase the knowledge of high school teachers of the prerequisites of college engineering and applied science courses.
- **Formal education:** Document knowledge and skill assumptions of upper division courses and facilitate changes to associated lower division courses.
- **Informal education:** N/A?
- **Grass roots:** Facilitate the work of informal groups of pre-engineering instructors.

Rules of Engagement for the Morning

- Your rotations among table groups from 9:30 – 11:15 are assigned. Please check the lavender sheet in your folder.
- Go with the flow of your moderator's style – they are all different, and this process is pretty free-form.
- Keep the goal in mind: enough information to make an informed vote
- Please encourage everyone to contribute:
 - If applicable, review the results from the last group.
 - Keep your own comments succinct and to the point.
 - Listen for insights.
 - Look for ways to connect diverse perspectives.
 - Gather and record collective knowledge.
 - Help keep the discussion moving.
 - Review the discussion record – anything missing?