STEM Education Innovation Alliance
Potential 2017 Policy Recommendations
April 28, 2016

During the April 28, 2016, meeting of the STEM Education Innovation Alliance, the members divided into four topical small discussion groups:

1) Early learning/K-12
2) High school to postsecondary transitions
3) Midlevel skills and education
4) Baccalaureate and graduate level education

Listed below are the key policy recommendations drawn from these discussions. Following that is a summary of the main points that arose in each of the four discussion groups.

As last year, it will be best to narrow down the key policy recommendations for 2017 to around four to keep the focus on the most impactful and important proposed actions. Of course, other issues that are not included in the highlighted recommendations can be addressed in the narrative of the 2017 STEM Education Report Card - so these other important recommendations of the STEM Alliance are also articulated.

This is not intended as a definitive list at this point but merely intended to help us begin to refine our focus. You will have ample opportunity to comment on the list and add other recommendations that may have been left out at the meeting on July 13, 2016, and again in early September 2016.

High Level Ideas Generated and Potential Policy Recommendations

- Develop a mid-level version of the Washington State Opportunity Scholarship.
- Continue to expand funding for computer science enrollments
- Continue investments in additional MESA enrollments.
- Reaffirm the Dual Credit recommendation from last year.
- Additional investments in K-12 Professional Development and/or funds for equipment or supplies to implement STEM focused projects or curriculum.
- Enhance the High School and Beyond plan requirements

- Leverage state investments in K-12 basic education for STEM outcomes, critical for job and postsecondary readiness.

What is missing in this short list? What other ideas should be added for consideration as a key policy recommendation for next year?

DETAILED SUMMARY OF POLICY BREAKOUT DISCUSSIONS

Below are the summary notes from each breakout group with a detailed overview of the topics discussed and ideas generated. Please let us know if we missed any important subjects in the discussion that you participated in, or if there are topics or ideas that should have been brought up but were not.

Early Learning to K12

Participants: Randy Spaulding (facilitator), Susan Enfield (reporter), Cindy Gustafson, Glen Malone, Randy Steele, Sam Whiting, Nancy Truitt Pierce, Jeff Estes, and Marcie Maxwell

The group discussion coalesced around four big ideas:

1. As we think about our recommendations, we need to be mindful of other agencies' work. We need to provide a means to inform and be informed by that work. This may include advocacy for initiatives or recommendations coming from our partners.
2. STEM literacy is a critical competency for 21st century learners. As such, STEM education should be viewed as a critical part of basic education and the McCleary decision.
3. Professional Learning is critical to student success. We need to rethink our approach to professional learning and provide dedicated time for teachers to learn and collaborate. One specific suggestion was to provide full release days with an explicit responsibility for curriculum planning of multi week units so both teachers and students are better prepared. Also, the group noted that this may be part of a larger issue around teacher compensation.
4. Need to provide opportunities for educators to share practices across institutions. This could include joint collaboration time at a conference or other convening and/or online collaboration tools.

The group also added that there is need to revisit House Bill 1813 to look at what was funded, what works, and what should be enhanced.

High School to Postsecondary Transitions

Participants: Rachelle Sharpe (facilitator and reporter), Gene Sharratt, Nova Gattman, Juliette Schindler Kelly, Gil Mendoza

Evaluate outcomes and create accountability systems to understand whether students are provided with broad college and career opportunities at all levels of education
- Evaluate individual education plans

- Make progress on disability taskforce recommendations
- Align with ESSA metrics
- Broaden awareness of 24 credit graduation requirements and using variable routes
- Increase access to career guidance and navigation
- Boost professional development for counselors for guidance regarding STEM in both 2 and 4 year programs
- Engage family engagement coordinators
- Use more flexible federal funding to incent districts to offer integrated STEM education
- Evaluate participation in work-based learning
- Allow career exploration of STEM
- Bolster public private partnerships for experiential learning opportunities
- Provide mentors to engage and understand local industries
- Manson SD has a requirement for grades 9-12
- Allows for flexibility
- Incorporate and evaluate high school and beyond plan experiences
- Ensure dual credit opportunities include and encourage professional technical pathways

Metrics Discussion
Add work based learning participation to #5 through the measurement section
- Use the environmental scan being done

Mid-Level Skills and Education
Participants: Maddy Thompson (facilitator), Gilda Wheeler (reporter), Brian Bonlender, Yale Wong, Margaret Tudor, Dana Riley Black, Naria Santa Lucia, Ellen Matheny, Eleni Papadakis

Faculty
- Professional development is needed for professional and technical faculty; faculty needed to be certified in certain areas and skills updated.
- Shortage of faculty due to compensation: faculty salaries don't compare to wages in industry. Possible solutions include:
  - Public/private partnership model (such as loaning employees as faculty)

Labor Market Information and Career Connected Learning
- There is a need to develop and better disseminate useful labor market information for use by parents, students and working adults considering returning to postsecondary education:
  - Possible solutions include: a targeted workforce study that takes the Joint Report a step further and focuses on STEM needs, specific survey for STEM-related employers (projected needs), and education supply
- Intensify career guidance for students in schools (not meaningful enough currently, need to make this visceral for students). Possible solutions:
  - Work with school leadership to understand the importance of this
  - Dedicate counselor time to career counseling
  - Make careers real for kids by seeing professionals at work

- Make better use of Washington career guidance association, OSPI student services and guidance division materials
- Leverage McCleary dollars for STEM/CTE purpose

Create Program to Incentivize and Support Access and Completion in Mid-Level STEM
- Reinstitute and expand WAVE
- Create Opportunity Scholarship-like program for students in mid-level STEM programs and include component for wrap around emergency services to enhance completion and success (Statutory change probably required: could be done by altering Opportunity Grant statute, by altering Opportunity Scholarship statute or through altering the WAVE scholarship)
- This new program needs four components in place to be successful:
  - Adequate faculty (supply and skills) in community and technical colleges (so we need to address compensation compared to industry and updating skills through professional development and certifications.
  - Financial aid for scholarships and support services for completion
  - Career-connected learning in K-12 to increase awareness of mid-level skills in STEM and building employability skills
  - Help employers understand how to work with students and simplify the process where possible

Connections between Education and Industry
- Need to invest in the intermediary role so intermediary can support student learners, educators and employers
- Convince employers to invest in employees (Massachusetts is working with low-income employees example, COSTCO invests in employees)
- Low to no-interest degree completion loans targeted to working-age adults (social impact fund?)
- Loosen up internship regulations
- Utilize workforce development system to reach larger segment of the population

Baccalaureate and Graduate Level Education
Participants: Marc Webster (facilitator and reporter), Daryl Monear, John Aultman, Ed Lazowska, Yolanda Watson Spiva, Cody Eccles

The group's discussion focused on a few core ideas:

Expand capacity in key fields in which employer demand is outpacing degree production.
- Computer Science is facing the most pressing capacity shortage. At UW, one-third of qualified applicants (350 students per year) are turned away due to insufficient capacity. Student demand is not being met. Programs like Code.org and First Robotics will continue to have an impact on student interest, which is a very good thing. But higher education capacity will need to grow to meet the student demand.
- Both needs for increased space (capital funding) and for increased faculty numbers should be addressed in order to increase enrollment capacity.

- Engineering is also a field in which we see degree production is not meeting employer demand for skilled workers.
- Both of these fields play large roles in the aerospace industry in Washington. A recent WDC report has shown that the greatest workforce gap in the aerospace industry is for computer science specialists. This report also highlights a trend at Boeing to move some of their engineering shops to other parts of the country because they need the ability at times to hire large numbers of engineers for relatively short term projects. Having units spread out gives them more flexibility.

Capacity pressures and bottlenecks in the four-year sector could be alleviated by expanding capacity in the two-year sector.
- Improving and streamlining student transfer pathways from 2-year to 4-year institutions in key fields, like computer science and engineering may ease capacity issues.

Enhance support systems to improve student persistence and success
- Introduce more rigor in the High School and Beyond planning process to better prepare students for postsecondary success.
- Streamline program coursework by eliminating "dead-end intro" courses that are different than the intro courses that students who have already decided to major in the field take.

Expand programs proven successful in helping historically underrepresented minorities succeed
- *Washington **STARS** in engineering* program provides highly motivated students who are eligible for financial aid with a specialized curriculum designed to build learning skills and academic preparation.
- ***Math Academy***: High-achieving high school juniors from Washington State live on the UW campus in Seattle for a four-week, intensive, summer session. Students engage in coursework created by UW math faculty and designed to develop the skills necessary to meet the high standards of college-level math and engineering. Students also have enrichment opportunities to explore the range of career opportunities available to engineers through lab tours, research projects, site visits and networking events.
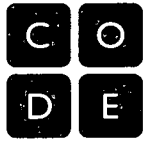
May 9, 2016

The Honorable Jay Inslee
Governor of Washington
Office of the Governor
PO Box 40002
Olympia, WA 98504-0002

Dear Governor Inslee:

Two weeks after the launch of the open letter for computer science, I'm writing to THANK you for your support. This was a unique moment in history where America's top CEOs, K-12 leaders, and 29 governors joined forces in rare bipartisan unity.

The launch was huge. The enclosed ran as a full page ad in the Washington Post, and was delivered to every member of Congress. Besides traditional media, we owned the day with 100M impressions on social media (http://bit.ly/openlettersocial), thanks to posts by dozens of CEOs, educators, governors and elected officials from both parties.

More than 120,000 Americans have signed our petition, making this the #1 petition on Change.org. We still have a long way to go on this issue, and my team will be in touch on other ways you can help.

Thank you for supporting computer science,

Hadi Partovi
Code.org

Every student in America should have this opportunity.

Dear Members of Congress and fellow Americans,

As business leaders, elected officials, and educators, we join forces to deliver a bipartisan message about opportunity and the American Dream. Technology is transforming society at an unprecedented rate. Whether it's smartphones or social networks, self-driving cars or personalized medicine, nothing embodies the American Dream so much as the opportunity to change or even reinvent the world with technology. And participating in this world requires access to computer science in our schools. We ask you to provide funding for **every student in every school to have an *opportunity* to learn computer science.**

Support for this idea is sweeping our nation. Ninety percent of parents want their children to have access to computer science education at school, and teachers agree. They know that technology opens doors. A hundred thousand teachers have taken matters into their own hands and already begun teaching computer science. Over 100 school districts are rolling out courses, from New York to Chicago to Los Angeles, from Miami to Las Vegas. Twenty states have passed policies and are now looking to support professional training for new computer science teachers. Private donors have collectively committed tens of millions of dollars to solving this problem, including $48 million of new commitments announced today by many of the undersigned.

Despite this groundswell, **three-quarters of U.S. schools do not offer meaningful computer science courses**. At a time when every industry in every state is impacted by advances in computer technology, our schools should give all students the opportunity to understand how this technology works, to learn how to be creators, coders, and makers — not just consumers. Instead, what is increasingly a basic skill is only available to the lucky few, leaving most students behind, particularly students of color and girls.

How is this acceptable? America leads the world in technology. We invented the personal computer, the Internet, e-commerce, social networking, and the smartphone. This is our chance to position the next generation to participate in the new American Dream.

Not only does computer science provide every student foundational knowledge, it also leads to the highest-paying, fastest-growing jobs in the U.S. economy. There are currently over 500,000 open computing jobs, in every sector, from manufacturing to banking, from agriculture to healthcare, but only 50,000 computer science graduates a year. Whether a student aspires to be a software engineer, or if she just wants a well-rounded education in today's changing world, access to computer science in school is an economic imperative for our nation to remain competitive. And with the growing threat of cyber warfare, this is even a critical matter of national security. Despite this growing need, targeted federal funding to carry out these efforts in classrooms is virtually non-existent. **This bipartisan issue can be addressed without growing the federal budget.**

We urge you to amplify and accelerate the local efforts in classrooms, unlock opportunity in every state, and give an answer to all the parents and teachers who believe that every student, in every school, should have a chance to learn computer science.

Join us to sign your name in support: www.Change.org/computerscience

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Business leaders

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CEO, Marriott

Barry Diller
Chairman, IAC and Expedia

Bill and Melinda Gates

Bobby Kotick
CEO, Activision Blizzard

Brad Smith
President, Microsoft

Brian Chesky
CEO, Airbnb

Brian Cornell
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Governor, Montana (D)

Susana Martinez
Governor, New Mexico (R)

Terry Branstad
Governor, Iowa (R)

Terry McAuliffe
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CEO, Chicago Public Schools

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Superintendent, Charles County Public Schools

Michelle King
Superintendent, Los Angeles Unified School District

Pat Skorkowsky
Superintendent, Clark County School District

Richard Carranza
Superintendent, San Francisco Unified School District

Susan Enfield
Superintendent, Highline Public Schools

Tom Torlakson
State Superintendent, California

Education & Nonprofit leaders:

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CEO, Association for Computing Machinery

Cornell Brooks
President and CEO, NAACP

Daniel A. Domenech
Executive Director, AASA, The School Superintendents Association

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Peggy Brookins
CEO, National Board for Professional Teaching Standards

Telle Whitney
CEO, Anita Borg Institute for Women and Technology

Thomas J. Gentzel
Executive Director, National School Boards Association
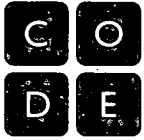
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The Honorable Jay Inslee
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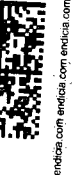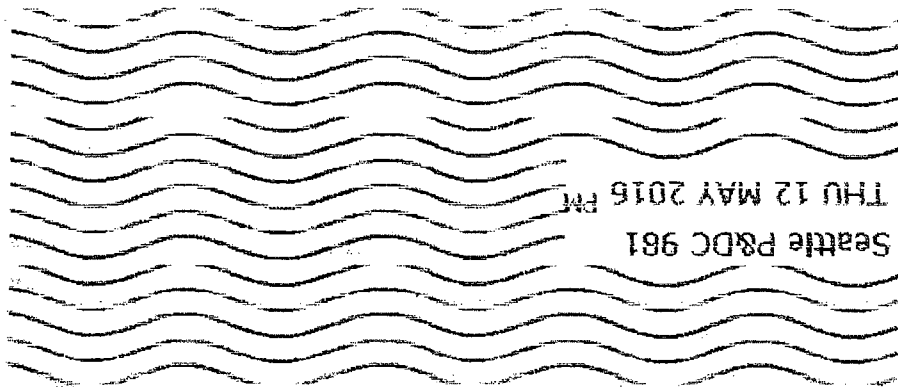REIMAGINING SCIENCE, TECHNOLOGY,
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**Analysis and Recommendations to Advance STEM Learning Opportunities
and Outcomes through Washington State K-12 Basic Education Investments**

Overview and opportunity:

In 2012, the Washington State Supreme Court ruled that the Washington State legislature was not meeting its Constitutional paramount duty to fund "basic education" for K-12 students across the state. The Court issued the legislature a deadline of 2018 to achieve full state funding of K-12 basic education. While the legislature has incrementally increased state investments, the Court has called on the legislature to step up its progress. Since August 2015, the Supreme Court has fined the state legislature $100,000 per day for violating its basic education funding obligations.

The 2017 session of the Washington State legislature represents a historic opportunity to shape the state's anticipated full funding investments in ways that improve student learning outcomes, close opportunity gaps and deliver on the stated goals of K-12 basic education of preparing students for success in college, careers and life. During the legislative session, lawmakers will both develop the 2017-19 biennial budget and tackle key education policy issues such as the role of local levies and educator compensation.

Within this context, the nonprofit Washington STEM intends to seed the 2017 debate with concrete recommendations for how to leverage the state's new and substantial K-12 basic education investments to improve STEM learning opportunities and outcomes. Washington STEM believes it is imperative to improve STEM outcomes in order to 1) fulfill the goals of basic education as defined by the legislature, 2) drive equity and opportunity for individuals, and 3) support economic development, which in turn fuels revenue for future education investments.

Currently, a lack of K-12 student success in STEM subjects is hindering students' preparedness for post-secondary programs and the great jobs being created right here in Washington. As a result, affected students have less opportunity for economic well-being after high school. For example: Roughly 50% of community college students must take remedial math courses, delaying their degree completion and increasing costs for those students and the state. Many K-12 students don't have access to computer science education, thereby hindering their preparation and interest in fast growing and high-paying jobs in the state.

Washington STEM has contracted Education First to create a comprehensive and user-friendly analysis that yields actionable recommendations, ranging from highly feasible ideas ("low-hanging fruit") to the very bold.

Research question:

With the state poised to invest billions more dollars into K-12 "basic education," how can Washington policy levers and funding structures be optimized to advance student learning opportunities and outcomes in STEM (including computer science)?

Goals of research:

- Identify concrete policy and funding levers to advance STEM outcomes, particularly for underrepresented/underserved students
    1. within existing Washington state K-12 basic education state policies and funding structures (e.g. prototypical schools model),**++**
    2. informed by best practices from other states with recommendations for how to operationalize them,
    3. (As able) leveraging federal policy and funding, such as Every Student Succeeds.
- Offer concrete policy and budget proposals for 1) state policymakers to enact (OSPI, Governor, and Legislature) and 2) district leaders within local control parameters.
- Support development of a state budget request for Washington STEM to both support and augment STEM learning opportunities and outcomes. E2SHB 1872 (2013) created a state funding mechanism for Washington STEM and requires a 1:1 private match.
- Inform the policy development and advocacy efforts of Washington STEM and its partners before and during the 2017 legislative session.

Research partner and process:

Washington STEM is partnering with Education First to undertake this research. Education First is a mission driven strategy and policy organization with unique and deep expertise in education improvement. They partner with practitioners, policymakers, funders and advocates to design and accelerate policies and plans that help all young people— particularly students in poverty and students of color—succeed in college, careers and life.

Education First will work with external advisors and conduct interviews with policymakers and stakeholders. Final products will include a 2-5 page policy brief (with supporting research documentation) and an advocacy presentation.

Timeline and deliverables:

- June –Conduct interviews with stakeholders and initial analysis.
- July 10, 2016 – Preliminary analysis and recommendations due to Washington STEM.
- July/August – Education First incorporates feedback on research and analysis, ongoing interviews.
- September 16, 2016 – Final published products due to Washington STEM.
- September 20, 2016 – Presentation to Washington STEM Board.

Student Demand and Workforce Demand Data

Provided by Ed Lazowska

University of Washington Computer Science and Engineering

Student Demand: Top 10 First-Choice Majors of UW Confirmed Incoming Freshmen
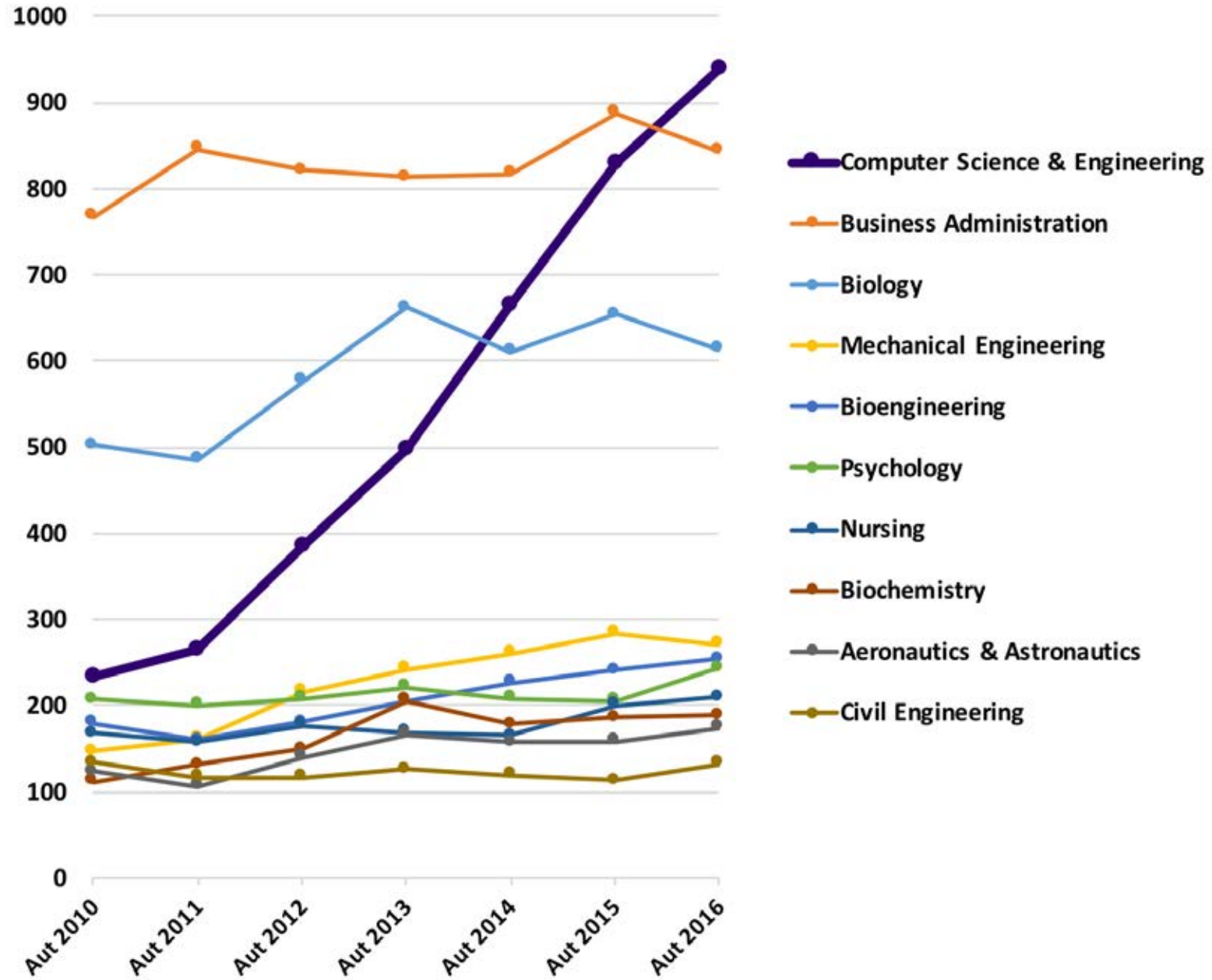
Student Demand: CSE Introductory Course Annual Enrollment (1-year moving total)

Employer Demand: Washington State Workforce Gaps, 2018-23, Bachelors Level

Washington Student Achievement Council / State Board for Community & Technical Colleges / Workforce Training & Education Coordinating Board, 2016

A Skilled and Educated Workforce 2015 Update

An analysis of postsecondary education, workforce preparation, and employer demand in Washington

- Annual Degree Completers Entering the Workforce
- Additional Annual Completions Needed, 2018-2023
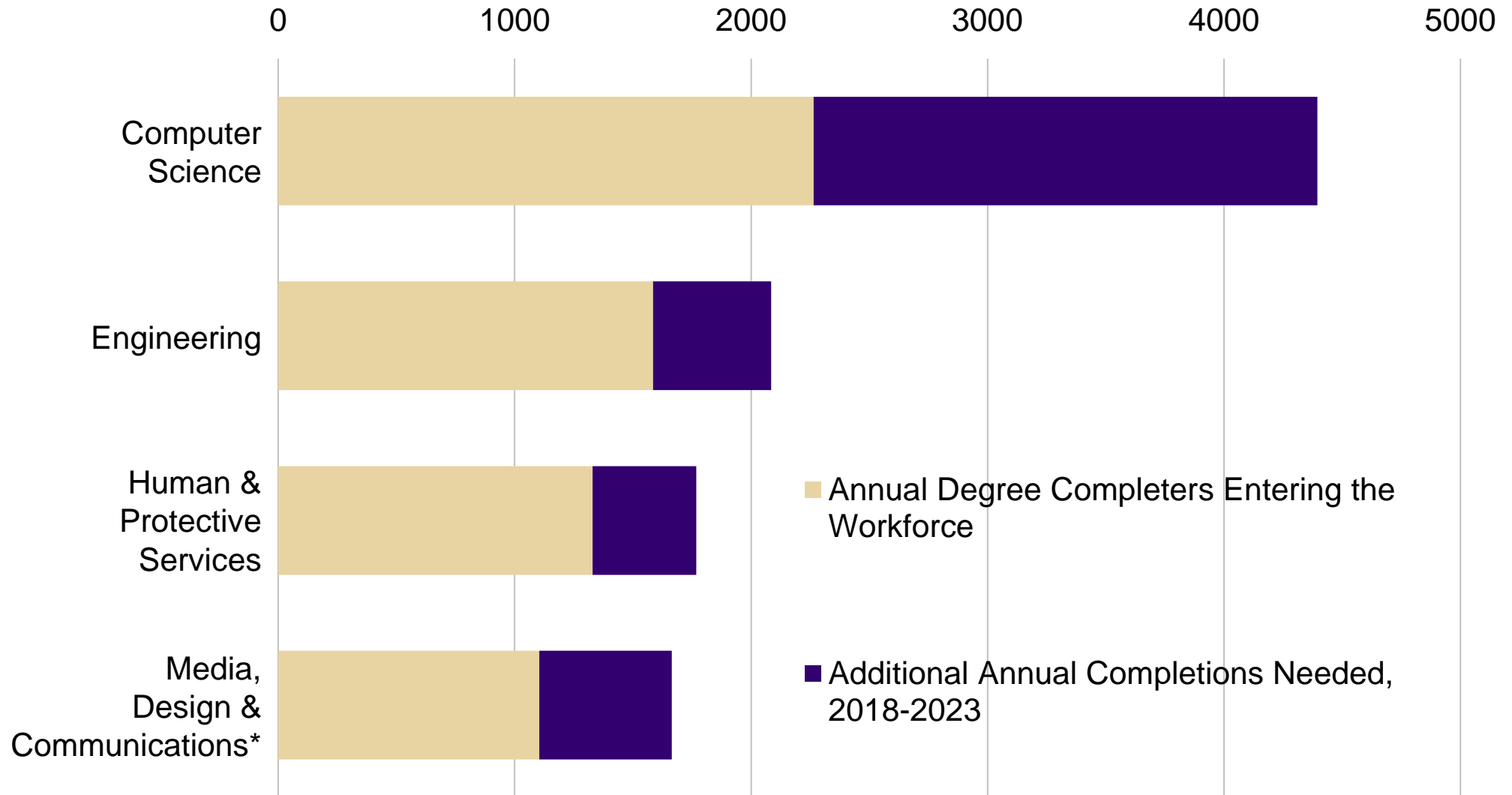
*Driven by the technology sector
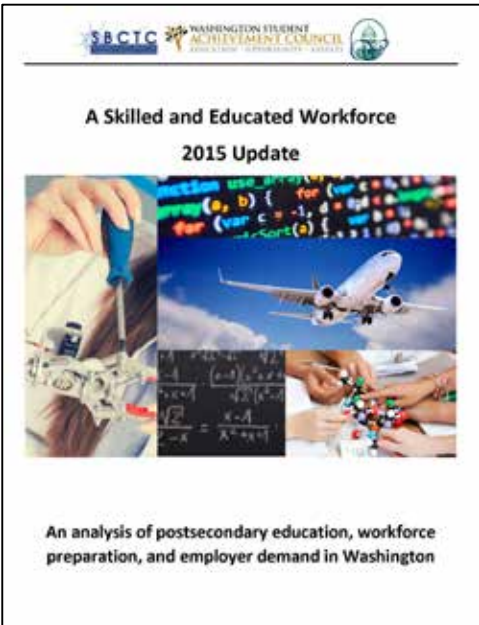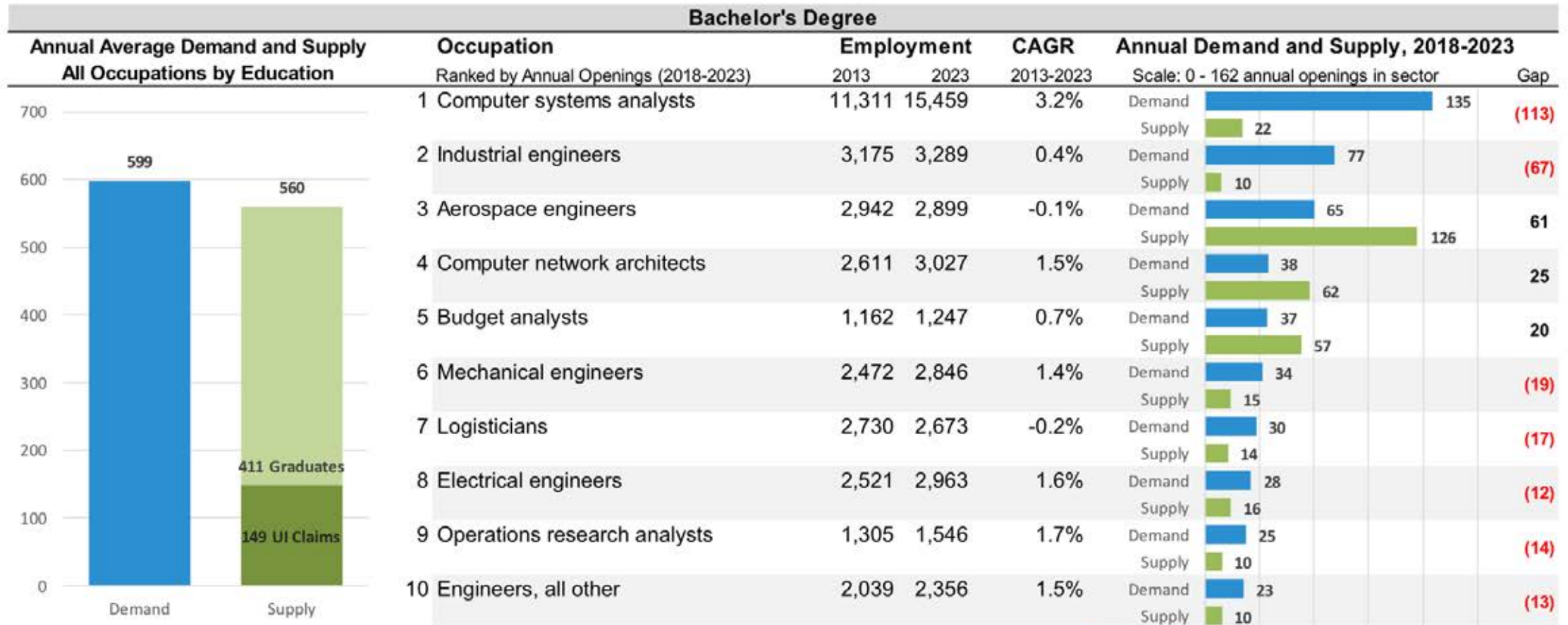
Employer Demand: National Job Growth and Job Openings Projections in STEM Fields, 2014-24

U.S. Bureau of Labor Statistics

Job Growth, 2014-24
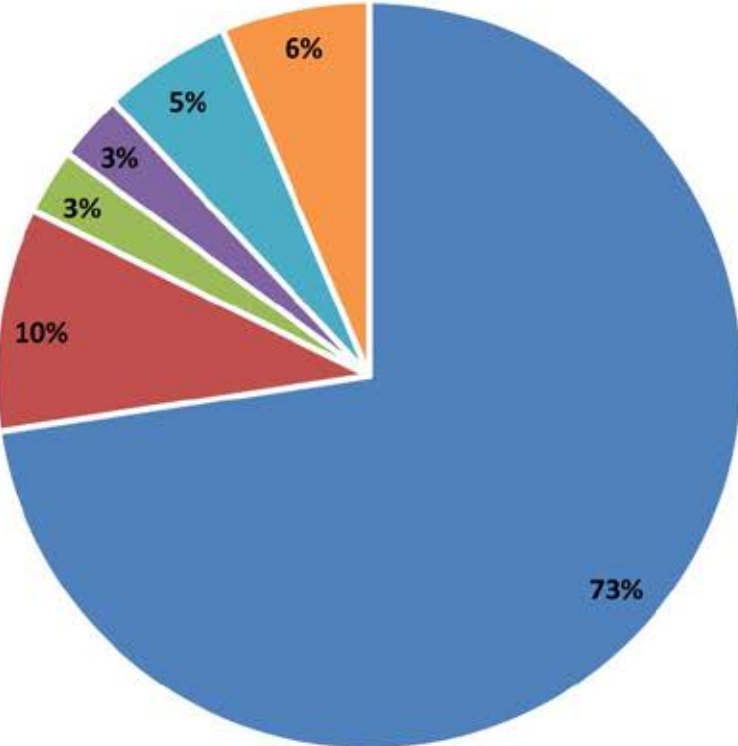
Job Openings (Growth+Replacement), 2014-24
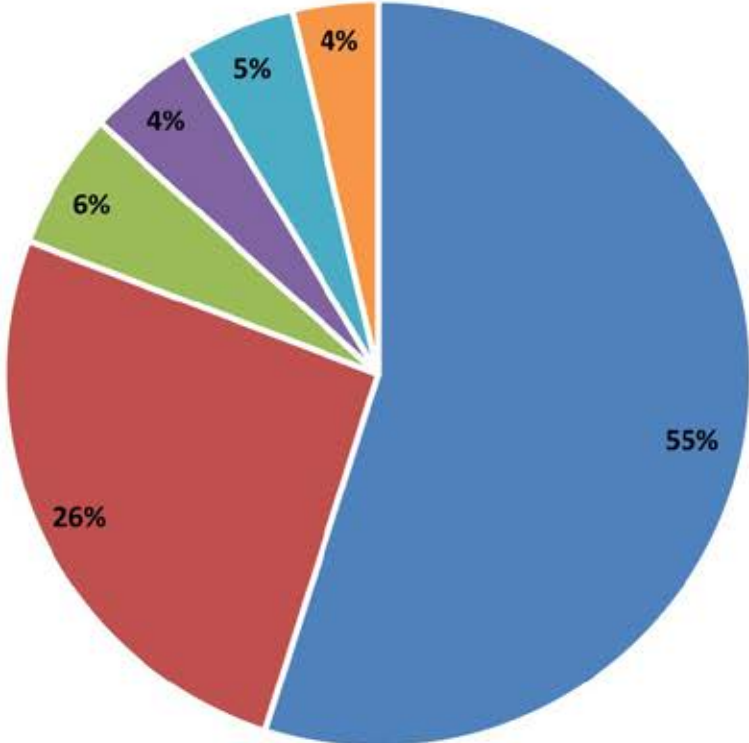
- Computer occupations (15-1100)
- Engineers (17-2000)
- Life scientists (19-1000)
- Physical scientists (19-2000)
- Social scientists and related workers (19-3000)
- Mathematical science occupations (15-2000)

Data from the spreadsheet at http://www.bls.gov/emp/ind-occ-matrix/occupation.xlsx

STEM Education Innovation Alliance
Meeting Notes
April 28, 2016
Seattle Metropolitan Chamber of Commerce, Seattle Washington

Gene Sharratt, Executive Director of the Washington Student Achievement Council, welcomed everyone to the meeting.

Overview of Legislative Session

John Aultman from the Washington State Office of Governor updated the group on the 2016 legislative session.

An open letter to the US Congress from the Computer Science Education Coalition and Code.org was sent on April 26, 2016, asking Congress for funding to provide every student in every school the opportunity to learn computer science. It also listed the contributions from contributing organizations that total $48 million in new private funding. *See press release in meeting documents*.

An ad placed in the Washington Post included nine local signatures and was co-sponsored by Code.org, a nonprofit organization based in Seattle with the mission to advance computer science education. *See "Every Student in America Should Have this Opportunity" in the meeting documents.*

The work of the STEM Alliance helped inform the Governor's Office comments when they contributed to the letter.

John is putting together a list, in collaboration with WSAC, that shows the state's investment in education across all enterprises: higher education, K-12, and ADA (disability component).

The Governor's Office is working to secure a resource to sustainably fund the STEM Alliance.

Maddy Thompson, WSAC Director of Policy & Government Relations, provided more detail on the State of Washington legislative investment in STEM. She summarized – broken out into financial aid, affordability and higher education funding, K-12 STEM investments, and capital budget – what was funded in the 2015 biennial and the 2016 supplemental budgets. *See "STEM Investments" in meeting documents.*

A member mentioned that this funding is a pretty good investment in education.

A member noted that the backfill of higher education was not fully funded; public colleges and universities did get some funding, but not enough to make the full 5% tuition reduction.

Daryl Monear highlighted the key items listed on the timeline associated with the National Governors Association-issued grant. NGA extended the grant to August 31, 2016, to provide additional time to work on the data dashboard and education/industry partnerships. *See "National Governors Association Grant Timeline 2014-2016 and Beyond" in the meeting documents.*

Update: Collaboration with NGA Work-based Learning Project
Eleni Papadakis, Executive Director, Workforce Training and Education Coordinating Board

Eleni is excited about the collaboration happening between this NGA-funded project (STEM) and the NGA Policy Academy on Scaling Work-Based Learning. The outcomes of the project will provide real work-based learning opportunities for young people between the ages of 16 to 29. *See "UPDATED: Washington Team Deliverables" in the meeting documents.*

The draft work space learning definition is not solely about having a young person in the workplace doing actually work. It is also about informing the students about the workplace while they are still in their classrooms - bringing the workplace and what we know about it into the classroom and bringing the young people and the teachers into the workplace. Performance accountability is key - we need to know the quality of work based learning and how we are measuring it.

Daryl Monear is working with an NGA cross-state discussion group on developing a toolkit to help states focus on best practices and measure performance and progress in expanding work-based learning opportunities.

Environmental Scan of Work-Based Learning Opportunities – The Workforce Board will be doing an environmental scan of all work-based learning going on across the state in every sector, targeting a wide variety of population groups. They want to build the "umbrella" that encompasses all of them, to figure out how to advocate for them and pinpoint the programs that are really working. They are picking a handful of those programs as their learning laboratory to assist the project in coming up with policy recommendations for the framework of skills of work-based learning for all young people, assisted by Washington STEM.

The Workforce Board is building a web-based database to match employer opportunities with programs for young people. They have a couple possible sites already that are willing and ready to help them locate the database, and businesses and labor organizations that can help populate and update it.

Part of the grant activities is a Governor's Summit on work-based learning to be held in May 2017, with a focus around STEM.

Marcie Maxwell affirmed that our progress to date shows Washington State Legislators how important the STEM Alliance is, and hopes it is a priority for them.

Exploration of Scholarships for High Demand Career and Technical Education Degrees
Naria Santa Lucia, Executive Director, Washington State Opportunity Scholarship

Naria introduced Gary Rubens, a new WSOS board member. Gary recently gave WSOS a $20 million dollar grant, which will allow WSOS to significantly increase the amount of students that they fund. WSOS will be able to fund 14,000 students.

WSOS, with support from Gary Rubens, has a vision for a similar program in the career technical field that expands the current WSOS programs. The public–private partnership of this program is essential and a rich integration between state and private funds.

Naria reviewed some of the statistics and benefits associated with the WSOS to date. She mentioned that the scholarship funds do not pay for all of a student's schooling, but they help minimize the need for living off campus or working while going to school so these students can be competitive in their highly rigorous fields. *See "WSOS: By the Numbers" and "Washington State Opportunity Scholarship" in meeting documents.*

A member asked about the comparison between college graduation rates from students that go through WSOS and normal graduation rates. Naria said 75% of WSOS students graduate and are employed within their field within nine months (national average is 42%) that can be attributed to both scholarship funding and the WSOS support.

Gary Rubens shared that he grew up in a financially poor and non-college educated family in Sequim and Issaquah. He saw education as a way to financial success. He achieved in school but was unable to attend Washington State University due to family finances. He enrolled in vocational/technical classes and built and sold a couple businesses.

Gary complimented College Success Foundation on its program. He said the program's match portion was really important to him - to see his one dollar become two dollars, unusual for a gift to charity. Gary felt he wasn't "wired" to attend a four year university, but he enjoyed automobile mechanics. He talked with students who also were drawn to vocational and technical careers and wondered who is helping them achieve those goals. He noticed the great need for workers in these fields in the workforce (e.g., Boeing can't hire enough aircraft mechanics). He wondered about certificates or technical degrees that require less time to learn and cost substantially less but greatly help Washington's businesses grow. He envisioned creating a program similar to WSOS and wondered if the state would match private donations for students in the high demand vocational/technical skills areas.

He sees that the WSOS student support system helps students persist in their studies, graduate and become employed. His idea is in its infancy, but he suggested one way to proceed is to

modify Washington's current approach. He asked if this is something that sounds interesting and applies to the work that the STEM Alliance members do.

A member from the community college community said she endorses the idea. She sees career technical education meeting many of the state's priorities in terms of economic development in regions throughout the state. She said it will help meet the workforce need in high demand areas that keep the companies here in the state, help them be profitable and keep them hiring a lot of Washington's graduates.

Another member from K-12 education also supported the idea. He said every student has aspirations for greatness beyond high school.

Briefing: STEM Robotics 101 / FIRST in Class
Randy Steele, STEM Curriculum Support, Olympia School District

Randy is a former computer chip designer who went into teaching when his youngest child went off to college. He spoke about a grassroots movement to make robotics more accessible in the public schools. *The presentation "STEM Robotics 101" slides are in the meeting documents and provide additional detail presented in this meeting.*

STEM Robotics 101 is a turnkey curriculum for new robotics teachers and a collaboration tool for existing teachers to make STEM and computer science more approachable for both classroom teachers and students.

The idea for this curriculum was initiated by the Olympia School District in 2010 as part of its STEM initiative. OSD looked at several different platforms and eventually converged onto robotics as an ideal application to challenge its students who are mastering math and science. OSD has expanded its programs to offer courses in computer science, engineering, critical thinking, team work and project management. This coursework exposes students to various engineering disciplines, allowing them to specialize in programming, computer science, system design, or electrical or mechanical engineering.

For those students who are struggling in math and science, robotics provides an application that can stimulate their interest in technology. Robotics provides a pathway for these students and a way to engage students so they can start envisioning STEM and computer science as part of their future.

Their mission statement is to help rural students advance from being mere consumers of technology to become creators of technology.

An Alliance member commented that one thing he likes about STEM robotics is that it allows computers to be useful.

The STEM Robotics 101 outreach has 2,000 registered teachers around the world using the curriculum, with 100 of those teachers from Washington State. The organization has been trying diligently to reach out to local schools. They hope House Bill 1813, with its focus on expanding computer science education, will help them spread the word.

The program's goal is to harness the current excitement, generated mainly in the after school programs, to integrate it into the classroom and expand the student population to include the underrepresented groups in computer science and thus increase equity, especially in middle and elementary schools.

An important task in successful implementation of the program is to train and equip existing teachers to become their schools' STEM teachers and to help their students envision computer science and STEM as a part of their future.

An Alliance member asked about the private match for program funding and if the organization partners with First Robotics' grant. Randy said First Robotics is the fiscal agent. She also asked about expanding the program into preschool to third grade. Randy said they started STEM Robotics 101 in the 7th grade because it was funded using CTE funds but are now aligning it with the 4th through 8th grades.

An Alliance member, who is on the FIRST board and has an FFL team in her school district, said 6th grade girls ask when they can start coding. She said the FFL experience can end up with only privileged students at the competitions. She is excited about the initiatives to build equity into this activity.

Discussions on Key Policy Topics

The members divided into four breakout groups, by key policy topics. Using these questions, they considered what further enhanced investments can be made by the state, what recommendations need further development and what is missing from the group's considerations so far.

The following sections list the members of each breakout groups and a summary of their discussions.

High Level Ideas Generated from Breakout Groups and Potential Policy Recommendations

- Develop a mid-level version of the Washington State Opportunity Scholarship.
- Continue to expand funding for computer science enrollments
- Continue investments in additional MESA enrollments.
- Reaffirm the Dual Credit recommendation from last year.
- Additional investments in K-12 Professional Development and/or funds for equipment or supplies to implement STEM focused projects or curriculum.
- Enhance the High School and Beyond plan requirements

- Leverage state investments in K-12 basic education for STEM outcomes, critical for job and postsecondary readiness.

Early Learning to K12

Participants: Randy Spaulding (facilitator), Susan Enfield (reporter), Cindy Gustafson, Glen Malone, Randy Steele, Sam Whiting, Nancy Truitt Pierce, Jeff Estes, and Marcie Maxwell
The group discussion coalesced around four big ideas:

1. As we think about our recommendations, we need to be mindful of other agencies' work. We need to provide a means to inform and be informed by that work. This may include advocacy for initiatives or recommendations coming from our partners.
2. STEM literacy is a critical competency for 21st century learners. As such, STEM education should be viewed as a critical part of basic education and the McCleary decision.
3. Professional Learning is critical to student success. We need to rethink our approach to professional learning and provide dedicated time for teachers to learn and collaborate. One specific suggestion was to provide full release days with an explicit responsibility for curriculum planning of multi week units so both teachers and students are better prepared. Also, the group noted that this may be part of a larger issue around teacher compensation.
4. Need to provide opportunities for educators to share practices across institutions. This could include joint collaboration time at a conference or other convening and/or online collaboration tools.

The group also added that there is need to revisit House Bill 1813 to look at what was funded, what works, and what should be enhanced.

High School to Postsecondary Transitions

Participants: Rachelle Sharpe (facilitator and reporter), Gene Sharratt, Nova Gattman, Juliette Schindler Kelly, Gil Mendoza

Evaluate outcomes and create accountability systems to understand whether students are provided with broad college and career opportunities at all levels of education
- Evaluate individual education plans
- Make progress on disability taskforce recommendations
- Align with ESSA metrics
- Broaden awareness of 24 credit graduation requirements and using variable routes
- Increase access to career guidance and navigation
- Boost professional development for counselors for guidance regarding STEM in both 2 and 4 year programs
- Engage family engagement coordinators
- Use more flexible federal funding to incent districts to offer integrated STEM education

- Evaluate participation in work-based learning
- Allow career exploration of STEM
- Bolster public private partnerships for experiential learning opportunities
- Provide mentors to engage and understand local industries
- Manson SD has a requirement for grades 9-12
- Allows for flexibility
- Incorporate and evaluate high school and beyond plan experiences
- Ensure dual credit opportunities include and encourage professional technical pathways

Metrics Discussion
Add work based learning participation to #5 through the measurement section

- Use the environmental scan being done

Mid-Level Skills and Education

Participants: Maddy Thompson (facilitator), Gilda Wheeler (reporter), Brian Bonlender, Yale Wong, Margaret Tudor, Dana Riley Black, Naria Santa Lucia, Ellen Matheny, Eleni Papadakis

Faculty -

- Professional development is needed for professional and technical faculty; faculty needed to be certified in certain areas and skills updated.
- Shortage of faculty due to compensation: faculty salaries don't compare to wages in industry. Possible solutions include:
  - Public/private partnership model (such as loaning employees as faculty)

Labor Market Information and Career Connected Learning -
- There is a need to develop and better disseminate useful labor market information for use by parents, students and working adults considering returning to postsecondary education:
  - Possible solutions include: a targeted workforce study that takes the Joint Report a step further and focuses on STEM needs, specific survey for STEM-related employers (projected needs), and education supply
- Intensify career guidance for students in schools (not meaningful enough currently, need to make this visceral for students). Possible solutions:
  - Work with school leadership to understand the importance of this
  - Dedicate counselor time to career counseling
  - Make careers real for kids by seeing professionals at work
  - Make better use of Washington career guidance association, OSPI student services and guidance division materials
  - Leverage McCleary dollars for STEM/CTE purpose

Create Program to Incentivize and Support Access and Completion in Mid-Level STEM -
  - Reinstitute and expand WAVE

- Create Opportunity Scholarship-like program for students in mid-level STEM programs and include component for wrap around emergency services to enhance completion and success (Statutory change probably required: could be done by altering Opportunity Grant statute, by altering Opportunity Scholarship statute or through altering the WAVE scholarship)
- This new program needs four components in place to be successful:
  - Adequate faculty (supply and skills) in community and technical colleges (so we need to address compensation compared to industry and updating skills through professional development and certifications.
  - Financial aid for scholarships and support services for completion
  - Career-connected learning in K-12 to increase awareness of mid-level skills in STEM and building employability skills
  - Help employers understand how to work with students and simplify the process where possible

Connections between Education and Industry -
- Need to invest in the intermediary role so intermediary can support student learners, educators and employers
- Convince employers to invest in employees (Massachusetts is working with low-income employees example, COSTCO invests in employees)
- Low to no-interest degree completion loans targeted to working-age adults (social impact fund?)
- Loosen up internship regulations
- Utilize workforce development system to reach larger segment of the population

Baccalaureate and Graduate Level Education

Participants: Marc Webster (facilitator and reporter), Daryl Monear, John Aultman, Ed Lazowska, Yolanda Watson Spiva, Cody Eccles

The group's discussion focused on a few core ideas:

Expand capacity in key fields in which employer demand is outpacing degree production.

- Computer Science is facing the most pressing capacity shortage. At UW, one-third of qualified applicants (350 students per year) are turned away due to insufficient capacity. Student demand is not being met. Programs like Code.org and First Robotics will continue to have an impact on student interest, which is a very good thing. But higher education capacity will need to grow to meet the student demand.
- Both needs for increased space (capital funding) and for increased faculty numbers should be addressed in order to increase enrollment capacity.
- Engineering is also a field in which we see degree production is not meeting employer demand for skilled workers.
- Both of these fields play large roles in the aerospace industry in Washington. A recent WDC report has shown that the greatest workforce gap in the aerospace industry is for

computer science specialists. This report also highlights a trend at Boeing to move some of their engineering shops to other parts of the country because they need the ability at times to hire large numbers of engineers for relatively short term projects. Having units spread out gives them more flexibility.

Capacity pressures and bottlenecks in the four-year sector could be alleviated by expanding capacity in the two-year sector.
– Improving and streamlining student transfer pathways from 2-year to 4-year institutions in key fields, like computer science and engineering may ease capacity issues.

Enhance support systems to improve student persistence and success
– Introduce more rigor in the High School and Beyond planning process to better prepare students for postsecondary success.
– Streamline program coursework by eliminating "dead-end intro" courses that are different than the intro courses that students who have already decided to major in the field take.

Expand programs proven successful in helping historically underrepresented minorities succeed
– Washington STate Academic RedShirt (STARS) program provides highly motivated students who are eligible for financial aid with a specialized curriculum designed to build learning skills and academic preparation.
– Math Academy: High-achieving high school juniors from Washington State lodge on the University of Washington campus in Seattle for a four-week, intensive, summer session. Students engage in coursework created by UW math faculty and designed to develop the skills necessary to meet the high standards of college-level math and engineering. Students also have enrichment opportunities to explore the range of career opportunities available to engineers through lab tours, research projects, site visits and networking events.

Meeting notes recorded and summarized by Washington Student Achievement Council staff members Ellen Matheny and Daryl Monear.

STEM EDUCATION INNOVATION ALLIANCE - April 28, 2016 Meeting Attendance

APPOINTED MEMBERS

First Name	Last Name	Position Title	Organization
John	Aultman	Executive Policy Advisor for Higher Education and Workforce Development	Washington State Office of the Governor
Brian	Bonlender	Director	Washington State Department of Commerce
Maud	Daudon	Director & CEO	Seattle Metropolitan Chamber of Commerce
Susan	Enfield	Superintendent	Highline School District
Jeff	Estes	Director, Office of STEM Education	Pacific Northwest National Laboratory
Christine	Johnson	Chancellor	Community Colleges of Spokane
Ed	Lazowska	Bill & Melinda Gates Chair	University of Washington Computer Science & Engineering
Glenn	Malone	Executive Director	Puyallup School District - Assessment, Accountability & Student Success
Marcie	Maxwell	Citizen Member	Former State Representative
Eleni	Papadakis	Executive Director	Workforce Training and Education Coordinating Board
Dana	Riley Black	Executive Director STEM, Legislation & Partnerships	Everett Public Schools
Naria	Santa Lucia	Executive Director	Washington State Opportunity Scholarship
Gene	Sharratt	Executive Director	Washington Student Achievement Council
Nancy	Truitt Pierce	Director, School Board	Monroe Public Schools
Margaret	Tudor	Executive Director	Pacific Education Institute
Yolanda	Watson Spiva	President & CEO	College Success Foundation
Sam	Whiting	President & CEO	Thrive Washington
Yale	Wong	Chairman and Founder	General Biodiesel

ALTERNATE MEMBERS

First Name	Last Name	Position Title	Organization
Gil	Mendoza	Deputy Superintendent	Office of Superintendent of Public Instruction

OTHERS

First Name	Last Name	Position Title	Organization
Cody	Eccles	Associate Director	Council of Presidents
Nova	Gattman	Legislative Director	Workforce Training and Education Coordinating Board
Cindy	Gustafson	Chief Financial Officer	Washington STEM
Ellen	Matheny	Assistant Director of Operations	Washington Student Achievement Council
Daryl	Monear	Associate Director for Academic Affairs and Policy	Washington Student Achievement Council
Gary	Rubens	Founder	Start It Labs, Rubens Family Foundation
Juliette	Schnidler Kelly	Director of Government Relations	College Success Foundation
Rachelle	Sharpe	Deputy Director	Washington Student Achievement Council
Randy	Spaulding	Director of Academic Affairs and Policy	Washington Student Achievement Council
Randy	Steele	Career & Technical Education Coach	Olympia School District
Maddy	Thompson	Director of Policy & Government Relations	Washington Student Achievement Council
Natalie	Truong	Policy Analyst, Education Division	National Governors Association, Center for Best Practices
Marc	Webster	Fiscal Policy Advisor	Washington Student Achievement Council
Gilda	Wheeler	Senior Program Officer	Washington STEM

FABRICATION
SHOP

Denver Ave

Meeting Location
"Garage Room"

PARKING
Level 1 and 2

McKINSTRY
BUILDING

INNOVATION
CENTER

PARKING

Downtown Seattle ▶

N
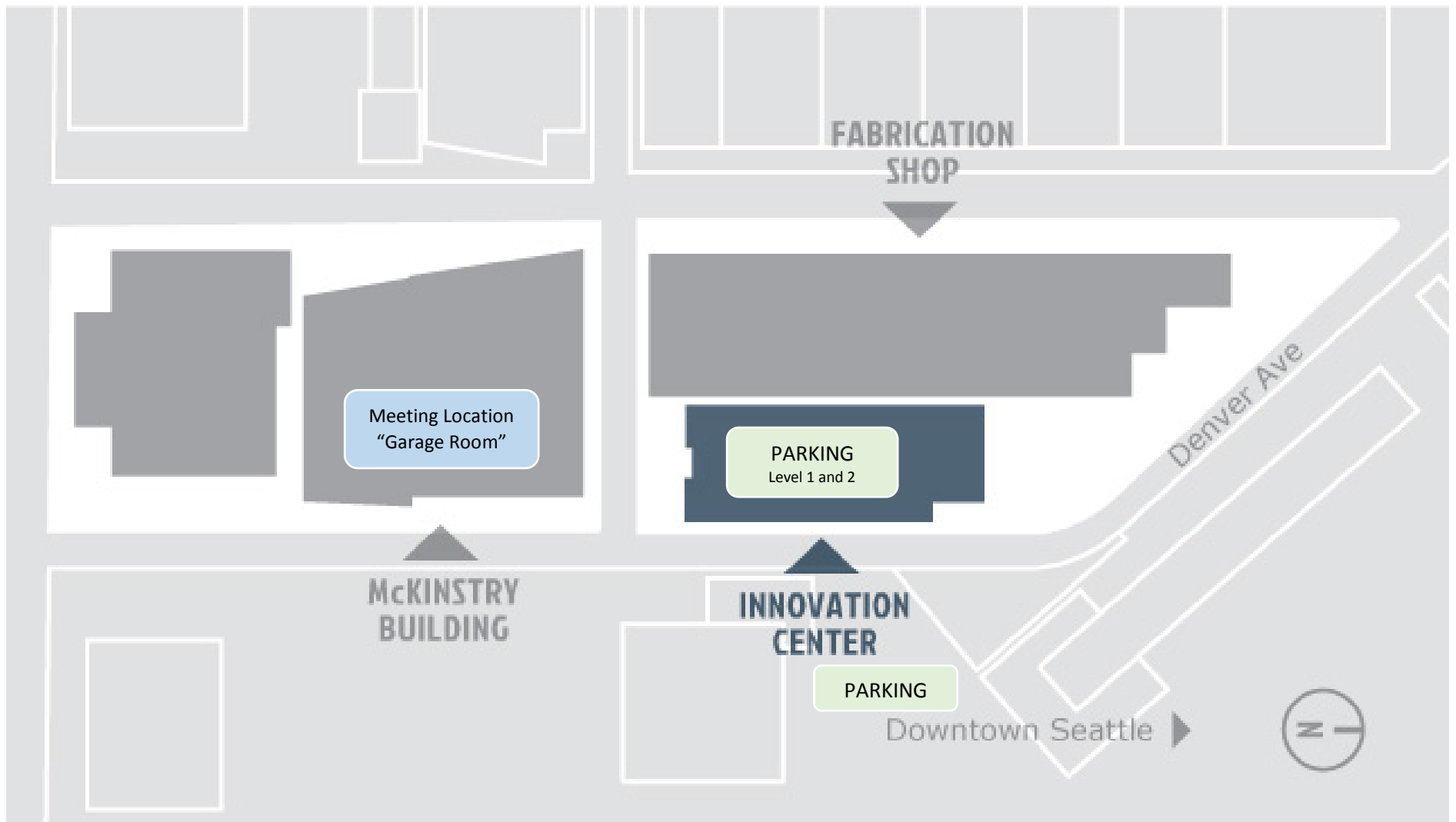
Parking is free and available on the first two levels of the McKinstry Innovation Center and across the street. Limited on street parking is also available.

Education First and ECONorthwest will help Washington STEM identify P20 state and local STEM investments

Overarching Project Question

With the state poised to invest billions more dollars into K-12 "basic education," how can WA policy and funding opportunities be optimized to advance student learning and outcomes in STEM (including computer science)?

Goals of the Research

Identify concrete policy and funding priorities to advance STEM outcomes, particularly for underrepresented/underserved students

1. Within existing WA K-12 basic education state policies and funding structures (e.g., prototypical schools model)
2. Informed by best practices from other states with recommendations for how to operationalize them
3. Leveraging federal policy and funding, such as ESSA

Washington has a "paramount duty" to make "ample provision" for all children. The legislature defines basic education's purpose to:

- Develop essential knowledge and skills

- Earn meaningful high school diploma that prepares students for postsecondary, gainful employment and citizenship

DRAFT

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ENGINEERING + MATH EDUCATION

WA STEM will engage education leaders, state policymakers and advocates to gain input on policy and funding priorities

Local, State, National Research (June-July)

Goal: investigate preK-12 STEM proven practices and priorities

Policy & Funding Priorities (July-September)

Goal: pressure test and cost out short-list of policy & funding priorities

Continue to Engage Partners (July-December)

Goal: inform WA STEM P-20 agenda & become champs for STEM legislative priorities

Interviewing, surveying, engaging:
Governor's Office, STEM Alliance, Legislators, Business, Superintendents, P20 Agencies, Education Advocates, ESDs, STEM Networks

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Five priority areas are emerging from research

Key research findings

Focus Area: Educators

A. Support flexible **STEM teacher credentialing** to ease industry experts' access into teaching & increase flow of traditionally-trained K-12 STEM teachers into CTE

B. Enhance **STEM professional learning** for WA's most in-need districts

C. Strengthen **STEM teacher prep and minority recruitment** to ensure WA's educators are STEM content experts
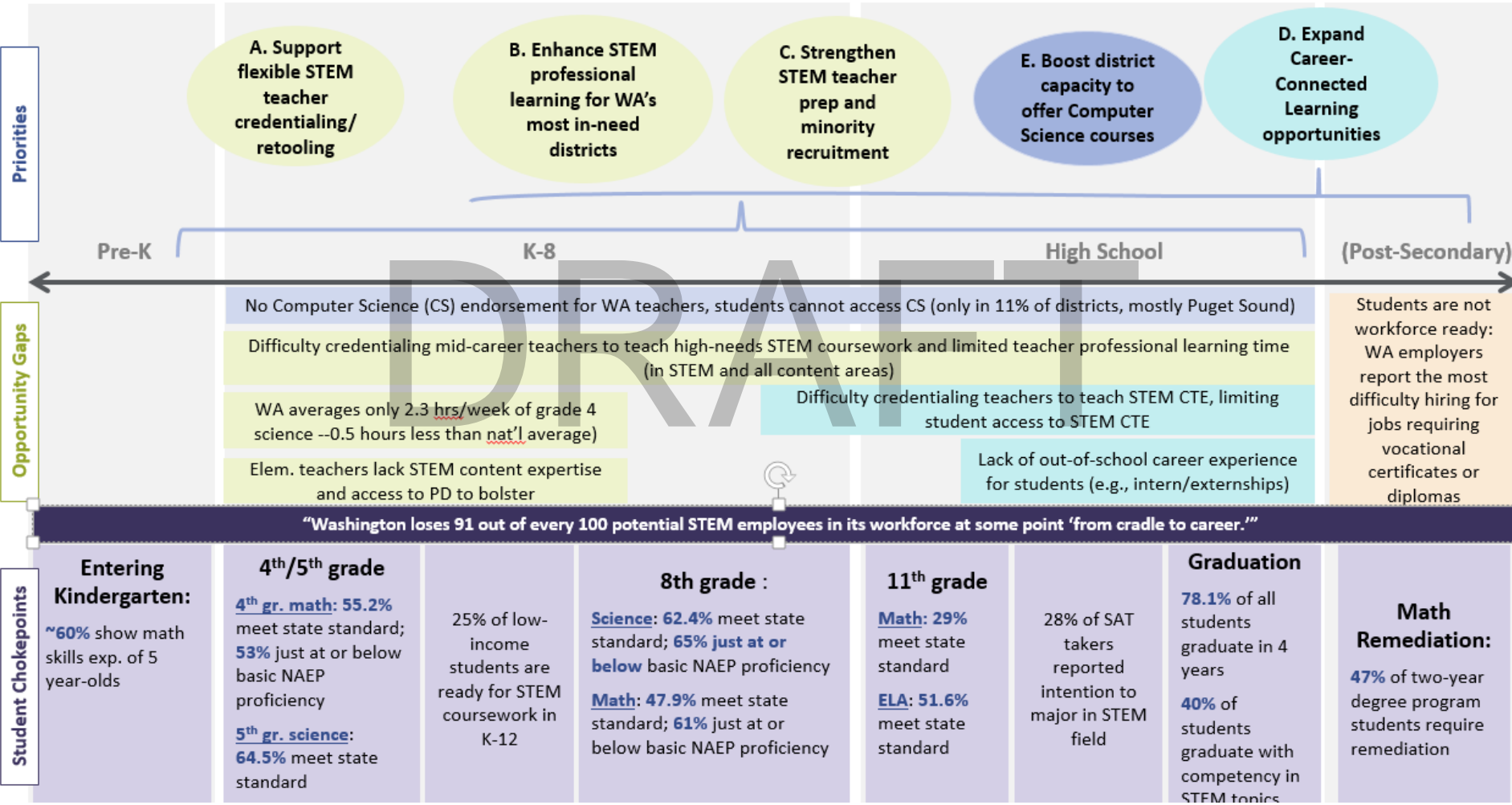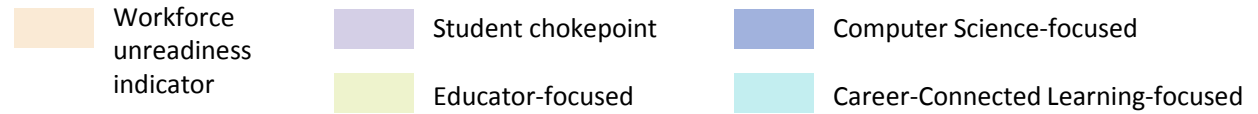
Focus Area: Career Connected Learning

D. Expand **Career-Connected Learning opportunities**, making STEM learning more relevant

Focus Area: Computer Science

E. Boost **district capacity to offer Computer Science** courses

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Emerging priorities address the student chokepoints and opportunity gaps

Legend:
- Workforce unreadiness indicator
- Educator-focused
- Student chokepoint
- Computer Science-focused
- Career-Connected Learning-focused

Priorities

- **A. Support flexible STEM teacher credentialing/retooling**
- **B. Enhance STEM professional learning for WA's most in-need districts**
- **C. Strengthen STEM teacher prep and minority recruitment**
- **E. Boost district capacity to offer Computer Science courses**
- **D. Expand Career-Connected Learning opportunities**

Pre-K — K-8 — High School — (Post-Secondary)

DRAFT

Opportunity Gaps

- No Computer Science (CS) endorsement for WA teachers, students cannot access CS (only in 11% of districts, mostly Puget Sound)
- Difficulty credentialing mid-career teachers to teach high-needs STEM coursework and limited teacher professional learning time (in STEM and all content areas)
- WA averages only 2.3 hrs/week of grade 4 science --0.5 hours less than nat'l average)
- Difficulty credentialing teachers to teach STEM CTE, limiting student access to STEM CTE
- Elem. teachers lack STEM content expertise and access to PD to bolster
- Lack of out-of-school career experience for students (e.g., intern/externships)
- Students are not workforce ready: WA employers report the most difficulty hiring for jobs requiring vocational certificates or diplomas

"Washington loses 91 out of every 100 potential STEM employees in its workforce at some point 'from cradle to career.'"

Student Chokepoints

Entering Kindergarten:

~**60%** show math skills exp. of 5 year-olds

4th/5th grade

4th gr. math: 55.2% meet state standard; **53%** just at or below basic NAEP proficiency

5th gr. science: 64.5% meet state standard

25% of low-income students are ready for STEM coursework in K-12

8th grade :

Science: 62.4% meet state standard; **65% just at or below** basic NAEP proficiency

Math: 47.9% meet state standard; **61%** just at or below basic NAEP proficiency

11th grade

Math: 29% meet state standard

ELA: 51.6% meet state standard

28% of SAT takers reported intention to major in STEM field

Graduation

78.1% of all students graduate in 4 years

40% of students graduate with competency in STEM topics

Math Remediation:

47% of two-year degree program students require remediation

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WASHINGTON STEM 2015 ANNUAL REPORT

STEM = A bright future of opportunity and success, on the job and in the world.

A high-quality STEM education creates **"future ready"** community members: individuals with the technical and creative skills needed to thrive in today's jobs and in the unknown jobs of tomorrow; people who **exemplify opportunity and create shared prosperity for our communities.**

At Washington STEM we work to dramatically increase the number of Washingtonians who are **future ready**. We serve a powerful role as a **backbone organization**, serving as a convener and catalyst for STEM education initiatives. We've established **seven STEM networks**, with **three more** in the planning phase. We've worked in Olympia to pass **key legislation** supporting computer science. We've ensured **sustainability** of great STEM education work through raising and leveraging support funds. We held the **largest Washington Summit** to date and hosted our national partner STEMx's annual conference. We've **sharpened our focus** on five initiatives critical for advancing equity and outcomes in STEM: **computer science, early math, engineering, career connected learning, and teaching quality.**

This year marks our five year anniversary. We've accomplished so much with your commitment and support. And we've got big goals ahead to support Washington residents on the road to success. Thank you for supporting a bright future through STEM.

Bill Lewis
Lease Crutcher Lewis
Board Chair, Washington STEM

Patrick D'Amelio
CEO, Washington STEM

2015 IMPACT BY THE NUMBERS

$4.8M *raised*	**$20.3M** *leveraged*	**TEN** *established and developing networks*	**249** *Network partners*	**94%** *of voters support STEM education*

STATE SUPPORT FOR STEM

We worked closely with the State Legislature and Governor to pass HB 1813, which calls for the state to adopt nationally recognized computer science learning standards. The Legislature also spurred a $4M public/private matching commitment to implement computer science education.

We successfully advocated for historic levels of investment in early learning, high-demand STEM degree production, and a $12.5M capital investment that will allow high need schools to invest in STEM classroom space and instruction materials.

COMMUNITY SOLUTIONS

We continue to grow a statewide Network of 10 regional STEM Networks which bring together business, education, and community organizations to advance STEM education efforts.

This year we worked with our seven existing networks to engage with statewide policy makers to pass computer science legislation, leverage local funding, and hold regional events like Women in STEM Town Halls and Hour of Code. We also provided planning grants to establish three new Networks: Wenatchee, Sedro-Woolley, and Tacoma.

PARTNERS IN SUCCESS

We worked strategically with partner organizations to align and coordinate our efforts to strengthen STEM opportunity.

We designed and funded an engineering fellows program with national partner 100Kin10 and local partner Washington MESA. We increased applications to the Washington State Opportunity Scholarship (WSOS) program by 150 percent through our Networks. We began work with Thrive Washington and WSOS to align early math, K-12, and postsecondary STEM education programs and funding.

STEM ⊜ FUTURE READY

VISIONARY DONORS

A special thank you to the following visionary donors whose cumulative giving to Washington STEM since our inception has had an extraordinary impact on STEM education.

$5,000,000+
Bill & Melinda Gates Foundation
Microsoft Corporation

$1,000,000+
The Ballmer Group Philanthropy
The Boeing Company

$500,000+
Dean and Vicki Allen/McKinstry
Charitable Foundation

$250,000+
Anonymous
Bezos Family Foundation
College Spark Washington
JPMorgan Chase & Co.
Urban Research Park CDE LLC

$100,000+
Bill Lewis
Schultz Family Foundation
The Paul G. Allen Family Foundation

A full list of our 2015 donors is available at www.washingtonstem.org/annualreport2015.

In 2015 every dollar we invested in our STEM Networks was leveraged by an additional $2.40 in private and public funds for a total of $3.4M. Additionally, we invested $604K in policy and advocacy, which leveraged $16.9M in STEM investments from the state.

> "Our job in education is to prepare students for a future beyond what we can reliably predict."
>
> **Dr. Mae Jemison, first African American female astronaut, Washington STEM Summit December 2015**

FUNCTIONAL EXPENSES

2015
- Program Services — 73%
- Management & General — 12%
- Fundraising — 15%

2014
- Program Services — 81%
- Management & General — 9%
- Fundraising — 10%

STATEMENT OF FINANCIAL POSITION (audited)

ASSETS		2015		2014
Cash & Investments	$	3,404,718	$	1,886,328
Pledges and Other Receivables		3,730,387		4,149,634
Equipment & Other		64,452		82,552
Total Assets	**$**	**7,199,557**	**$**	**6,118,514**

LIABILITIES & NET ASSETS		2015		2014
Unrestricted	$	3,801,801	$	1,501,740
Temporarily Restricted		3,061,213		4,168,027
Total Net Assets		**6,863,014**		**5,669,767**
Total Liabilities		336,543		448,747
Total Liabilities & Net Assets	**$**	**7,199,557**	**$**	**6,118,514**

STATEMENT OF ACTIVITIES (audited)

		2015		2014
Revenues	**$**	**4,844,202**	**$**	**3,239,341**
Program Services		2,647,798		3,410,423
Management & General		443,381		393,686
Fundraising		559,776		425,110
Expenses		**3,650,955**		**4,229,219**
Change in Net Assets		**1,193,247**		**(989,878)**
Net Assets, Beginning of Period		5,669,767		6,659,645
Net Assets, End of Period	**$**	**6,863,014**	**$**	**5,669,767**

*This financial statement is an excerpt of the full report audited by Clark Nuber, which is available at **washingtonstem.org***

WASHINGTON STEM BOARD OF DIRECTORS

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Community Colleges of Spokane

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Lease Crutcher Lewis

Ben Minicucci
Alaska Airlines

Phil C. Ohl, PE
Kurion, Inc.

Brad Smith
Microsoft

Liz Tinkham
Accenture

CELEBRATING FIVE YEARS OF SUCCESS

2011

We launch with nearly $20M in commitments from founding donors

We make investments to support STEM innovation including Washington MESA to support students of color in STEM

2012

Both gubernatorial candidates attend our first STEM Summit, cementing STEM as a nonpartisan priority

We launch our first STEM Networks

We invest in University of Washington - Tacoma's Math Science Leadership Program

2013

We launch a 50-school pilot to support STEM teacher professional development with technology

We work with the state to pass HB 1472, making AP Computer Science an AP credit, and HB 1872, establishing the STEM Framework: a statewide set of performance indicators

Washington becomes seventh state in the nation to adopt Next Generation Science Standards

2014

The state adopts the STEM Framework and launches the STEM Education Governor's Alliance

Reverend Jesse Jackson speaks at our STEM Summit
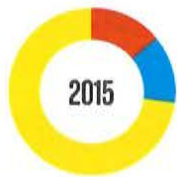
2015

10 STEM Networks and still going strong

375 people at Summit - our biggest ever - and we host national STEMx conference

Historic state investments in computer science grants, high-demand STEM degree production, and STEM capital grants
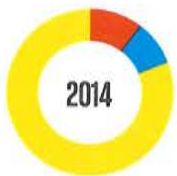
Teachers create 650 hours of professional development video and share over 1000 times

Selected for competitive national funding to launch Engineering Fellows with Washington MESA

Washington State Continues to Push for Computer Science Education

BY: Tanya Roscorla | July 15, 2016

Washington state has brought together education, business and community organizations to move computer science education forward and has become one of the leading states in this area. But it's taken a lot of collaboration to get this far, and state leaders still have more work to do.

At the Governor's STEM Education Innovation Alliance meeting on July 13, leaders from a variety of sectors talked about recent progress they've made on science, technology, engineering, math and computer science. They also shared ideas about what policy recommendations to make to the Legislature next year. While they're still working on those recommendations, CEO Hadi Partovi of the nonprofit advocacy organization Code.org threw out two big goals: Give every K-8 student a foundation in computer science and offer a full-year computer science course in every high school by 2020 or 2022. Another leading computer science state — Arkansas — already made computer science classes available to every high school last year.

"We want to see computer science in a real way in every high school, and we have opportunities to do this kind of thing," Gov. Jay Inslee said in the meeting. He and Arkansas Gov. Asa Hutchinson are leading the Governors' Partnership for K-12 Computer Science, which is bringing together governors Friday, July 15, at the National Governors Association meeting in Des Moines, Iowa, for a policy discussion and a short coding tutorial.

Cross-sector partnerships

Collaboration seems to be the key for Washington computer science education to move forward as the issue is uniting non-profit advocacy organizations, legislators, technology companies and education institutions. Code.org and another non-profit, Washington STEM, started in 2013 and 2011 respectively and have been pulling together support from all these groups. Their support helped representatives Drew Hansen and Chad Magendanz work across the aisle to pass two major pieces of computer science legislation. In the 2013-14 session, House Bill 1472 allowed computer science to count for high school science and math graduation requirements.

"The initial bill around AP computer science really just exposed all of the other pieces that needed attention," said Caroline King, chief policy and strategy officer at Washington STEM. "But also, importantly, it exposed real excitement and enthusiasm from educators and students."

In the 2015-16 session, House Bill 1813 created a $2 million matching grant program to draw more women and underrepresented minorities into computer science, and the second round of those grants went out at the end of June. The bill also doubled the capacity of higher education institutions to address the shortage of qualified graduates and created a computer science teaching endorsement for K-12 educators who graduate from teachers' colleges. Both Washington STEM and the Washington Technology Industry Association worked with the legislators on this bill.

A number of major tech companies make their home in Washington's Puget Sound area, including Microsoft and Amazon, while Silicon Valley-based companies such as Google, Facebook and Apple have opened branch offices there. The tech industry has been asking colleges to graduate students who have the skills to fill the large number of job openings in software development and other areas across the country.

"They all have a vested interest in ensuring that they can draw the talent to their companies, so they've been very supportive all the way through," said Magendanz, a Republican ranking minority member on the Education Committee who also serves on the Appropriations, and Technology & Economic Development committees.

Even though software development is one of the most common jobs in the state, not many legislators had software development backgrounds back in 2013 when Magendanz went to the Legislature with a mission to close the skills gap. While serving on a nuclear submarine in the Navy, Magendanz wrote software in his spare time, and when he finished his service, he moved to Washington to work for Microsoft for 10 years. Both Magendanz and Hansen are running for re-election this year, and if they win their elections, they plan to address another component of the computer science skills gap in 2017: early internships for high school students, Magendanz said.

Moving ahead

The legislators see potential for a bill that would establish a clearinghouse for internships in the tech sector. The clearinghouse would allow students to find and apply for internships in one place, and companies could share the administrative overhead of posting internships, which will especially help small and medium-sized companies that couldn't afford to do it on their own. These internships will address the skills gap and youth unemployment while also helping students hone soft skills including teamwork, managing others and interacting with customers.

Because of the way many Washington school days are structured, students only have six periods a day to meet the 24-credit high school graduation requirement. That doesn't leave much room for electives including computer science or for failing a course, which could push them off-track for graduation.

"We're working to basically ensure that there's some buffer there, that kids have the chance to experiment in high school," Magendanz said.

Along with working out internship legislation, other leaders in this movement see a number of issues to tackle going forward. From Washington STEM's point of view, computer science and STEM education opportunities should be integrated throughout K-12 schools each day so every student can access these resources — not just the ones that receive philanthropic donations.

At the Office of the Superintendent of Public Instruction, STEM Program Supervisor Clarence Dancer sees two major challenges left: infrastructure and instructors. Especially for rural schools, it's difficult to find enough money to provide bandwidth for students to practice computer science online, not to mention challenging to get affordable pricing from broadband providers. It's also not clear where all of the computer science instructors will come from because few teachers exist in this field.

"You've got to have the equipment, you've got to have the infrastructure and you need an instructor," Dancer said.

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