WSU Viticulture and Enology Program (V&E)
Strategic Plan 2017-2026

MISSION
The Viticulture and Enology Program at Washington State University creates and translates information for the development of industry, future leaders, and innovation through extraordinary research, teaching, and extension for the region and the world.

VISION
The Viticulture and Enology Program at Washington State University provides a transformative educational experience for students and is a convener of world-class researchers. The program fosters innovation and discovery which result in global leadership, economic prosperity, and propels the state wine industry to world-class status.

Program Background and Growth
The V&E Program at WSU had its beginnings in the 1930s in the pioneering work of horticulturist Dr. Walter Clore. Clore worked collaboratively with industry members to explore opportunities for the expansion of the wine and juice grape industries in Washington. He was joined in 1960 by microbiologist Dr. Charles Nagel whose knowledge of wines and winemaking practices started the winegrape research program and training for winemakers. It was from the collaboration of these two scientists and their partnership with Washington’s farmers and early investors that the Washington wine industry and the supporting WSU research and education program grew.

Over time the V&E Program continued to grow and develop. In 2002, a V&E major was instituted and the V&E extension certificate was created in 2003. In 2006 the Viticulture and Enology Building at WSU-IAREC (Prosser) was constructed. Recently, the Ste Michelle Wine Estates WSU Wine Science Center at WSU TriCities opened (2015) and the Viticulture and Enology Building at WSU-IAREC (Prosser) was renovated and expanded (2013).

In 2008, an Industry Research Task Force compiled the document “Building the Future of the Washington State Wine Industry through Research” that recognized the need for increased research, education, and extension to ensure the Washington wine and grape juice industries could successfully compete nationally and internationally. In 2009, a subsequent Gap Analysis report by the Research Task Force reviewed the 12 research and extension priorities that form some of the core strategies for the V&E research and extension programming. This report also formed the basis for the V&E facilities and staffing plan effort that led to the design, construction, and staffing of the Wine Science Center and to the expansion of the Viticulture and Enology Building at WSU-IAREC. (Appendix 1 - Current V&E Program Faculty and Staff, and Future Needs)

The Strategic Research Plan for the Washington Wine Industry was approved in June 2015 by the Washington State Wine Commission. The plan looked at the structure of the research program led by WSU and recommended that the research program needed to be scaled up, systematized, communications improved, and staff be dedicated to research.
The plan is based on five goals:

1) Establish the research process
2) Define the research focus
3) Create the research structure
4) Sustainably fund research
5) Execute strategic communications.

(Appendix 2 - Strategic Research Plan for the Washington Wine Industry)

Facilities for
The Ste Michelle Wine Estates WSU Wine Science Center, completed in 2015, has significantly increased the visibility of the V&E Program regionally, nationally, and internationally, and positions WSU to be recognized worldwide as a leading institution in grape and wine research, extension and education. The Wine Science Center complements the existing facilities on the WSU main campus in Pullman and at the Irrigated Agriculture Research and Extension Center in Prosser.

The Wine Science Center combines a research and teaching winery with laboratories for analytical chemistry, microbiology, molecular biology, microscopy, plant anatomy, and sensory analysis, a classroom, a teaching laboratory (not yet built out), seminar room, a wine library, and offices spaces for staff, faculty, and graduate students. The viticulture focus of the Prosser facilities is supported by wine and juice grape vineyards, laboratories for plant physiology and pathology, plant growth rooms, as well as distance-teaching and meeting facilities. Facilities in Pullman include a food science pilot plant, microbiology laboratory, sensory laboratory, and classrooms. Together, these state-of-the-art facilities support an increasing amount of research, education, and extension; attract international scholars for research collaborations; attract top-tier undergraduate and graduate students who will be future leaders in industry and academia; expand our capacity and deepen our relationship with the wine and juice industries; and enhance our competitiveness for resources through the expanded capacity of the program and increased collaborations within WSU and with partner programs nationally and internationally.

Plan of Action
This strategic plan identifies how the V&E Program plans to achieve its vision of excellence, while also showing the needs and challenges of the program as it grows and evolves with the WA wine and grape juice industry.

STRATEGIES AND METRICS
The research, teaching, and extension activities of the V&E Program will focus on the key overarching themes of advancing economic and environmental sustainability, fruit and wine quality, and providing a skilled workforce through traditional education programs and continued professional learning paths.
1) Viticulture focus areas
   a. Vineyard management and operations
   b. Vine physiology and anatomy
   c. Biochemistry and molecular biology
   d. Plant pathology, vineyard microbial populations
   e. Grape virology, plant-virus interactions, impact on vine productivity and fruit quality
   f. Entomology, role and control of arthropod populations
   g. Soil sciences
   h. Agrometeorology (AgWeatherNet)
   i. Sensor and remote technology, automation

2) Enology focus areas
   a. Grape and wine chemistry and biochemistry
   b. Wine microbiology, microbial ecology of fruit, must, and wine
   c. Winery management and operations
   d. Sensory science of grapes, juice, wine, and brandy

Teaching in the V&E Program also is based on research and a collaboration with partner programs in the US and abroad. The V&E Program will ensure integrated undergraduate and graduate student programs leading to both internal and distance degrees, and non-degree certificate programs. The internal degrees will:

1) Integrate viticulture and enology in undergraduate education
2) Maintain quality education through integration of classroom and experiential learning (laboratory, field trips, internships, undergraduate research)
3) Encourage acquisition of foreign language skills (one language other than English) for undergraduate students
4) Extension

**Strategy 1: Research - Develop research of benefit to the grape and wine industry that will have regional, national, and international impact.**

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<th>Action</th>
<th>Responsibility</th>
<th>Metric</th>
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<tr>
<td>1) Seek extramural funding for collaborative research.</td>
<td>Director, Faculty, WSU, Wine Industry, strategic partnerships</td>
<td>1) Research collaborations with national and international researchers.</td>
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<td>2) Develop national and international research partnerships.</td>
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<td>2) Internal funding budget and partial funding in place by end 2018.</td>
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<td>3) Provide V&amp;E Program startup funding.</td>
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<td>3) Invited presentations to regional, national and international conferences.</td>
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<td>4) Provide V&amp;E Program funding to enable exchange of students and scholars.</td>
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<td>4) International visiting researchers and collaborations on research projects.</td>
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<td>5) Funding from State and Federal sources, the WA wine industry and private donors.</td>
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**Strategy 2: Extension - Enhance the quality, economic vitality, and environmental sustainability of the WA grape and wine industries through dissemination of science-based Extension programing.**

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<td>1) Identify long-term educational planning for viticulture and enology Extension. Identify educational delivery methodology.</td>
<td>Director, Faculty, WSU Wine Industry, strategic partnerships</td>
<td>1) Survey results from workshops, seminars and presentations to evaluate effectiveness of directed extension efforts.</td>
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<td>2) Improve information dissemination to key stakeholders through digital delivery.</td>
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<td>2) Increase number of VE email listserv subscribers by 2% annually, with baseline subscription set in 2017.</td>
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<td>3) Assist industry organizations in planning and executing annual meetings, field days, workshops.</td>
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<td>3) Improve email open and click rates from 2018 baselines (approximately open rates at 30%).</td>
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<td>4) Enhance peer-reviewed Extension content for Viticulture and Enology educational planning</td>
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<td>4) Involve WSU V&amp;E in planning assistance for, on average, 3 industry-led or sponsored events annually.</td>
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<td>5) Write or edit a minimum of 1 peer-reviewed extension publication in viticulture and peer-reviewed extension publication in enology bi-annually.</td>
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<td>6) One full day WAVE seminar every other year and two half day WAVEx each year.</td>
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<td>7) One Ravenholt Lecture each year with every other year being a half day symposium.</td>
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<td>8) Two extension workshops each year in viticulture and in enology.</td>
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<td>9) Support the technical program planning committees of the Washington State Winegrowers Association, the Washington Grape</td>
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Strategy 3: Teaching - Enhance academic excellence and global impact through a world-class education that enables graduates to become successful in the juice and wine industry, academic settings, supplier industry, or politics.

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<td>1) Provide first-class undergraduate program.</td>
<td>Director; Curriculum Committee; Faculty</td>
<td>1) Undergraduate degree: by 2020 have 20 to 25 graduating per year</td>
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<td>2) Connect with community colleges through articulation agreements and guest lectures.</td>
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<td>2) Graduate degrees: 5 year rolling average of 2 graduating per year, 100% job placement</td>
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<td>3) Provide first-class graduate student education.</td>
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<td>3) Fifty percent of undergraduate students receive scholarships and 70% of graduate students receive fellowships.</td>
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<td>4) Provide V&amp;E Program graduate assistantships to faculty with ≥0.3 FTE research.</td>
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<td>4) 100% of all undergraduate students have completed internships.</td>
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<td>5) Encourage undergraduate internships in both viticulture and enology, utilize internship bootcamp.</td>
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<td>7) Conduct syllabus review with industry members.</td>
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<td>8) Establish a School of V&amp;E</td>
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The 2+2 V&E undergraduate program will require that additional positions be based at WSUTC so that the teaching needs can be met. The requirement that all V& undergraduate majors will complete their third and fourth year at the WSU TriCities campus is to start in fall 2019.

**NEEDS AND CHALLENGES**

**Personnel**

**Faculty**
To fill critical gaps in expertise and alleviate weaknesses within the V&E Program, five faculty positions are required. These might be new hires with a partial or full time appointment in V&E or they may be existing positions with part or all their responsibilities redirected to V&E. These additional FTEs directed to the V&E Program are essential to ensuring that the V&E Program can deliver current information to the scientific community and the Washington and other grape and wine industries. The requirement, starting in fall 2018 for incoming freshmen, that all V&E majors complete their last two years at WSU TriCities necessitates additional teaching faculty FTE at WSUTC and moving towards fully addressing the research needs identified in the ‘Research Roadmap’ requires additional research faculty FTE in the WSC.

Each of the following positions will have split research and teaching appointments:

1) Wine Microbiologist (1 FTE V&E, fill by end 2018, 0.3 FTE teaching and 0.7 FTE research, located in the Wine Science Center). Expertise in molecular biology and microbial ecology studies. Research focus on microbial populations on grapes and in fermentation products and processes. Teaching advanced wine microbiology and general microbiology and laboratory in undergraduate and graduate level.

2) Plant Biochemist/Molecular Biology (0.6 FTE V&E, fill by end 2018, 0.5 FTE teaching and 0.5 FTE research, located in the Wine Science Center) Expertise in biochemistry and/or molecular biology, especially genomics of grapevines. Progress in fundamental grapevine biology and the plant’s interaction with the biotic and abiotic environment. Research using modern concepts and tools to enhance existing expertise in the areas of viticulture, grapevine physiology, plant pathology, microbiology, and enology. Teaching includes grapevine genetics and biochemistry.

3) Process Engineer (0.5 FTE V&E, fill by end 2020, located at Wine Science Center) Expertise in biosystems and chemical engineering. The push for sustainable practices and potential future regulation require research (60%) leadership in sustainable processing, water use and treatment and recycling, alternative energy generation, fermentation process engineering, byproduct recovery and conversion and separations technology. Teaching (40%) includes vineyard and winery engineering.

4) Soil scientist, specialist in irrigated soil management (0.5 FTE for V&E, the position itself should be 0.75 FTE research, 0.25 FTE teaching, located at WSU IAREC)

5) Sensory Scientist (0.75 FTE for VE, 9 month appointment, technician position or clinical faculty, teaching and research support, 0.25 FTE summer funding, located at Wine Science Center).

6) Pesticide Safety Specialist/MRL (0.2 FTE V&E; immediate need, located at WSU IAREC). Position about to disappear, but the need for expertise persists. Increasing federal and global regulations and restrictions on pesticide use and residue levels on food crops and products require expertise in the areas of pesticide safety and maximum residue limits for pesticides. Studies on pesticide application (target and non-target) and interaction with regulatory agencies must continue to provide our growers with the technical expertise and the materials they need to successfully farm. This is a faculty position supporting many fruit crops with 0.2 FTE to VE Program.
**Technical Support**

Another important aspect is preservation of existing key areas of expertise. Consequently, the following Administrative Professional positions (FTEs) are not additional to the V&E Program but are replacing expertise that has recently disappeared, is disappearing, or is in imminent danger of disappearing. Either we redirect efforts of existing faculty or we need to hire new faculty to maintain this expertise in the V&E Program. This is especially critical because rapid industry expansion strains extension personnel and resources. Each of these positions has or will have split extension and research appointments:

1) **Research Winemaker and Extension Enologist (1.0 FTE with 0.5 FTE extension).**
   a) The Research Winemaker is responsible for coordinating all winemaking activities in the research winery at the WSC, equipment maintenance, safety, records and compliance. Extension Enologist (this is a technician position, 0.5 FTE V&E (immediate need). This need for enology extension support would be best served through 0.5 FTE extension provided by the research winemaker. Position lost in 2010 despite increasing industry demand. This person is the primary liaison with the Washington Wine Tech Group to support their programming and joint workshops. She/he develops and organizes workshops and seminars in wine science and winemaking technology, and supports applied research under the leadership of the enology faculty. With the growing industry all across the state the demand for seminars across the state and seminars for beginners and for experience wine industry members keeps increasing.

2) **Vineyard and greenhouse manager for IAREC Prosser and for WSUTC.**
   a) This person would also assist in plant science laboratory course instruction.

In addition to faculty positions, the core technician positions are critical to the success of the V&E Program research goals. The program aspires to fund core technical support positions as follows:

1) One technician for each faculty with 0.3-0.7 FTE research appointment, and two technicians for each faculty with >0.7 FTE research appointment.

The V&E Program aspires to fund a base number of graduate students as follows:

1) One graduate student for each faculty with ≥0.3 FTE research appointment;
2) Additional graduate student assistantships on a competitive basis for any V&E faculty, as funds permit.

**Facilities and Equipment**

There is a need for additional core facilities and other infrastructure that are crucial to achieve the strategic goals of the V&E Program. These include:

**Wine Science Center (Tri-Cities)**

- Completion of teaching laboratory
- Growth chambers for studies at extreme low and high temperatures
- Greenhouse to support teaching and research
- Upgrades and maintenance of winery and laboratory equipment
- Electrical power backup system (solar/wind plus battery storage)
- Update and replacement of aging analytical instruments (starting 2020)
- SUV for carrying people and instrumentation to vineyards and industry meetings
Irrigated Agriculture Research and Extension Center (Prosser)

- Greenhouses for year-round pot experiments in viticulture (2100 ft²), grape virology (2100 ft²), and plant pathology (2100 ft²)
- Bird-proof screen house (2100 ft²) for outdoor pot experiments
- Plant growth rooms (4 installed in 2016, 2 more needed)
- Workshop for construction of small research equipment
- Expansion and support of research vineyards (10 acres) to permit alternating field trials under homogeneous conditions
- Upgrades and maintenance of vineyard and laboratory equipment
- Wind machine for vineyard expansion
- Mechanical harvester and pruner to reduce labor costs
- SUV for carrying people and instrumentation to vineyards and industry meetings

Funding

Faculty positions need to be funded through CAHNRS and the WSU Tri-Cities campus. Laboratory and office space is available for the microbiologist, plant biochemist, process engineer, and sensory scientist at the WSC. It is envisaged that a portion of the funds now combined in the Washington Grape and Wine Research Program (Washington State wine grape research funds, wine tax funds, federal research funds, WSWC funds, and income from the Auction of Washington Wines be used to provide partial funding for the core long-term support staff positions (both technical and administrative) and graduate student assistantships.

Funding for Research Winemaker / Extension Enologist and for the Vineyard and Greenhouse Manager would be shared by CAHNRS and WSUTC.

Funding for core technicians would be assigned from the annual wine research funds allocated by the Washington Legislature to WSU CAHNRS.

Funding for graduate student assistantships will be a mixture of research assistantships provided by the V&E Program and competitive research programs, endowments, and teaching assistantships provided by the partnering departments, schools, and campuses.

Endowments will be sought for:

- Winery Operations (include equipment maintenance and updates)
- Vineyard Operations (include equipment maintenance and updates)
- Laboratory equipment service and replacement fund
- Microbiology faculty position
- Plant Biochemistry faculty position
- Process Engineer faculty position

The industry is also exploring the possibility of creating a separate research and extension fund, funded through a dedicated assessment collected through the WSWC. It is under consideration that WSWC funds currently committed towards paying the construction costs of the WSC will be directed towards research and program support. The WSWC expects to have paid off its $7.4 million contribution to the construction of the WSC in 2019. At current production of 250,000 tons of wine grapes (2016) the
annual payment by the WSWC amounts to about $1 million. The V&E Program and CAHNRS will keep working with the WSWC and other industry associations to explain the need for research for the long term prosperity of the grape and wine industries.

Appendix 1:
Current V&E Program Faculty and Staff, and Future Needs

Appendix 2:
Strategic Research Plan for the Washington Wine Industry