Approval Process, Instructions, and Templates

for Proposing

A New Degree Program
(not currently offered by WSU at any location)

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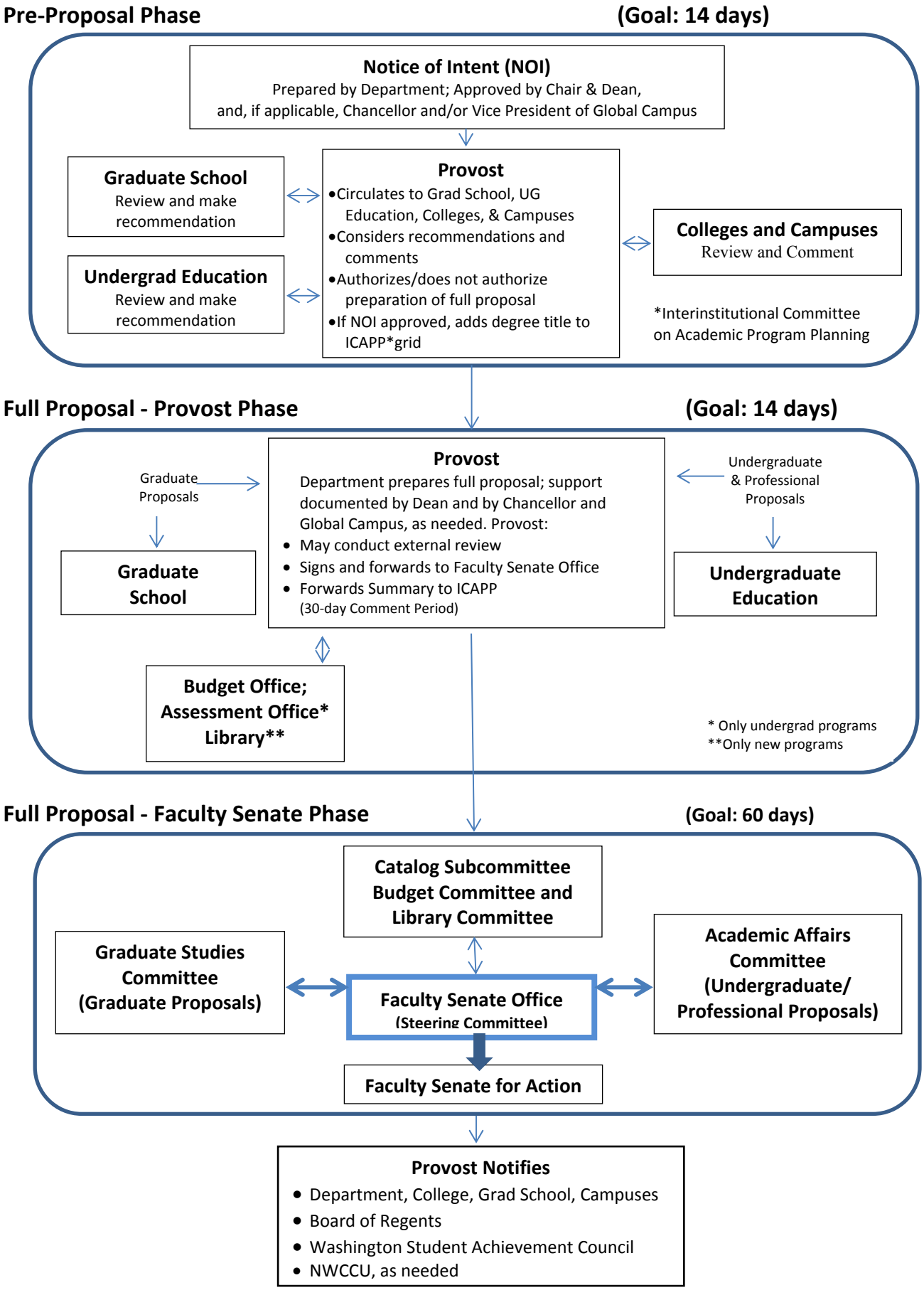
Approval Process for Creating, Extending, Moving, Consolidating, Renaming, or Eliminating a Degree Program (7/25/14)



Process Rationale

Pre-Proposal Phase (Notice of Intent) The purpose of the Pre-proposal Phase is to inform academic units across the University of potential changes at the degree program level. This enables the identification of any conflicts and possible collaborations with existing or planned programs before significant time is invested in the development of a full proposal. Additionally, the review of pre-proposals within the Provost's Office enables the alignment of proposed degree programs with University goals to be assessed prior to developing a full proposal.

Full Proposal – Provost Phase The purpose of the Provost Phase of full proposals is to assure that financial resources and personnel, learning outcome assessment, and diversity provisions are sufficient. Additionally, the examination enables the identification and resolution of any issues before proposals are forwarded to the Faculty Senate and, when deemed necessary, inclusion of external reviewers, thus facilitating these reviews.

ICAPP Review – Sharing early information and, subsequently, a summary of the full proposal with the other public colleges and universities insures that issues of minimizing unnecessary duplication and enhancing collaboration can be appropriately addressed among the institutions involved.

Washington Student Achievement Council Notification – The WSAC maintains the database of all degree programs offered in the state of Washington, as well as of the programs approved for students using veterans' benefits, and they are responsible for identifying underserved regions and populations, as well as fields of study where there is unmet state need. So it is important that their inventory of programs is kept up to date.

Instructions

1. Complete and submit a **Notice of Intent** (NOI) for the proposed new program to your dean and, if applicable, chancellor and/or vice president of the Global Campus.

2. *Once the NOI has been approved by the Provost Office*, please electronically complete Workbook 1, Analyzing Library Capacity and Workbook 2, Analyzing Demand and Cost using as much space as necessary for each item – do not be constrained by the space between questions on the template. Please work through the Workbooks before completing the Proposal Template and forward them along with the Proposal Template itself. (Details in the Workbooks will be used internally, but will not be forwarded to external entities or reviewers.)

3. Complete and forward the Proposal Template (along with the Workbooks) to your college dean(s) and, if applicable, chancellor and/or vice president of the Global Campus. The dean will forward the proposal electronically to the Provost's Office (donnac@wsu.edu).

4. If the new degree will include new courses or new program requirements, submit the required change forms (https://www.ronet.wsu.edu/ROPubs/Apps/HomePage.ASP) directly to the Registrar's Office at the same time the proposal itself is sent to the Provost's Office. *The Faculty Senate Curriculum Subcommittee will not consider new program proposals until new courses and requirements for that program have been approved.*

5. The completed Proposal Template will be forwarded to the Faculty Senate Office for review by the appropriate committees and the Faculty Senate. A summary of the proposal will also

be forwarded to the Interinstitutional Committee on Academic Program Planning (ICAPP) for posting on the Council of Presidents website for 30-day statewide comment (see diagram) and, as appropriate, to the Northwest Commission on Colleges and Universities.

6. In addition to your department and college, the following resources can answer questions:
    a. Graduate School 335-3535
    b. Provost's Office 335-5581
    c. Budget Office 335-7783

Templates

Notice of Intent: Complete and submit the template at XXXXX to your dean and, if applicable, chancellor and/or vice president of the Global Campus (see diagram).

Workbooks Complete the following two workbooks: one to assess the adequacy of library holdings and services, and a second to assess student demand and costs. The workbooks should be completed prior to the Proposal Template.

Workbook 1 – Analyzing Library Capacity

The Faculty Senate Library Committee reviews all proposals for new degree programs for adequacy of library holdings and services. To assist the committee in its deliberations, please address the topics below in your proposal in collaboration with the librarian(s) responsible for collection development in your discipline(s). The names of appropriate librarians are available from the Director of Libraries at 335-4558 or from your dean's office.

1. In specific terms, describe the adequacy of existing capacity:

Questions to ask:

- How adequate are the existing library collections for the proposed program?
- How adequate is the existing library equipment for the proposed program?
- How adequate are the existing personnel and services for the proposed program?
- How will this program contribute to the funding of existing serials, given their ever increasing costs?

The current library collections, equipment, and personnel and services are adequate to meet the needs of the proposed program.

2. What is the need for new library collections:

Areas to consider:

a. Serials (e.g., journals or indexes in print, electronic format, microform, etc.):
   1) List new serials titles (and costs) that will be needed.
   2) What funds have been designated for these titles and for the ongoing serials subscriptions?
   3) Can any of your current serials subscriptions be cancelled to purchase the new titles?
   4) What additional library equipment will be needed and how will it be funded (e.g., terminals, CD-ROM readers, etc.)?

b. Monographs (e.g., books in print, electronic format, etc.):
   1) Will monographs need to be purchased?
   2) Have continuing funds been designated for these and future purchases?
   3) What additional library equipment will be needed and how will it be funded (e.g., terminals, CD-ROM readers, etc.)?

c. Media (e.g., films, videotapes, sound recordings, etc.):
   1) Are media materials needed?
   2) Have funds been designated?
   3) What additional multimedia equipment will be needed and how will it be funded?

No new library collections are needed for the proposed program at this time.

3. What new library personnel will be needed?

Questions to ask:

- Will specialized expertise be required to serve your new program?
- Will additional library staff or faculty need to be hired?
- If so, how will the position(s) be funded?

No new library personnel will be needed for the proposed program at this time.

4. What additional library services will be needed?

Questions to ask:

- To what extent will additional interlibrary loan services be required?
- On-line network access?
- References services?
- Library user education?
- If so, have funds been designated for this purpose?

No new additional library services are needed at this time.

5. For programs offered away from the Pullman campus: To what extent will collections and services be provided from Pullman and to what extent by other campus or local libraries?

The majority, if not all, library services will be online and can be provided from Pullman.

6. Are there any other library resource considerations *(e.g., additional space):*

No.

Workbook 2 – Analyzing Demand and Cost

Situational Analysis: The purpose of this section is to identify the strengths and weaknesses of the department(s) as they relate to competition.

Strengths: Why is your department/school able to provide the proposed new degree better than other WSU departments/schools or other universities?

New faculty expertise in Software Engineering and existing faculty expertise in complementary areas of Computer Science and Computer Engineering create a unique and advantageous opportunity for the School of EECS to offer the proposed new online MSSE degree.

Weaknesses: What characteristics of your department or school disadvantage it in offering the proposed new program relative to other WSU departments/schools or competitor universities? Why might other WSU departments/schools or universities be equally or better able to offer the proposed new degree?

None. No other department/school at WSU is positioned to offer the proposed degree at the proposed minimal costs.

Opportunities: Opportunities, as related to this degree program, are developed from your department's/school's strengths or positive circumstances.

Questions to ask:

- What is happening in the state/nation/higher education now that we can take advantage of?
- How can we best take advantage of it?
- How long will this "window of opportunity" be available?

The demand for software engineers, especially in state of Washington, is at an all-time high. WA state government and legislator as well as WA industries are making huge investments in education and training of computer scientists and software engineers as demonstrated by the recent state's engineering expansion investments. With faculty expertise in computer science and engineering and adding new expertise in software engineering, the School of EECS is well positioned to establish the proposed program and address one of the state's highest workforce needs. The demand for software engineers is expected to continue to grow till 2020 and beyond.

Threats: A threat is a problem. Relative to the proposed degree, is there anything that appears to endanger your current situation or future opportunities?

Questions to ask yourself:

- What uncontrollable factors can influence our success?
- What is the worst that is likely to happen?
- For how long is the threat likely to continue?
- How can we eliminate or minimize its effects?

The major threat has to do with the funding of the program. If the state legislature declines to fund the proposed sister program, i.e., BSSE at Everett, it will significantly dampen our ability to offer the new degree.

Competitive Analysis: The competitive environment includes other WSU departments/schools as well as competitor colleges and universities, both public and private.

Determine who your top competitors are. Examine other institutions providing a similar program. Be aware that the "competitor" may not look like Washington State University and may not provide education in the same manner that you are proposing. For example, the new online MIS program might compete for the same students not just with other MIS providers but also with some technical training and computer science programs. Don't think too narrowly in this area. Choose competitors whom you believe are actively seeking the students you would like to attract. Competitors may include similar programs at WSU.

Select a strongest, geographically nearest, and lowest price competitor that are accessible to the same pool of students, and describe each of them as completely as possible using the following characteristics:

Name of program and credit hours – indicate the program that is currently being offered. Theirs may not be exactly the same as yours, but should be similar enough to be considered a competitor.

Total Enrollment - number of existing students enrolled in this certificate and/or program.

Total Cost for Certificate and/or Program and Cost per credit hour

Access – what medium is used to communicate with the students?

Faculty to student ratio

Support Services – Other than the instructor, what staff and/or services are provided for the student? How does the student gain access to these support services?

How long has this certificate and/or program been offered? – If not currently offered, what is expected timing of entry into the market?

What is each program's weakness? – Think in terms of areas that may work to your advantage.

What is each program's advantage? - What specific characteristic makes each institution "stand out"? Why would someone choose the other program over yours? This is also called a differential advantage – the trait that makes you "different" and puts you at an advantage. This should help you in determining what marketing strategy you will take. For example, if you know that one of the others is "cheaper", you can then decide if you want to lower your prices to compete head-to-head, or take the "quality" approach in marketing your program.

What is each competitor's market share? - What percent of the total market for this type of program belongs to each institution?

Example: **Market:** all students enrolled in 4-year public colleges in state (WA)
Market size: 89,200 students (source: internet sites for all 6 colleges)
WSU enrollment: ~ 28,000 (all locations) (source: www.wsu.edu)
WSU's Market share: approximately 31%

Software engineering graduates are rare and easily demand 6-figure salaries upon graduation. While other states such as California, Massachusetts, Pennsylvania, Illinois, and Indiana have committed to building software engineering programs and producing SE graduates, the State of Washington is lagging in this area. To the best of our knowledge, currently there is no online Master of Science in Software Engineering degree offered at any of the 4-year institutions of higher education in the Sate. University of Washington has a face-to-face, evening professional Master's degree in Computer Science and Engineering and UW-Bothell offers a face-to-face Master of Science program in Computer Science and Software Engineering. Western Governors University offers competency-based online MS degrees in Information Technology, but not in Software Engineering.

Therefore, the proposed new online MSSE program at WSU Global Campus will be unique and will help the State and its computing/IT industries meet their needs by producing highly skilled and trained graduates in software engineering.

Washington State University:

Additionally, are there any barriers that might inhibit WSU from entering this market? These might include required economies of scale, brand identity, accreditation standards, known plans of competitors, access to distribution, switching costs and government policy.

No barriers are identified that might inhibit WSU from entering this online market.

Competitor 1 _____

Competitor 2 _____

Competitor 3 _____

Demand Analysis:

Employer Demand:

Employer demand is defined as the number of program graduates needed to fill current and anticipated job openings. Please include information from professional societies and their publications, industry advisory groups and advocacy groups, internal studies, department of education, department of labor, or employment security department statistics, letters of support, and other sources to estimate current employer demand for graduates of the program.

Questions to ask:

- What is the national employer demand for graduates in this program area?
- Is national employer demand trending upward or downward?
- What is the regional and local employer demand for graduates?
- Is regional and local employer demand trending upward or downward?

Access to baccalaureate and graduate degrees continues to be a major issue curbing overall educational attainment and nationwide economic competitiveness in Washington. The problem is most acute in the areas of computer science (CS) and software engineering (SE). A 2011 joint report prepared by the Washington State Higher Education Board, State Board for Community and Technical Colleges, and Workforce Training and Education Coordinating Board indicates that during the 2014-2019 period there will be a ratio of nearly 2 to 1 between demand and supply in the State for graduates with BS degrees in CS or SE.

A recent comprehensive market study by Global Campus shows that software engineering skills are highly sought after in the workplace. Employment in the area of software engineering is growing rapidly with jobs such as Software Development Engineer, Software Developer, and Software Engineer growing about 87%, 56% and 74%, respectively, in Washington alone in 2012-2013. Employer demand is expected to continue this trajectory through 2020.

Data from the second half of 2013 show that 4,483 regional jobs posted requiring Software Engineering skills at graduate level and 11,881 regional jobs posted requiring Software Engineering skills at Bachelor's level.

Student Demand:
Student demand is the number of qualified students desiring to participate in your program. Student demand is determined by several factors including:

Market – the geographic area from which the program will attract students.

Questions to ask:

- Where are potential students physically located? (e.g., international, national, state-wide, regional, local, etc.)
- Would potential students be required to relocate or can they remain at home via distance-learning?

Since this is a distance-learning (online) program, there are no geographic limitations for student participation. We expect the majority of the initial online MSSE students to come from the state of Washington, esp. from the west side of the state. However, over the long-term, we anticipate global participation with no geographical boundaries.

Market size – the number of potential students in the market area

Questions to ask:

- What is the current number of students in existing programs in the proposed market area in this field?
- What is the potential number of students forecasted?

In recent years, due to industry demand and high-paying career opportunities, enrollment in computer science and related fields has rapidly grown nationally, within the state of Washington, and at WSU. Our computer science program has grown by an average of 12.5% per year in the past 5 years, almost doubling its enrollment during that time span. All studies indicate that the increase in demand for computer science and related fields, including software engineering, will continue to grow in the next decade due to the strong industry demand for a highly educated, qualified workforce in this area.

Market Segment – the characteristics of students that you intend to serve

Questions to ask:

- What are the characteristics of students currently in the department's programs (age, location, employment, goals, etc.)?
- Why do they choose WSU?
- What kind of students choose to go elsewhere for programs like this? Why?

The characteristics of the majority of the students participating in this program will be that of industry professionals with baccalaureate degrees who are interested in gaining advanced, graduate degrees in software engineering. All participating students strive to have professional careers in computer or programming industries. Many choose this program and WSU due to the high quality of our programs or due to family traditions and ties to WSU.

Market capacity – the upper boundary of a market. This would represent and include every potential student interested in the program within the market area. If all of the needs are served and there is an excess of supply over demand, then the market is considered saturated

Referring to "Market Size," "Employer Demand," and "Competitive Analysis" sections, we believe the proposed program to be unique in the state with plenty of student demand that is not being fulfilled by the state's 4-year higher education institutions.

Growth rate – the rate at which demand is increasing in the target market (geographic area of interest). What is the expected growth rate of student and employer demand?

Questions to ask:

- What are long-term population trends, especially in the target age group?
- Are competitor-institutions planning to introduce similar programs/expand existing ones?
- Is long-term employer demand expected to grow, remain stable, or decline?

Refer to "Market Size," "Employer Demand," and "Competitive Analysis" sections.

Target Market –This is the group of people whose needs you will focus on fulfilling better than anyone else.

Questions to ask:

- Who are they?
- What is their need?
- How will we serve it?

The target market for this program consists of place-bound professionals working in computing or software industry who desire to attain advanced, graduate degrees in Software Engineering.

Estimate the number of individuals you expect to enroll from your target market for the 1st, 2nd and 3rd years. This market segment can be based on demographics -- e.g., the number of students who complete community college in WA each year with an AA degree with a business emphasis, or (for a graduate program) the number of students who graduate with an undergraduate degree in this field in the Northwest. This will help you identify potential trends and your target market.

Your **target market** is usually the segment that has the largest numbers of individuals in it. However, if that segment's needs are already being taken care of by one of your competitors, you may wish to target another group or go for the specialty "niche," or secondary market. Note that it may be better to target 50% of a smaller group rather than 2% of a global market.

	1st year	2nd year	3rd year
Target	___20__	___30___	___40___

To whom will your marketing efforts be directed? What are the key characteristics of that segment to which you will appeal?

TARGET MARKET:	**Characteristics:**
State Computing and Software Industries	*All professionals or individuals with a BS degree in computer science or related field who may be interested in attaining an advanced, MS degree in Software Engineering.*
_____	_____
_____	_____
_____	_____
_____	_____

Recruitment Plan:

1. **How and where are students going to find out about this program?**

Through websites and brochures, utilizing the market operations of the WSU Global Campus.

2. **Who will represent this department in its promotion activities?**

One of the software engineering faculty hires will take on the program coordination role and will represent the department in its promotion activities.

3. **What specific venues can you use to promote an awareness of this new program?**

Marketing and recruitment plans will be developed and executed by WSU Global Campus.

4. **What means will be used to access and educate businesses, industry, agencies, and/or institutions about this offering?**

Through our existing industry advisory board, current connections and links with the industry, websites, and brochures.

Financial Analysis:

A major factor in determining whether or not a proposed program is viable is financial feasibility. The following Excel spreadsheet contains five tables, which can be pasted into the proposal template document after it is completed. Both your college's Finance Officer and the University Budget Office are available to assist you with this spreadsheet.

Faculty Participation – Table 1
Use Table 1 of the spreadsheet to list the faculty resources required by the new program.

Enrollment Projections – Table 2
Enrollment objectives are established to provide a measurement of the cost of the program. They are based on expected enrollment trends and the capacity of your unit to realize those opportunities by meeting student needs. Use Table 2 of the spreadsheet to report enrollment projections.

When considering a new program, the focus will be on its cost per student FTE (full time equivalent). There are guidelines available in the Budget office to help the University assess which programs are high or low cost, compared to other programs in the same discipline, as well as the overall cost mix for all University programs.

Administrative/Support Staff Participation – Table 3
Use Table 3 of the spreadsheet to list the administrative/support staff FTE resources required by the new program.

Cost Projections – Table 4
Many of the expenses involved in creating new programs can be absorbed into the existing structure. However, a new program can add fixed and variable costs that significantly impact the financial analysis.

- **Fixed** costs are independent of the number of students in the classes – they will not change (not considering inflation) as you move from Year 1 to Year N when you reach what you consider to be "Full Enrollment."

- **Variable costs** are those costs that vary depending upon the number of students. These costs will grow from Year 1 to Year N. Some costs exhibit a step function pattern; that is, they are fixed for X number of students, but increase for X+1 students and again for 2X students. For purposes of this worksheet, assume your enrollment goals will be met.

If you are using similar kinds and sizes of courses and similar methods of delivery as an existing program, you may be able to project the costs of the new program fairly closely by determining the cost of the existing program. If this site will use different delivery methods, start with fewer students, or otherwise differ from the existing one, this may not be the case. Check with your college's Finance Officer or the Budget Office for assistance.

Direct and indirect expenses must be considered in the financial analysis. **Direct expenses** are specifically tied to the proposed program and include:

- Instructor salaries and benefits
- Administrator salaries and benefits
- Clerical Support salaries and benefits
- Graduate Assistant salaries and benefits
- Equipment costs
- Travel costs
- Goods and Services – phones, copying, etc.
- Classroom materials costs
- Other

Indirect expenses are costs that are often associated with existing or additional support services that increase incrementally because of the addition of the program. These costs should not be confused with the Facilities and Administrative (F&A) costs that are applied to grants and contracts. The indirect costs related to new programs are the facilities, academic support, administrative support and student services costs that are in place to support the delivery of the University's academic programs. The Budget Office tracks the overall cost of these services, and the appropriate rate is included in the template.

Note: if you are developing a new program that will be delivered via the Global Campus, you should reduce the indirect percentage to 0.32 in the template. Please call the budget office if you have questions).

Opportunity costs are the costs of not doing something else. They are not included in Table 4, but should be kept in mind. For example, if an instructor or other existing resources are "re-allocated" to this proposal, what area will be affected and what is the value of these resources? Every time a new program or site is proposed, we should carefully consider that it is subtracting resources from other programs or sites. If a new program or site is not taking resources from other programs, it may imply that we have underutilized resources. How does your proposal address this?

Additional Information for Completing Table 4

- The Internal Reallocation column indicates that the costs within the column will be covered by reallocation resources from other programs within the department or college.

- New State Funds should only be shown as a source when a program is being developed at one of the branches or if implementation will await the availability of new funds (e.g., state-funded High Demand FTEs). Note that listing items in the New State Funds column does not imply or guarantee that these funds will be available when needed.

- Other Sources of funding (e.g., be matching funds for equipment or in-kind resources available to the program).

- Complete the template using your best estimates of the costs to deliver this new program, both in the first year of delivery and in the year that you expect it to reach full capacity (Year N). It is often true that the first year of a program has higher costs per student FTE, as the enrollments in early years are

lower than expected full capacity. Over time, as the number of FTE increase, the costs per FTE will decrease.

- The spreadsheet will calculate both the indirect and total costs, as well as the cost per student FTE.

Salary Cost Detail – Table 5

Use Table 5 to provide aggregated salary data for the personnel in Tables 1 and 3 for Years 1 and N. Do not include faculty and staff names in Table 5. Provide only the aggregate salary data for each category in the table.

NOW *SUMMARIZE* THE INFORMATION AND ANALYSIS FROM THE ABOVE WORKBOOKS IN COMPLETING THE PROPOSAL TEMPLATE

New Degree Program Template

The Proposal *Template* leads you to answer the array of questions about your proposed program that are important to your department, your college, the Faculty Senate, the State, and, in some cases, external reviewers.

By placing all proposals in a similar format, this template provides a common standard for comparison, ensuring that all potential programs can be evaluated in an equitable fashion. It can be used to determine whether or not a program is feasible within the university's academic and financial situation, and if it will have the resources to further the University's objective of providing high quality education and scholarship.

Finally, this template can become a framework to think about the viability of your ideas. It can thus be a tool for strengthening both your proposal and the resulting program itself, since a program that is starved for either students or resources from its inception is not likely to become a high quality program.

Here are some of the things you will be asking as you complete the template:

> What are the aspirations for the reputation of this program – local, regional, national? What will it take to make that a reality?
>
> Who are we trying to attract with this new program? Will it bring new students to the university, better meet the needs of current students in the department, or draw students away from other departments?
>
> How strong is the demand for education of this kind, and in what specific careers will someone who receives such an education will find meaningful employment?
>
> How many students do we need to attract to break even, and can both the market and our capacity support this number?

Providing good answers to hard questions maximizes the likelihood that a new program will not just win faculty senate and administration acceptance, but ultimately will be successful in attracting students and placing graduates.

Proposal to Offer a New Degree Program

I. Overview:

Program Title: Master of Science in Software Engineering (MSSE)

Degree (level) Master of (type) Science

In (major or field) Software Engineering

CIP Code (consult registrar): Computer Software Engineering: 14.0903
(**C**lassification of **I**nstructional **P**rograms)

Department(s): School of Electrical Engineering and Computer Science (EECS)

College(s): Voiland College of Engineering and Architecture

Departmental Contact:
Name: Behrooz Shirazi Title: Professor and Director
Phone: 509-335-8148 e-mail: shirazi@wsu.edu

Campus of Origin: Pullman, WSU Global Campus

Starting Date: Fall 2016

Method of course delivery: (check all that apply)

- ☐ Classroom (including hybrid)
  - ☐ Pullman
  - ❍ Vancouver
  - ❍ Tri-Cities
  - ❍ Spokane
  - ❍ WSU Research, Learning, or Extension Center(s) at:
  - ☐ Other Location(s) at:
- ☐ AMS or Video-Conferencing System
- ☑ The Global Campus
- ☐ Other (please describe)

II. Mission Statement

Washington State University

Vision
Washington State University will be recognized as one of the nation's leading land-grant research universities.

Mission
Washington State University is a public research university committed to its land-grant heritage and tradition of service to society. Our mission is threefold:

- To advance knowledge through creative research and scholarship across a wide range of academic disciplines.
- To extend knowledge through innovative educational programs in which emerging scholars are mentored to realize their highest potential and assume roles of leadership, responsibility, and service to society.
- To apply knowledge through local and global engagement that will improve the quality of life and enhance the economy of the state, nation, and world.

What is the Mission statement of your Department(s)?

The School of Electrical Engineering and Computer Science (EECS) education, research, and outreach missions are as follows.

Education mission:
- Educate graduates for professional leadership, civic influence, and lifelong learning
- Provide an education based on a theoretical, experimental, and ethical foundation and enhanced by opportunities for participation in research, internships, international studies, interdisciplinary programs, or programs in entrepreneurship

Research mission:
- Conduct research and develop technology to address present and future societal problems
- Advance the state-of-the-art in areas incorporating technical disciplines from electrical engineering and computer science
- Collaborate with researchers from other disciplines to address societal grand challenge problems

Outreach mission:
- Serve the community and the profession by participating in activities designed to improve and preserve the body of knowledge in engineering and computing
- Participate in service that advances engineering and computing education
- Transfer research results to communities, the nation, and the world to increase economic equity, quality of life, and ecological sustainability

Your College(s)?

The Voiland College of Engineering and Architecture (VCEA) mission is to provide a comprehensive education to a diverse constituency in engineering and architecture that prepares students to contribute effectively to the profession and society, for advanced study, and for lifelong learning; to conduct research, integrated with education, in selected areas of excellence, within traditional disciplines and within interdisciplinary teams, technologically important and relevant to the region and nation; and to serve constituents through technology and design transfer partnerships and extended education programs.

Your Campus(s)?

The mission statement for the Pullman campus is already outlined above. The mission statement for the WSU Global Campus is as follows:

The Global Campus is a door that connects the world to WSU and WSU to the world. It provides access to the best of WSU for students, faculty, and anyone seeking to gain or share knowledge. The Global Campus advances WSU's mission to bring education beyond geographic boundaries. And it goes beyond education to create a virtual gathering place that offers a true campus experience.

Describe how this proposed program will complement or reflect these missions.

Questions to ask:

- Where are we? (as a department/college/campus)
- Where do we want to go (or to develop, or to be perceived)?
- How will the proposed program help us get there?

The proposed new online Master of Science degree in Software Engineering (MSSE) is in line with and reflects the university, global campus, college, and school missions in several ways, including:

- Producing highly qualified, much in demand, software engineering professionals.
- Expanding access to high-quality master's degrees in science and engineering in the state, the nation, and globally.
- Producing work-ready graduates with advanced, state-of-the-art education and training.
- Meeting the workforce needs of the state and regional industries.
- Establishing and fostering research in software engineering at WSU.
- Providing support for high priority research and educational initiatives such as data science/analytics.

III. Program Description

Questions to ask:

- What is the nature and focus of this program?
- Is it interdisciplinary in nature? If so, what are the fields of study involved, and how will multiple units work together in delivering the program? *(Document support from all units involved.)*
- Within what discipline(s) does it fall? What distinguishes it from other similar disciplines or from other branches of the same field?
- Is it a broad, general program or will it focus on one specialization? Does it offer more than one option?

The proposed online Master's degree in Software Engineering is intended to be a complementary, sister program to already existing MS Computer Science program at WSU. As sister disciplines, computer science and software engineering share the fundamentals of a computer science curriculum. Where they differ is in advanced, graduate level courses—CS focuses on topics in machine learning, data science, algorithm design, distributed and networked systems, human computer interfacing, pervasive computing, bioinformatics, and other topics of interest to the students. In contract, a BSSE program focuses on advanced courses in software design and development, software testing and validation, software maintenance, software security, and software management and integration—all specialties of high demand among the State's computing and IT industries.

In addition, the proposed online MSSE program will utilize a few existing courses from the MS Engineering Management program that are related to professional ethics and project management.

It should be noted that software engineering and software design principles play fundamental and supporting roles in application development in many domains, including those served by computational and data sciences, such as health or environmental informatics, business analytics, and bioinformatics. Therefore, several of the advanced elective courses in software engineering will be of interdisciplinary nature with applications in business, biology, health, and environmental sciences.

The proposed MSSE courses and degree program will be offered entirely online (distance-learning) through the WSU Global Campus. The online, asynchronous delivery mode makes the program equally desirable for working professionals looking for part-time, slower-pace participation as well as full-time graduate students seeking a quicker-pace to completion for a professional MS degree.

The online MSSE degree will be a terminal, non-thesis, degree designed to address the needs of professionals seeking advanced degrees or those seeking employment in industry/commercial sector right after graduation.

The online MSSE program is intended to be an extension of the newly proposed BS in Software Engineering program [see the attached BSSE proposal] that will be offered in both Pullman and WSU North Puget Sound at Everett campus. We believe due to the acute computing and software workforce shortage in the state, it is imperative that we develop the proposed online MSSE program as soon as possible and simultaneously with the BSSE program. This can be achieved with minimum risk by careful planning and skewing the timelines for the development of the two programs:

- First, it should be noted that the MSSE degree will only require 6-8 new software engineering courses, which when combined with 2 Engineering Management courses and 1 or 2 Computer Science courses, will constitute the curriculum for the entire degree. The development of these courses will be spread over 2-3 semesters and offered as initial students progress through their degree.

- Second, the BSSE degree is slated to start in Spring 2016 while the MSSE degree will be offered in Fall 2016. This will allow the faculty time to develop 2-3 MS software engineering courses for the start of the program while other courses will be developed over time as explained above.

IV. State Need and Student Demand for the Program

Summarize your conclusions about need and demand from the *Workbook II - Analyzing Demand and Cost* here:

Access to baccalaureate and graduate degrees continues to be a major issue curbing overall educational attainment and nationwide economic competitiveness in Washington. The problem is most acute in the areas of computer science (CS) and software engineering (SE). A 2011 joint report prepared by the Washington State Higher Education Board, State Board for Community and Technical Colleges, and Workforce Training and Education Coordinating Board indicates that during the 2014-2019 period there will be a ratio of nearly 2 to 1 between demand and supply in the State for graduates with BS degrees in CS or SE.

The land grant mission of the University is to extend access to education. Delivering the proposed MS degree online and asynchronously, provides access to qualified place-bound individuals state-wide, nationally, and internationally. Additionally, the demand for individuals with software engineering skills in Washington State and the Pacific Northwest has grown steadily and significantly over time and is expected to continue to grow rapidly in the coming decade.

A recent comprehensive market study by Global Campus shows that software engineering skills are highly sought after in the workplace. Employment in the area of software engineering is growing rapidly with jobs such as Software Development Engineer, Software Developer, and Software Engineer growing about 87%, 56% and 74%, respectively, in Washington alone in 2012-2013. It is expected to continue this trajectory through 2020.

Data from the second half of 2013 show that 4,483 regional jobs posted requiring Software Engineering skills at graduate level and 11,881 regional jobs posted requiring Software Engineering skills at Bachelor's level.

Software engineering graduates are rare and easily demand 6-figure salaries upon graduation. While other states such as California, Massachusetts, Pennsylvania, Illinois, and Indiana have committed to building software engineering programs and producing SE graduates, the State of Washington is lagging in this area. To the best of our knowledge, currently there is no online Master of Science in Software Engineering degree offered at any of the 4-year institutions of higher education in the Sate. University of Washington has a face-to-face, evening professional Master's degree in Computer Science and Engineering and UW-Bothell offers a face-to-face Master of Science program in Computer Science and Software Engineering. Western Governors University offers competency-based online MS degrees in Information Technology, but not in Software Engineering.

Therefore, the proposed new online MSSE program at WSU Global Campus will be unique and will help the State and its computing/IT industries meet their needs by producing highly skilled and trained graduates in software engineering

Alignment with Strategic Plans:

The proposed online MS SE degree is inline with the University, VCEA, and EECS strategic plans in building strong research and educational programs in the data science or data analytics areas. A widely accepted definition[1] denotes that data science takes place at the intersection of hacking skills (software

[1] http://drewconway.com/zia/2013/3/26/the-data-science-venn-diagram

development), math and statistics knowledge, and domain expertise. Therefore, software engineering plays a central and supporting role in any strong data science program.

In today's data driven societies and economies, scientific and engineering solutions often heavily rely on acquisition, management, and careful analysis of vast datasets. This analysis requires a skill-set as broad as it is deep in that scientists must be experts not only in their own domain, but in statistics, computing, algorithm building, and software design as well. Therefore, software engineering plays a central role as WSU, VCEA, and EECS strive to build strong research and educational programs in data science/analytics. For example, many of the MS degrees in Data Science or Data Analytics at universities such as NYU, Columbia, IIT, and SMU have software engineering as part of their core curriculum.

Data science research requires interdisciplinary collaboration among computer scientists, software engineers, mathematician and statisticians, and domain experts. Since software engineering expertise is currently non-existing, or at a minimal level, in Pullman, the proposed software engineering program will provide an opportunity to fundamentally contribute towards building a strong data science research program on Campus. Furthermore, the proposed program will provide a strong supporting role in building robust, vibrant PhD programs in data science by helping in the production of PhD graduates with strong multi-disciplinary expertise (including software development).

V. Goals and Objectives, Student Learning Outcomes and Assessment

Preamble: In 2014 we requested new state funding to establish a BSSE degree both in Pullman and at WSU North Puget Sound at Everett campus. The development of the proposed online MS in Software Engineering degree relies on the same faculty and teaching resources requested for the BSSE program. Simultaneous with state budget decisions, the hiring of the new faculty to support the software engineering programs will take place in late spring or early summer of 2015. However, (conditional) Faculty Senate approval at this time is needed in order to hire the faculty this spring/summer when funding becomes available.

The new faculty members will be instrumental in designing the program goals and objectives, student learning outcomes, the curriculum to achieve the outcomes, and the processes for assessment of student learning outcomes. Once the new software engineering faculty are in place (Fall 2015), final Faculty Senate approval will be requested by providing detailed responses to sections V-A, V-B, V-C, and VI below, as prepared with input from the new software engineering faculty.

In summary, we are requesting conditional Faculty Senate approval at this time due to two factors:

- *Be able to proceed with the planned hiring of the software engineering faculty, and*
- *Be responsive to the urgent workforce needs of the WA industries for highly educated and trained graduates with computer science and software engineering expertise.*

The School of EECS Computer Science, Computer Engineering, and Electrical Engineering UG programs have long been accredited by ABET for many decades. Our faculty members are very much familiar with and support clear and concise program goals and objectives, student learning outcomes, and assessment of the objectives and achievements of the outcomes for our programs. We have extensive assessment plans in place for the evaluation of our existing educational programs. With this experience and with the arrival of the new software engineering faculty and their input, we are confident we will be able to define clear and justifiable program goals and objectives, student learning outcomes, and a solid assessment plan for the

evaluation of the objectives and outcomes. The same is true with the development of the curriculum for the new online MSSE degree and mapping of the courses and the student learning outcomes.

A. Goals and Objectives

Questions to ask:

- What are we trying to achieve with this program?
- How will we assess whether we are meeting our goals and objectives – i.e., how will we gather information and how will we use it?

See the preamble note to section V. Specific goals and objectives will be provided in Fall 2015 for Faculty Senate final approval.

B. Student Learning Outcomes

Questions to ask:

- What will our graduates know and be able to do as a result of this program?
- Are these outcomes observable and measurable?
- Do they align with other university learning goals, such as the Seven Goals of the Baccalaureate, and/or with standards from professional or disciplinary organizations?

See the preamble note to section V. Specific student learning outcomes will be provided in Fall 2015 for Faculty Senate final approval.

C. Assessment of Student Learning and Student Achievement (resources and samples appended)

Questions to ask:

- How will we assure whether students are achieving the student learning outcomes?
- Does this program include a capstone class or experience, where students demonstrate mastery of the learning outcomes and assessment can readily occur?
- What resources are available to support assessment?
- If the new program will be included in an existing program's assessment plan, how will the assessment data be disaggregated to provide useful information on the new program? How will the new program participate in assessment? Are there any unique assessment needs or constraints (may include delivery mode, for example)?

Please indicate as appropriate:

- ☐ Assessment of this program will be incorporated into the existing assessment plan for _____. Please attach a copy of the existing plan.
- ☐ A draft assessment plan is attached.

See the preamble note to section V. Specific plan and processes for assessment of student learning outcomes will be provided in Fall 2015 for Faculty Senate final approval.

VI. Curriculum

Questions to ask:

- What courses will be required?
- What electives (if applicable) will be available?
- What courses from other departments/colleges will be used? *(Document support from those units.)*
- How do the required courses align with the student learning outcomes to ensure students can build and refine skills and knowledge over time? Has the curriculum been mapped?
- If this is an undergraduate program, how have the needs of transfer students been taken into account in planning for it? What arrangements are in place to ensure that pre-requisites are readily available and that CC students will be appropriately prepared and well advised? If this is an undergraduate program offered at a location other than Pullman, how have local community colleges and their faculties been involved in planning for it?

Please attach a curriculum map (matrix aligning courses and the program's student learning outcomes)

See the preamble note to section V. Specific curriculum, requirements, and mapping of the courses and the student learning outcomes will be provided in Fall 2015 for Faculty Senate final approval.

VII. Uses of Technology

Questions to ask:

- What kinds of technology will be used in teaching this curriculum?
- Will instructors or students need any training or support using technology? If so, how will the training or support be provided?
- What technologies will the students learn to use in order to be employed in this field? To what extent do the class technologies align with technologies in the field?

The proposed MSSE program will primarily rely on computer systems and software tools as technologies for offering the curriculum. The participating distance Software Engineering students will be required to have their own laptops or computer systems for their various programming and project assignment needs. Therefore, no new physical computing facilities will be required.

Many of the software tools needed for the MSSE is already in place and in use for the Computer Science program. Additional tools will be acquired as needed.

The Computer Science and Software Engineering faculty are already experts in the use of computing technologies and software tools. The existing CS and the proposed SE curricula will prepare the students for the efficient use of these technologies and tools.

CS and SE students will use industry standard systems and tools in their course work, including but not limited to: Linux, Windows, iOS, and Andriod operating systems; programming tools such as Visual Studio;

software revision control tools such as Github; databases and search engines such as SQL and Solr; and, web and network development tools such as Apache and Microsoft .Net Framework.

VIII. Delivery methods

Questions to ask:

- Will this be an entirely site-based, face-to-face program, or will part or all of it be delivered off-campus and/or electronically?
- If the latter, what parts and by what media?
- If site-based and face-to-face, when will the program be offered (day/evening/weekend)?
- Will students or instructors need any training or support in using the delivery methods? If so, how will that training or support be provided?

The proposed MSSE courses and degree program will be offered entirely online (distance-learning) through the WSU Global Campus. The online, asynchronous delivery mode makes the program equally desirable for working professionals looking for part-time, slower-pace participation as well as full-time graduate students seeking a quicker-pace to completion of a professional MS degree.

IX. Students

A. How many students to you expect to serve with this program?
(If you expect a combination of part time and full time students, please use the FTE Calculator, at **Table 2** of http://www.budget.wsu.edu/Cost_template.xls , before completing this table.)

Table below shows the expected program growth at WSU North Puget Sound at Everett campus:

Number of Students	Year 1	Year 2	Year 3	Year _4_ *
Headcount	20	30	40	50
FTE**	20	30	40	50

* Enter year number in which program anticipates reaching full enrollment

B. Admission Requirements

Questions to ask:

- What are the certification requirements into this major (for undergraduates), or the departmental process and admission requirements (for graduate programs)?

The admission requirements for the online MSSE degree will be similar to the existing MS Computer Science program, as follows:

The School of EECS evaluates applicants for admission to its graduate programs based on college transcripts, GPA, the score on the general GRE, (3) letters of recommendation, a statement of purpose, and TOEFL score, if applicable for international students.

Students whose undergraduate studies did not include material equivalent to that covered in the following WSU courses will be asked to take course work to resolve their undergraduate deficiencies: CptS 121, 122, 223, 260, 317, 355, 360, 450, Phil 201, and Math 216. All or most of these courses should be completed before the student is eligible for admission into the MS program in Software Engineering. The admissions committee may require the student to correct other undergraduate deficiencies as well, including undergraduate prerequisite courses to graduate courses.

C. Expected time for Program Completion

Questions to ask:

- Will most students be full time or part time?
- How long will it take each type of student?
- If this is an undergraduate program, can it be completed in four years (if so, please outline a 4-year course of study; if not, please explain), and
- How can transfer students articulate smoothly into the program and complete it with approximately the same number of total credits as students who enter WSU as freshmen?*

The online MSSE degree is designed to be completed in 1.5 to 2 years with a full-time course workload. However, the online, asynchronous delivery mode makes the program equally desirable for working professionals looking for part-time, slower-pace participation as well as full-time graduate students seeking a quicker-pace to completion of a professional MS degree.

D. Advising

Questions to ask:

- Who will provide academic advising for the students?
- How will advisors be assigned?

The existing School of EECS Graduate Programs Coordinator will provide academic advising for the online MSSE students.

Each participating student will choose a faculty mentor and supervisor from among the computer science and software engineering faculty for guidance throughout their graduate studies.

E. Diversity

- Please describe specific efforts planned to recruit and retain students who are persons of color, disabled, or whose gender is underrepresented in this discipline.

Women are underrepresented in Computer Science, Software Engineering, and some engineering disciplines such as Computer and Electrical Engineering. Therefore, the School of EECS is developing several

initiatives to increase participation of women in its programs, including the proposed MSSE program. These initiatives include:

- Development of a marketing and promotional video featuring one of our female computer science athletes
- Supporting student clubs that are organized and run by women students with the goal of recruiting more women students to CS, CE, SE, and EE disciplines
- Becoming a member of and participating in programs offered by National Center for Women & Information Technology (NCWIT) Academic Alliance
- Partnering with American Association of University Women (AAUW) to set up a summer Tech Trek Camp for 150 high school girls to come to WSU each year and participate in a week-long math and science camp working with experienced professors on creative and engaging hands-on programming projects

X. Faculty and Administration

The online MSSE program is intended to be an extension of the newly proposed BS in Software Engineering program (BSSE) that will be offered in Pullman and at WSU North Puget Sound at Everett campus [see the attached BSSE proposal]. In 2014 we requested new state funding for establishing the BSSE degree. The development of the proposed online MS in Software Engineering degree relies on the same faculty and teaching resources requested for the BSSE program, consisting of 4 faculty, TA support, and support for adjunct faculty. No new staff support is required, as the existing EECS Graduate Programs Coordinator will manage the MSSE program as well.

XI. Facilities

Questions to ask:

- Will this program require new teaching laboratories?
- Will this program require new research facilities?
- Will this program require specialized equipment?
- If so, what resources are available for this purpose?

The proposed MSSE program will primarily rely on computer systems and software tools as technologies for offering the curriculum. The participating distance Software Engineering students will be required to have their own laptops or computer systems for their various programming and project assignment needs. Therefore, no new physical computing facilities will be required.

Many of the software tools needed for the MSSE is already in place and in use for the Computer Science program. Additional tools will be acquired as needed.

The tenure-track software engineering faculty hires (hired through the BSSE program) will be able to acquire their research computing needs through their start-up packages.

WSU Online (Global Campus) provides support to faculty in the development and delivery of the online course:

- An eLearning Consultant, with expertise in instructional design of online courses will work 1:1 with faculty members developing online courses to ensure that best practices and pedagogical recommendations for successful online learning are understood.
- The WSU Online media team will work with faculty to create appropriate media and interactive activities to promote learning and enhance engagement.
- The same eLearning Consultant will continue to support the faculty member during delivery as issues unique to the online learning environment arise.
- WSU Online provides face to face orientation and trainings and online tutorials to support online instructors.
- Managing proctored exams for the course, if needed.
- 24/7 technical support.
- Ongoing maintenance or updating of courses, each semester of offering is provided by WSU Online.

WSU Online provides support to students:

- Acquiring required resources, such as texts and media
- Arranging for proctored exams.
- Academic Consultants provide advising for WSU Online degree seeking students.
- 24/7 technical support

XII. Finances

The proposed online MSSE program does not require any additional budget or costs as it relies on the same faculty and teaching resources requested for the BSSE program [see the attached BSSE proposal]. Over time, as the enrollment grows, we will rely on the funds generated by the university revenue sharing policy to sustain and grow the program.

XIII. External Reviews

If this program is new to the Washington State University system, please provide the names and addresses of 3 – 4 external experts from similar institutions who could be contacted to provide reviews of this program.

1. Ali R. Hurson
Department of Computer Science
Missouri University of Science and Technology
hurson@mst.edu
573-341-6201

2. H.J. Siegel
Department of Electrical and Computer Engineering
Colorado State University
H.J.Siegel@colostate.edu
970-491-7982

3. Lynn Peterson
Department of Computer Science and Engineering
University of Texas at Arlington
peterson@uta.edu
817-272-5503

4. Samee Khan
Department of Electrical and Computer Engineering
North Dakota State University
samee.khan@ndsu.edu
701-231-7615

APPENDIX

Student Learning Outcomes and Assessment Plans

Will be provided in Fall 2015 (See the preamble for section V) for final approval