Dr. Kenneth E. Nidiffer

**Successfully Managing and Leading Software Projects
Software Engineering 625
Volgenau School of Information Technology and Engineering
George Mason University**

Class Syllabus for SWE 625

Fall 2024

Overview of the Class Syllabus for SWE 625

- Why Take SWE 625
- Scope
- Conclusions – DIB (Defense Industrial Board) Study on Software Acquisition and Practices (SWAP) Study Biography
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Why Take SWE 625?

- Successfully managing software intensive projects is a **priority** for the industrial, government and academic organizations

- The ubiquity of software and its critical role require fundamental shifts in software engineering management **are necessary** to maintain competitive advantage

- The course helps participants to **rapidly deploy innovation with confidence** within this shifting landscape by:
  - Applying new principles in software **engineering management for software intensive systems**
  - Developing new practices for **enabling business/mission capability with software innovation**

- **Equips students** in applying new management techniques in today's competitive job market

Scope of Software Engineering (SwE) Management

Mission/Business Success & Capability Focused

o System of Systems – (e.g., Cyber/Hyper-Connected and AI Engineered Systems)

o Networked Hardware/ Platforms

o Infrastructure

o Applications

o Workforce: People who digitally connect in cyberspace

Source: SEI
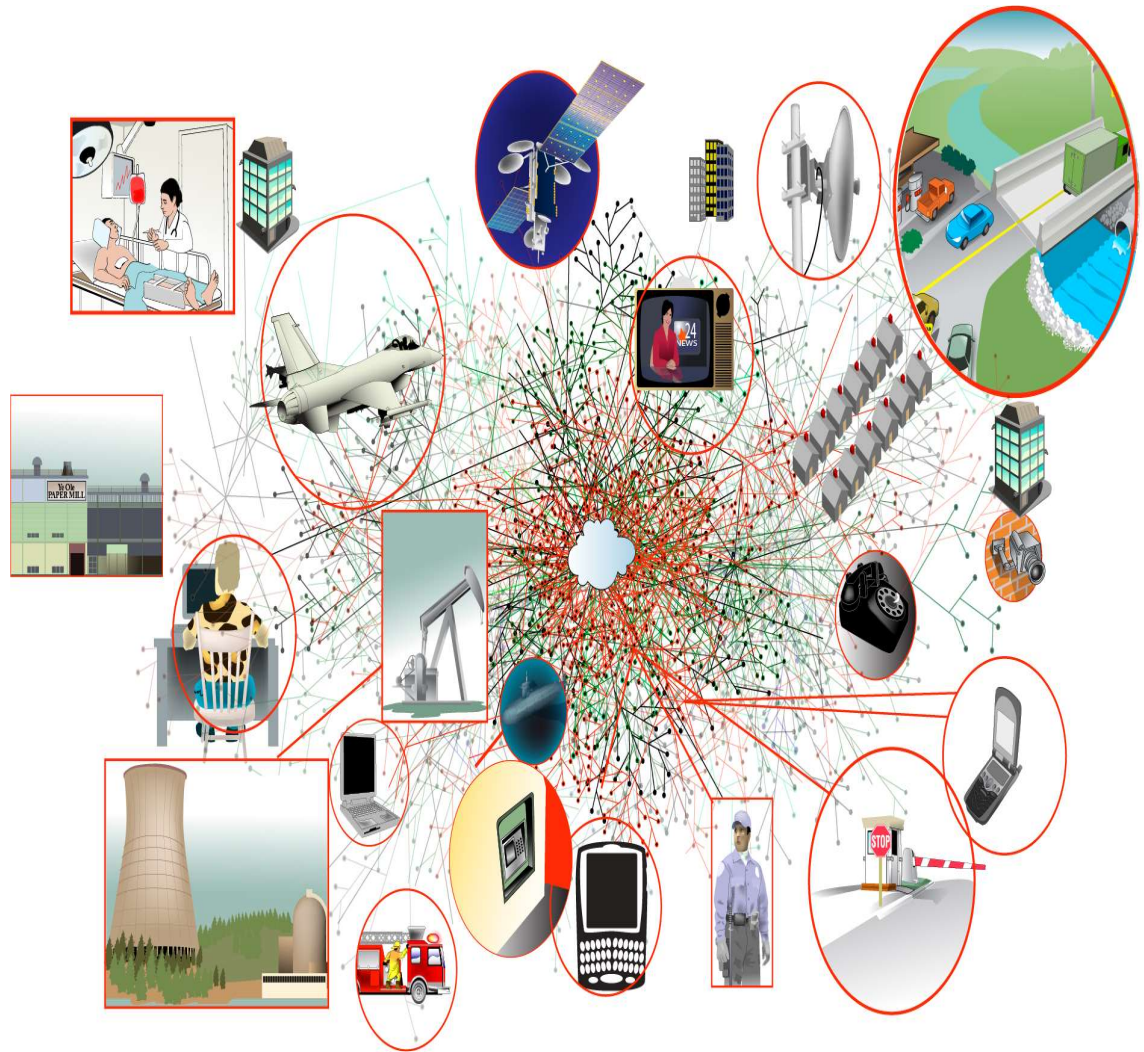
Conclusions - Defense Innovation Board (DIB) Software Acquisition and Practices (SWAP) Study – 11 Jan 2019

- **Software is ubiquitous and U.S. national security relies on software.** Well-equipped and well-trained warfighters provide the capability necessary to defend the nation, but software critically enables that mission. The ability to develop, procure, assure, and deploy software is central to national defense and integrating with allies and partners.

- **Speed and cycle time are the most effective metrics for software.** Software is a critical element of the Department's approach to executing missions, collaborating with allies, and managing its operations. DoD needs to deploy & update software at the speed of (mission) need and execute within the OODA loop of our adversaries to maintain advantage.

The **OODA loop** is the cycle observe–orient–decide–act, developed by military strategist and United States Air Force Colonel John Boyd.

Conclusions - Defense Innovation Board Software Acquisition and Practices (SWAP) Study – 11 Jan 2019

- **Software is made by people, for people, so digital talent matters.** DoD's current personnel processes and culture will not allow its military and civilian software capabilities to grow nearly enough. New mechanisms are needed for attracting, educating, retaining, and promoting digital talent, and providing the ecosystem that enables them to succeed.

- **Software is different than hardware (and not all software is the same)**. Hardware can be developed, procured, and maintained. Software is an enduring and evolving capability that must be supported and continuously improved throughout its lifecycle. The DoD acquisition process and culture need to be streamlined for effective delivery and oversight of multiple types of software-enabled systems, at scale, and at the speed of relevance.

Biography

DR. KENNETH E. NIDIFFER, PMP

Dr. Nidiffer has over sixty-one years of experience in the marketing, research, development, support, maintenance, and acquisition of software-intensive systems.   His 24-year career in the U.S. Air Force (where he retired as a full colonel) is marked by several firsts in software implementations, such as, first space-based compiler, first command-hardware in the loop simulation, a series of development/process standards, etc. From 1983-1986 he helped establish several noteworthy contributions, such as, the Software Productivity Consortium; the Software Project Management Program at the Defense Systems Management College; the George Mason Software Engineering Program and the Software Engineering Institute. At the Software Productivity Consortium, he launched the Consortium's business initiative in software process improvement, which became one of the largest programs in the world.

In 1991, Dr. Nidiffer left the Consortium to serve one of its founding members, Northrop Grumman, as Director of Systems Design and Development, Data Systems Division, and then as Director of Technical Operations, External Data Systems division, where he directed over 500 engineers and support personnel in the successful development of a variety of C4I, MIS/logistics, and high-speed computing systems.

Biography

In 1995, he joined Fidelity Investments Systems Company as Senior Vice President of Quality and Systems Assurance to lead a team of 165 professionals in implementing Total Quality Management, best-in-class software engineering processes, and the largest financial services test environment. He rejoined the Consortium in 1997 as Vice President for Business Development growing the membership from 50 to 100 agencies. In 2007 he joined the Software Engineering Institute (SEI) to focus on promoting key software engineering technologies that support government programs. In 2020 he left the SEI to form his own company, Ken's Software-Enabled Systems Company.

Dr. Nidiffer has been widely published in the systems and software engineering community. He received his B.S. degree in Chemical Engineering in 1962 from Purdue University, Indiana, a M.S. degree in Astronautical Engineering in 1969 from the Air Force Institute of Technology, Ohio, a MBA degree from Auburn University, Alabama in 1975 and his D.Sc. degree from George Washington University, Washington D.C. in 1988.

He is a member of the Program Management Institute (PMI); the International Council on Systems Engineering (INCOSE); the Armed Forces Communications & Electronics Association International (AFCEA); Senior Member of the Institute of Electrical and Electronics Engineers (IEEE); the Inter-National Committee for Information Technology Standards (INCITS)/Software and Systems Engineering (INCITS/SSE) Technical Committee, Senior member of the American Institute of Aeronautics and Astronautics (AIAA); member of the National Defense Industrial Association (NDIA Systems Engineering Division); Chair of the NDIA/OSD (DDR&E) Industrial Software Committee and Co-Chair of the NDIA Systems Engineering Education and Training Committee.

Biography

Ken is a certified logistician; a Professor Emeritus of the Defense Systems Management College; a Project Management Professional, co-editor IEEE SWEBOK (V4) – 2024, an adjunct engineering professor in graduate engineering at George Mason University for over 30 years.

Dr. Nidiffer is a man of faith and a family-oriented person. He has been married for 61 years to the former Mary Emma Walsh of Havana, Florida and they have three daughters: Sheri, Kristi and Kathi. four grandchildren and two great grandchild. In 2002 and in 2007, he was selected as the School of Information Technology's adjunct professor of the year in Software Engineering and received special recognitions for his GMU adjunct teaching service in 2002, 2007, 2009. 2013, 2017, 2018, 2022 and 2023.

GEORGE MASON UNIVERSITY
VOLGENAU SCHOOL OF INFORMATION TECHNOLOGY AND ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE

COURSE OVERVIEW
SOFTWARE ENGINEERING PROJECT MANAGEMENT 625

- COURSE TITLE: Software Engineering Project Management (SWE 625)

- INSTRUCTOR: Professor Kenneth E. Nidiffer

- SEMESTER CLASSES: Spring (26 Aug to 16 Dec) 2024, including final exam*

- SEMESTER FINAL EXAM*:   16 Dec, NEB**, Room 1103

- CLASS TIME/BLDG/ROOM: 1920 – 2200; NEB, Room 1103

*Note 1: Final exam is scheduled for 16 Dec 2024 (1930 – 2210)

**NEB = Nguyen Engineering Building

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COURSE OVERVIEW
SOFTWARE ENGINEERING PROJECT MANAGEMENT 625

- OFFICE HOURS: By Appointment
- Meeting Arrangement Mechanisms:
  - By the Internet – knidiffe@gmu.edu – Best Alternative for FTF*
  - By setting-up a Zoom Meeting – Good Alternative
  - By setting-up a conference call
  - By appointment in class
  - By note in my mailbox – Room D215A, Buchanan (Mason) Hall.
  - By setting-up a video-teleconference (VTC)

*FTF = Face-to-Face

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COURSE OVERVIEW
SOFTWARE ENGINEERING PROJECT MANAGEMENT 625

- CONTACT INFORMATION:
  - Internet/E-mail: knidiffe@gmu.edu (Best Method)
  - Oral Communication Mechanisms
    - Method 1:   (703) 217-0215 (Cell Phone) or Text – Best Method
    - Method 2:   (703) 455-4021(Home Phone Number) – Alternative Method

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COURSE OVERVIEW
SOFTWARE ENGINEERING PROJECT MANAGEMENT 625

Textbook 1:Title - Managing and Leading Software Projects*
Dated: 2009
ISBN 987-0-470-29455-0
Author: Dr. Richard E. (Dick) Fairley
Publisher: John Wiley & Sons, Inc.
Options to Obtain Your Own Copy:
1. Can be Pick-up at University Bookstore (located in the George W. Johnson Center)
2. Order on-line
3. Obtained previously owned book

* Students are not required to buy the course textbooks since electronic versions are provided for free (A copy of each textbook has been placed in Blackboard Learn – Lecture 1 – Project Asset Library)
* Students are expected to study and understand the contents of the course textbooks

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COURSE OVERVIEW
SOFTWARE ENGINEERING PROJECT MANAGEMENT 625

Textbook 2:Title - Systems Engineering of Software-Enabled Systems*
Dated: 2019
ISBN 9781119535010
Author: Dr. Richard E. (Dick) Fairley
Publisher: John Wiley & Sons, Inc.

* Students are not required to buy the course textbooks since electronic versions are provided for free (A copy of each textbook has been placed in Blackboard Learn – Lecture 1 – Project Asset Library)
* Students are expected to study and understand the contents of the course textbooks

COURSE OVERVIEW
SOFTWARE ENGINEERING PROJECT MANAGEMENT 625

COURSE PREREQUISITES:

Undergraduate courses or equivalent knowledge in structured programming in a high-level language, data structures, discrete mathematics, and machine organization or assembly programming.

COURSE DESCRIPTION:

This course is concerned with processes involved in project planning; organizing; staffing; estimating; measuring and controlling; communication, coordination and leadership; and risk management. Topics covered include lifecycle delivery approaches; process and engineering product development models with special emphasis on the best practices contained in the Capability Maturity Model Integrated (CMMI©) constellations, Generative AI and product/process standards. The course also stresses the Program Management Institute's Program Body of Knowledge (PMBOK©) and the Software Engineering Body of Knowledge (SWBOK).

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SOFTWARE ENGINEERING PROJECT MANAGEMENT 625

COURSE OBJECTIVES:

Upon completion of this course, students will know how to develop a software project management plan for software intensive systems; how to set up monitoring and control mechanisms; how to allocate and reallocate project resources; how to track schedule, budget, quality, productivity, and progress; understand the CMMI© frameworks and how to plan for the installation and sustainment phase of the system life cycle. They will understand the importance of the work breakdown structure and its relationship to the delivery lifecycle, resource planning and execution, and progress and product measures from both a project and enterprise perspective. In addition, they will understand the relationships among quality assurance, configuration management, verification and validation, and test and evaluation. They will also gain an understanding of the key issues in costing and pricing units of effort, motivation of workers, agile development, Secure DevOps, leading project teams, machine learning, ethics and total quality management.

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SOFTWARE ENGINEERING PROJECT MANAGEMENT 625

MAJOR TOPICS:

A taxonomy of management functions; corporate goals and objectives; system, project and product (functional and non-functional) requirements; architectural frameworks; best practice frameworks, cost estimation techniques and models; software process development models with special emphasis on the CMMI© and software systems engineering delivery models; technical methods; documentation, quality assurance, configuration management, verification and validation, test and evaluation; staffing plans; monitoring and controlling mechanisms; standards (e.g. IEEE/EIA 12207 and IEEE Std. 16326™), policies and acquisition frameworks (i.e. Defense (e.g. DODI 5000.02, Defense Acquisition Guidebook (DAG) and Commercial (e.g. Infrastructure Service Provider (ISP) /Application Server Provider (ASP) frameworks; Latest lifecycle development processes; Development and Platform as a Service (PaaS), Software as a Service (SaaS)), Agile processes (e.g. DevSecOps); work packages, schedules, budget, accounting systems, costing and pricing units of effort; risk management; post deployment software support; leadership, ethics, team building and total quality. Also, Defense Innovation Board (DIB) and Defense Science Board (DSB) findings will be addressed.

EVALUATION PROCEDURE:

Grades will be based on student homework, class contributions, student presentation and the final exam in the following proportions:

Class Contribution (Contributions In Addition to the Six Articles*)	10 %
Homework	10 %
Six Articles*	10%
Project	15 %
Student Project Presentations**	10 %
Final Exam***	45 %

   Note: Final exam is scheduled for 16 Dec (7:30-10:10 pm)

*   Articles can be submitted anytime to knidiffe@gmu.edu. All articles must be submitted by last day of classes (9 Dec 2024): All articles should be accompanied with a one-page analysis of each article. Three articles are to be from refereed sources and three can be from any source.
** 1920-2200/ SEB, Room 1103 (Project Presentation)
*** 1930-2210 SEB Room 1103 (Final Exam)

Lecture Topics
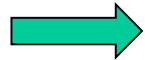
Session	Date	Topics
1	26-Aug	Introduction to Project Management
	2-Sep	No Class - Holiday - Labor Day - University Closed
2	9-Sep	Process Models for Software Development
3	16-Sep	Establishing Project Foundations
4	23-Sep	Plans and Planning
5	30-Sep	Project Planning Techniques
6	6-Oct	Estimating Techniques
	14-Oct	No Class - Fall Break
7	21-Oct	Measuring and Controlling Work Products

Lecture Topics

Session	Date	Topics
8	28-Oct	Measuring and Controlling Work Processes
9	4-Nov	Managing Project Risk
10	11-Nov	Teams, Teamwork, Motivation, Leadership and Communication
11	18-Nov	Organizational Issues
12	25-Nov	Furture of Software Engineering and It's Impact on Society
13	2-Dec	Student Presentations
14	9-Dec	Student Presentations
15	16-Dec	Final Exam

Course Materials and Location

Course Materials	**Location** (Blackboard Learn)
1. Announcements	On-line Folder/In-class/e-mail
2. Administrative Notes	On-line Folder/In-class/e-mail
3. Presentation (Slides)	On-line Folder
4. Student Handouts	On-line Folder
5. Student Responses	On-Line or Directly to Professor
6. Graded Responses	On-Line
7. Student Presentation	In-Class
8. Student Final	In-Class
9. Class Contributions	In-Class and On-line/e-mail

Blackboard Learn

- Blackboard Learn (previously the *Blackboard* Learning Management System) is a virtual learning environment and course management system developed by *Blackboard* Inc.

- Used by George Mason University

- SWE 625 Course information and assignments are contained on Blackboard Learn

- Key files are "Weekly Lectures" and "Assignments"

Blackboard Learn (Home Page)

Blackboard Learn (Lecture 1 Assignments and Hand in Requirements)

Blackboard Learn (Lecture 1 – Project Asset Library)

Lecture

Textbooks

Article

Reference Materials

Use of Generative-AI Tools

- ***Basic Academic Integrity Statement sample***:
- *Mason is an Honor Code university; please see the [Office for Academic Integrity](#) for a full description of the code and the honor committee process. Three fundamental principles to follow at all times are that: (1) all work submitted be your own, as defined by the assignment; (2) when you use the work, the words, or the ideas of others, including fellow students or online sites, you give full credit through accurate citations; and (3) if you are uncertain about the ground rules on a particular assignment or exam, ask for clarification. No grade is important enough to justify academic misconduct.*
- ***Generative-AI addendum, baseline***: *Use of Generative-AI tools should follow the fundamental principles of the Honor Code.*
- ***Generative-AI addendum, expanded:*** *Use of Generative-AI tools should be used following the fundamental principles of the Honor Code. This includes being honest about the use of these tools for submitted work and including citations when using the work of others, whether individual people or Generative-AI tools.*