

Software Engineering Licensing: Help or Hindrance?

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Disclaimer

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Outline

- **California Professional Engineering (PE) Law**
- **Texas Software Engineering PE License**
- **Impact of Licensing**
 - Process Improvement
 - Litigation Risk
- **Summary**

Why are Engineers Licensed?

- **To safeguard life, health, property, and public welfare of the people of California**
- **Ensure minimum standards are met by engineers**
 - Knowledge (education and testing)
 - Experience (work experience verified by PE exam)
 - Integrity (PE law exam)
- **Provides safe practice cost effectively**
- **Note:**
 - PE is not a Guild
 - Verifies minimum standards

Key Features of California Law

- **Regulates practice**
 - All civil
 - Electrical and mechanical engineering services
- **Regulates titles only for other disciplines**
 - e.g. control systems, manufacturing, nuclear
 - Practice unregulated outside civil, electrical, and mechanical
- **Practice only in area of competence (Rule 415)**
- **Purchase and use of stamp required**
 - Indicates that plans, specifications, etc. are complete
 - Means you are in responsible charge and approve

What does Responsible Charge Mean?

- **Maintain Span of Control**
 - Make engineering decisions
 - Review and approve decisions
 - Presence (physical or via communication devices)
 - Judge specialists and their recommendations
- **Engineering Decisions — selection or development of:**
 - Engineering alternatives
 - Standards, methods, and materials to be used
 - Testing methods or techniques
 - Manufacturing or construction methods
 - Operating and maintenance procedures

Process



Current California Licensure Process

	Licensure Paths			
	BSE	PhD	BS	No Degree
Education	ABET approved	Professor or Ph.D. ¹	Engineering or science	No college
FE exam	or 15 years ²	waived	or 17 years ²	Required
Experience ³	2	1	4	6
PE exam	Required	Required	Required	Required

¹ Tenure track professor at or Ph.D. from ABET accredited school (waiver program expires in 2000?)

² Work experience after graduation and degree must be in engineering
 • For comity: Recommend taking the FE exam

³ Work experience after graduation
 • For comity: Recommend 4 years experience before taking PE exam
 • MSE counts as 1 year of experience
 • Other combinations of education and experience qualify

What Constitutes the Practice of EE? It Does not Explicitly Include S/W

- **Profess to be an EE**
- **In responsible charge of EE work**
- **Attempt to Add S/W to EE Defeated in 1996**
- **Current definition of EE Put in Law by SB 2030:**
 - **Studies or activities relating to generation, transmission, and utilization of electrical energy**
 - **Design of electrical, electronic, and magnetic circuits**
 - **Technical control of circuit operation**
 - **Design of electrical gear**
 - **Concerned with research, organizational, and economic aspects**

What About Software? Can it be EE in California?

- **Programming ≠ Engineering**
- **Designing software can be engineering**
 - Determine if design work is EE
 - Determine if you are in responsible charge or a subordinate
- **Examples**
 - Not EE: coding another's design, writing application software, IEEE information system
 - Probably EE: Designing software for control of an agile beam radar, BART, or a steam turbine
- **Note: IEEE Computer Society is working on software engineering licensure/certification**

3 Views on Software Engineering Arise from Overlap with other Branches

- **No Such Thing**
 - Software is another body of knowledge
 - Used by all engineers
 - Like Mathematical, Physical, and Engineering Sciences
- **Engineers Specializing in Software for Systems Designed by Engineers**
 - Not shrink-wrap application software
 - e.g. software controlling radar, BART, or turbine
 - i.e. Safety critical systems
- **Software Engineering as its own Branch**
 - Can apply to all kinds of software
 - Can be strictly computer science

Texas
Law



Texas Defines Software Engineering as a Service or Creative Work Requiring Education or Experience

- **Analysis, design, or implementation of software systems**
- **Application of math, engineering, physical, or computer sciences**
- **Applied to:**
 - Real-time and embedded systems
 - Information or financial systems
 - User interfaces and networks

Texas Requires Education, Training, or Experience Including an Appropriate Combination of:

- **Computer Sciences**
 - computer organization
 - algorithm analysis and design
 - data structures
 - concepts of programming languages
 - operating systems
 - computer architecture
- **Software Design and Architecture**
- **Discrete Mathematics**
- **Embedded and Real-time Systems**
- **Other Engineering Education**

Texas Licensure Process: Software has no PE Exam

- Presently, no software engineering exam
- Must receive experience waiver to get licensed

	Licensure Paths			
	BSE	PhD	BS	No Degree
Education	ABET approved ¹	Ph.D. ¹	ET, Math or science	Not Allowed In Texas
FE exam	or 12 years ²	Or 6 years ²	or 16 years ²	
Experience³	4	4?	8	
PE exam	or 12 years ²	Or 6 years ²	or 16 years ²	

¹ Includes degrees in mathematical, physical, and engineering sciences from ABET approved schools

² With approval of the Board.
Ph.D. waiver is for teaching in ABET accredited program

³ Work experience after graduation

Two Types of Software Lead to Two Different Liability Paths

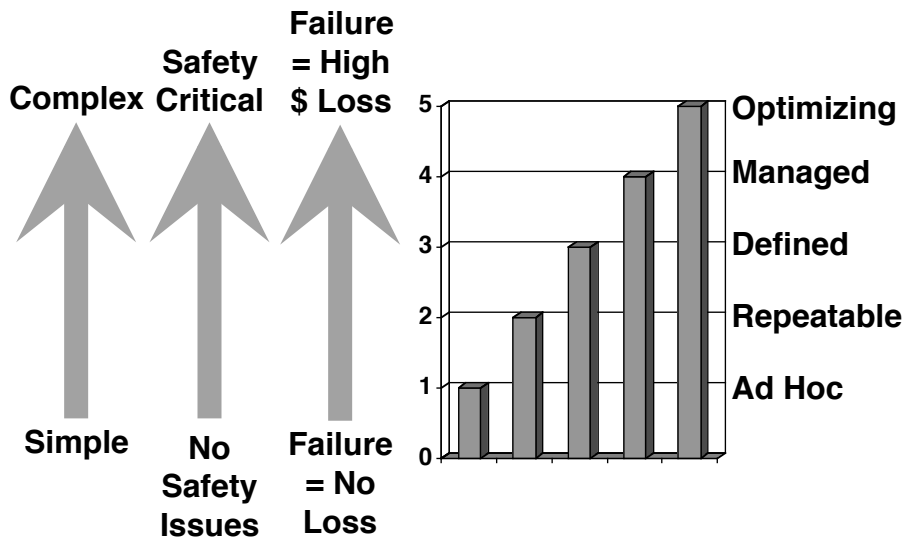
- **Shrink-wrap Design Tools**
 - Covered by shrink-wrap warranties
 - Provided “As Is”
 - Responsibility of engineer to find tool-induced errors
- **Embedded Software**
 - Interdisciplinary
 - Responsible Charge for:
 - Mechanical
 - Electrical
 - Systems
 - Software
 - etc.

Professional Practice: The 7 Deadly Sins

- Unlicensed Nonexempt Practice
- Deceit
- Misrepresentation
- Violation of Contract
- Fraud
- Negligence
 - Departure from Industry Standard of Care
- Incompetency
 - Lack of engineering knowledge, skill, fitness, or ability to carry out the professional duty or function

Process

What is the Industry Standard of Care for the SEI CMM Level?



Licensure is Not a License to be Sued

- **Engineers Design Stuff**
- **Design = Liability**
- **Myth: PE license acts like lightning rod for lawsuits**
- **Fact: Certificate of Merit Law provides protection**
- **For any lawsuit against a PE, law requires:**
 - Review of lawsuit by PE
 - Based on review, determine if case is reasonable
 - File a certificate stating that
 - Or show good faith effort to get PE review
 - Reduces risk of frivolous lawsuits

Licensing of Software Engineering: Probably Helps Process Improvement

- **Licensing means you meet minimum standards**
- **Texas Law is likely model**
- **A Software PE would**
 - Exercise Responsible Charge
 - Meet or Exceed Industry Standard of Care
 - Practice only where competent
- **Process Improvement**
 - Minor push from licensing
 - Major driver will be litigation protection
- **Some protection against frivolous litigation**
 - Certificate of Merit Law for PE