



Guideline for
**Professional Responsibilities in
Developing Software**

APEGGA's Software Subcommittee
Practice Standards Committee

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Presentation Outline

Outline

- Context of the Guideline
- Intellectual Property
- Responsibilities
- Authentication
- Safety Considerations
- Procedural Guidelines





Context – What is a guideline?

- Guideline defines acceptable practice.
- “Should” – recommended practice
- “Shall” – mandatory practice
- Jurisdiction is Alberta





Context – Why is it important?

Why is it important?

- Increase professionalism
- Provide a measurement





Context – Who is it for?

- Guideline for Members
- Guideline for Non-members
- Feedback indicates 10 times the usual interest

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Context – Who wrote the Guideline?

- APEGGA's Practice Standards Committee
- APEGGA's Software Subcommittee
- Significant contributions from:
 - CIPS
 - IEEE-CS
 - SHRC
- Many individuals





Ethics, Responsibility & Liability

- APEGGA's *Code of Ethics*
 - “shall, in their areas of practice, hold paramount the health, safety and welfare of the public, and have regard for the environment.”
- Law of civil obligation (torts)
- Courts expectation of Professionals
- Canadian Criminal Code

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Intellectual Property Rights

- Respect Intellectual Property Rights
- Intellectual Property Rights of related parties
 - Open source
 - Licensed software
- Canadian Intellectual Property rules:
 - Author owns rights
 - Rights can be assigned
 - Employee gives up rights
- Document agreement for the intellectual property
- APEGGA's Guideline for Ethical Practice:
 - Confidential Information should not be disclosed
 - Client designs remain property of Client
 - Use confidential information only with consent



Responsibilities for Engineering & Geoscience Software

Professional Members involved in developing software should:

- Document purpose and context
- Disclose testing
- Realistic sample data and verified results
- Conformance to applicable standards
- Document limitations, risks, or cautions
- Disclose limits on the liability





Responsibilities for Engineering & Geoscience Software (cont...)

Professional Members involved in developing software should:

- Provide support for reliability or accuracy of the software
- Provide sufficient design documentation to allow the client to perform maintenance
- Provide timely continuing educational and training services
- Timely access to source code
- Program to industry guidelines
- Program to industry best practices
- Professional development



Responsibilities for Engineering & Geoscience Software (cont...)

Additionally, Professional Members involved in developing software shall:

- Assess the risk of software failure and provide necessary safeguards
- Notify authorities - where public safety or environment





Responsibilities for Engineering & Geoscience Software (cont...)

Members applying software for professional purposes **shall**:

- Exercise due diligence
- Critically assess software fitness
- Communicate limitations
- Verify against standards
 - security – ISO/IEC 15408
 - structural design – hand calculations
- Take necessary training
- Use in accordance with published documentation
- Apply professional judgment



Authentication Process

Review of Software and Associated Professional Documents

- This applies if it can be used separately
- Reviewed and accepts responsibility
- Requires research, calculations and other professional
- Does not imply a complete rework.
- Attach review notes:
 - What the review consisted of
 - How extensive it was



Engineering and Geoscience Software Requiring Authentication (Examples)

Data acquisition, processing, and interpretation software for:

- Remote sensing, Geographic Information Systems (GIS), photogrammetry, geospatial data, geometrical correction, data visualization and editing
- Seismic data conversion, data processing and viewing, refraction and reflection interpretation





Engineering and Geoscience Software Requiring Authentication (Examples)

Modeling and design software for:

- Thermal modeling
- Air dispersion modeling
- Geographic Information Systems (GIS) modeling
- Petroleum resource appraisal systems and reservoir simulation
- Ore reserves estimation and grade control systems
- Slope stability analysis, structural analysis, pipe stress analysis
- Electrical and other facility design



Engineering and Geoscience Software Requiring Authentication (Examples)

Deployment and control software, such as:

- Supervisory Control and Data Acquisition (SCADA) systems and Programmable Logic Controllers (PLCs) design or modification that impacts original design parameters
- System protection (i.e., power, telecommunications, oil and gas)
- Industrial operation and control (i.e., nuclear facilities, process control for refineries or mills, robotics control systems, radar controlled aircraft landing systems, automated traffic management systems)



Engineering and Geoscience Software Requiring Authentication

How about software unrelated to engineering or Geosciences?

- I.e., business, financial, tax, e-commerce, database analysis software, and gaming software
- Authentication not required
- Professional and ethical responsibilities remain even though regulatory responsibilities don't apply.





Authentication Process

Software – What should be authenticated?

- The original version
- Electronic or Printed
- Authenticate the 'cover page' or introduction
- Implies software development controls
 - Leads to blanket authentication
 - Standard of care has been applied
 - Not a blanket guarantee
- Cannot duck responsibility or liability by not authenticating



Authentication Process

Professional Documents requiring authentication

“a document expressing a professional opinion or principals upon which someone else may rely” – engineering or geosciences related.

- Designs, requirements, specifications
- Physical models of control systems
- Risks
- Testing
- Implementation Procedures
- User Documentation
- Training Materials
- Development and maintenance documentation



Authentication Process

Revisions

- Must Authenticate revisions
- Must clearly state scope of authentication
 - Revision
 - Entire software
- Refer to APEGGA's Authentication Practice Standard



Multidisciplinary Projects

Clarify the responsibilities between the disciplines

- Coordinating
- Interface among disciplines
- Clearly define responsibilities between the respective areas

Code of Ethics

- Work only in areas of competency
- Project Manager obligations



Safety and Security Considerations

- Safety concerns increase rigour
- Federal and provincial legislation
 - Privacy of information
 - Freedom of information
- Privacy audit or security/vulnerability assessment
- Specifics for industry sectors

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Procedural Guidelines

- Choice of software development methodology
- Understanding advantages and pitfalls of chosen methodology
- Controls/processes - minimize risks
- Rapidly evolving
- Unproven methodologies increase risks.





Summary

- Professional Members may be involved in the development and/or usage of engineering, geological, geophysical or other software.
- Software failure may pose risks to public safety and security.
- Members must be aware of these risks and of their ethical and professional responsibilities to protect the public.
- Many others have developed best practices, guidelines, and standards.
- Professional Members are advised to direct themselves to these other references, as required.