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Digital Submission of Surveys

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Presented at the
 National County Surveyors Forum
 ACSM/LSAW Conference
 7 March, 2008

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Introduction

This presentation does not intend to provide a complete solution for the use of digital signatures, but rather to serve as a starting point for discussions within the engineering and surveying community


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Topics

- Digital Signature Overview
- Status Report - Oregon Administrative Rule and Oregon DOT
- Demonstrations
- Proposal – Digital survey filing with County Surveyors in Oregon

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Wet Signatures



- Hand written stylized version of the signers name on a physical document
- Its purpose is not to prove identity, but to show deliberation, agreement, and consent
- Historical legal concept recognizes any mark made with the intention of authenticating the marked document as a signature

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Engineering Documents



ORS 672.020 and 672.025 requires that the mark be a specific seal affixed to the document with the signature of the registered professional

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Engineering Documents

- Does not address digital signatures on digital documents
- The general understanding is that this requires a physical document with a wet signature

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Engineering Documents

672.020 Practice of engineering without registration prohibited; seal required. (1) In order to safeguard life, health and property, no person shall practice or offer to practice engineering in this state unless the person is registered and has a valid certificate to practice engineering issued under ORS 672.002 to 672.325.

(2) Each registered professional engineer shall, upon registration, obtain a seal of the design authorized by the State Board of Examiners for Engineering and Land Surveying. Every final document including drawings, specifications, designs, reports, narratives, maps and plans issued by a registrant shall be stamped with the seal and signed by the registrant. The signature and stamp of a registrant constitute a certification that the document was prepared by the registrant or under the supervision and control of the registrant.

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Surveying Documents

672.025 Practice of land surveying without registration prohibited; seal required. (1) No person shall practice land surveying in this state unless the person is registered and has a valid certificate to practice land surveying issued under ORS 672.002 to 672.325.

(2) Every registered professional land surveyor shall, upon registration, obtain a seal of the design authorized by the State Board of Examiners for Engineering and Land Surveying. Every final document including drawings, specifications, designs, reports, narratives, maps and plans issued by a registrant shall be stamped with the seal of and signed by the registrant. The signature and stamp of a registrant constitute a certification that the document was prepared by the registrant or under the registrant's supervision and control.

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Why Use Digital Signatures?

- Wet signatures on physical documents worked well in the era of hand written/drawn documents
- The use of computers has progressed into an era where electronic documents are transmitted; reviewed and approved; utilized during bidding; utilized for stake-less construction; and archived for future retrieval

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Why Use Digital Signatures?

- To apply a hand written signature to electronic files requires printing, signing the paper document, and then scanning it back into an electronic file
- Loses the original files native format and any imbedded intelligence, is time consuming, and in today's world... unnecessary.

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Problems with Wet Signatures

- The signature itself may not bind the signer to the document, unless the signer's identity was authenticated during the placement of a signature.
- The signature itself does not certify the integrity of the document.
- Today, most seals are simply CAD cells stored in a library open to anyone to copy, alter, and affix to any drawing.

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Problems with Wet Signatures

- The requirement for wet signatures significantly hinders the agency's abilities to fully integrate the development, transmittal, execution, archival, and retrieval of digital engineering documents.

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Electronic Vs Digital Signatures

- Often the terms *electronic signature* and *digital signature* are used interchangeably to mean the same thing.
- In the Information Security world, the two terms are distinctly different.

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Electronic Signatures

The term *Electronic Signature* may include scanned images of hand written signatures; typed notations such as /s/ Jane Doe; or signature blocks on email messages, etc. without any authentication and/or encryption system included.

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Digital Signatures

The term *Digital Signature* is more properly used to describe a signature system applied to an electronic document that utilizes specific technical processes to provide significant added security, authentication, and/or encryption.

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What is a Digital Signature?

- A digital signature is to an electronic document as a handwritten signature is to a paper one and much more.
- A digital signature provides signer authentication, document authentication, possible document encryption, and efficiency.

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What is a Digital Signature? (2)

- A digital signature uses digital keys to attach the identity of the signer to the document and record a binding commitment to the content of the document.
- Digital signatures enable "authentication" of digital documents, assuring the recipient of a digital document of both the identity of the sender and the integrity of the document.

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What is a Digital Signature? (3)

- A digital signature provides "who" signed the digital file. A time stamp of that digital signature provides "when" the digital file was signed.

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A Robust Digital Signature System

- Must be capable of creating a signature that is:
 - Unique to the person using it
 - Capable of verification
 - Under the sole control of the person using it
 - Linked to the document in such a way that if any part of the document is altered, the digital signature is rendered invalid.

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Why Use Digital Signatures?

- Provides a greater degree of security than a handwritten signature
- The recipient of a digitally signed document can verify both that the document originated from the person whose signature is attached and that the document has not been altered either intentionally or accidentally since it was signed.

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Why Use Digital Signatures? (2)

- Secure digital signatures cannot be repudiated.
- Reduction of paper handling
- Maintaining the data in a digital format.
- Signing documents digitally will enable and greatly facilitate the development of an Engineering Data Management System resulting in greater project delivery efficiency.

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Why Use Digital Signatures? (3)

- Digital signature technology has undergone thorough research and development for over a decade.
- It is not an emerging technology.
- Digital signatures have been accepted in several national and international standards developed and accepted by many corporations, banks, and government agencies.

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What is Needed to Create a Digital Signature?

- Software
- Signing Certificate
- Optionally:
 - A piece of hardware to provide further security with a signer's private key.
 - The services of a Certificate Authority



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Creating Digital Signatures

- Creating the signing certificate involves creating a public-private digital key pair.
- The public and private keys are related mathematically.
- Knowing the public key allows a signature to be verified but does not allow new signatures to be created.

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Public Key

- The *public key* certificate creates proof of the identity of the signer and made available to anyone who needs to verify the signature.
- The combination of the public key and proof of identity result in a public key certificate - also called a signer's certificate.

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Private Key

- The *private key* is something kept only by the signer.
- The document is signed with the private key.
- If the private key is not kept "private," then someone could maliciously create the original signer's signature on a document without consent.
- It is critical to keep the private key secret.

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Digital Signature Verification

- To verify a digital signature, the verifier must have access to the signer's public key and have assurance that it corresponds to the signer's private key.
- The solution to this is to use a trusted third party to associate an identified signer with a specific public key.
- That trusted third party is referred to as a "Certification Authority"

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Self Signed Certificates

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- A self-signed certificate is one that is created by the individual signer without the services of a certification authority.
- Should generally be avoided.
- A signature applied using a self-signed certificate signature tells a document recipient that "This document is valid, and I am authorized to sign it"

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GeoTrust

Independently Verified Certificates

- Digital IDs provided by 3rd parties are generally considered more secure, because an independent certificate authority has ratified them.
- A signature applied using a 3rd party digital ID tells them that "This document valid, I am authorized to sign it, and [Certificate Authority X] verifies my identity."

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Certification Authority

- To associate a key pair with a prospective signer, a Certification Authority issues a certificate, an electronic record which lists a public key as the "subject" of the certificate, and confirms that the prospective signer identified in the certificate holds the corresponding private key.
- The Certification Authority performs a background check on each individual that is assigned a signing certificate

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Types of documents that may utilize Digital Signatures

- CAD Drawings (Microstation Design Files)
 - Coordinate Correct Engineering Drawings
 - Contract Plans
 - Record of Surveys
 - Standard Drawings
- Spreadsheets
 - Engineering Calculations
 - Material Lists
- Word processor Documents
 - Inter-Governmental Agreements
 - Contracts
 - Engineer/Surveyor Narratives
 - Design Exceptions
- Email
 - Correspondence

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Status Report - ODOT

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Status Report

- 2 Committees
 - All ODOT Business Needs
 - Engineering/Surveying Needs
- Determined certificate level
- Developed product list
- Began determining workflow and format
- Presentation to OSBEELS
 - Agreed in concept

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Status Report

- Joint OSBEELS/ODOT Work Session:
 - Clarified intent of digital stamping
 - Determined whether change could be made by Oregon Administrative Rule change
 - Studied workflow
 - Developed draft Oregon Administrative Rule

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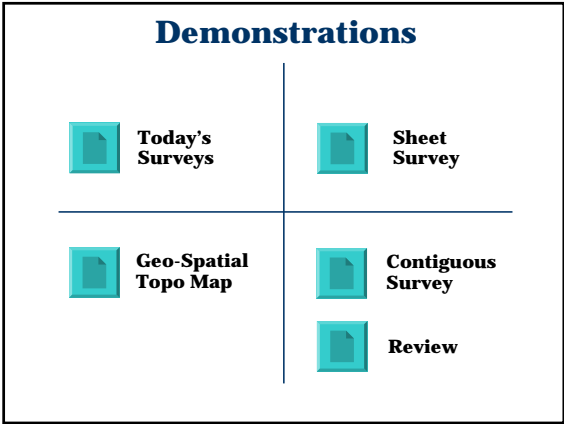
Next Steps


- OSBEELS Board Meeting – 11 March, 2008
- Public Hearing – May, 2008
- Adopt OAR – May, 2008

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Stamping Options

- Hardcopy Print (today)
- Source Document
- Portable Document Format (PDF)
- Wrapped Package



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Future Submittal of Surveys

- Electronic submittal
- No cutting into sheets
- Layered
- Geo-Referenced
- Electronic review
- No scanning needed at County
- Imbedded supporting data
- Automated inclusion into online GIS