The conventions we use to document design were developed during the era of pen and paper. Electronic information can be transmitted directly to the field, and documentation needs to keep pace. This session looks at current industry trends with a hard look to future applications.

Learning Objectives
1) Learn how the current conventions we use in construction documentation came to be.
2) Understand current office-to-field technologies and how they are changing the way we document and build.
3) See ahead to technologies and systems that will be in use in the next 20 years.
4) Learn new ways we should be thinking about the construction documentation phase.

Presenters

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Eric is an Industry Specialist for Nemetschek Vectorworks. Eric has an AAS degree in Landscape Contracting and Construction and a BSLA from the Ohio State University. He is a Past-president of ASLA’s Maryland Chapter, and chair of ASLA’s Professional Practice Committee and its BIM Working Subcommittee. Eric’s unique experience as a practicing landscape architect and user of various CAD programs allows him to help landscape architects develop best practices for site design and site information modeling.

James Van Rens
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Jim is President of RIEGL USA which is a world leader in LiDAR, airborne laser mapping, mobile laser mapping, terrestrial laser mapping, 3D laser mapping, laser scanners, and laser scanning. Jim holds degrees from Marquette University and has over 30 years of experience in remote sensing and 3D mapping. He was recipient of the 2010 Presidents award from MAPPS (National Society of Photogrammetry, Mapping and Geospatial Firms) for his work in LiDar aerial applications. Jim is an industry leader in 3D mapping techniques and their applications and lectures extensively to professional and lay audiences alike.

Thomas Ryan, FASLA
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Tom is president of Ryan Associates and also teaches at the Harvard Graduate School of Design. He holds degrees from the University of Wisconsin and Harvard GSD. Tom has also taught courses at Penn and SUNY. He is the co-author of Detailing for Landscape Architects and was a contributor to Timesavers Standards for Landscape Architects. He has lectured widely on issues of design, detailing, documentation and construction. Tom also consults with other Landscape Architects on construction, management and documentation. Tom has contributed many award winning landscapes including the Highline with Field Operations, Mesa Arts Center with Martha Schwartz, and the Sydney Olympics with Hargreaves.
Presentation Outline

1. History of Documentation
   a. Linen and ink master builder pre-1940s
   b. Standardization and cheap reprographics late 20th century
   c. Pin registration drafting as conceptual precursor to CAD layers
   d. PC based CAD in wide use in 1980s
2. The Digital Revolution The role of software in design and construction
   a. CAD as standard
      i. Benefits of CAD: Why did we switch?
         1. Larger to mid-size firms were first adopters (project type; client/team requirements, room in operating budget)
         2. Eventual migration from others (small firms) when systems went to PCs and the costs came down and the Universities trained enough students who were fluent in CAD systems ... did everyone switch? No... with project types, permissive clients, some projects are still hand-drawn
   3. Benefits most noted:
      a. Though time consuming to establish each new drawing, revisions are faster
      b. More precise/accurate (i.e. that 8’ bench is really 8’... too long for proposed location, choose 6’ bench)
      c. Quantity take-offs are quicker... linear feet is easier to discern, number of symbols/blocks can be counted, area calcs for paving/planting surfaces, etc..
      d. Visualization control (layering, hierarchy, lineweight consistency, hatches, etc.)
      e. Coordination and sharing information with Architects and Engineers is easier
   4. Challenges most noted:
      a. Training required...to be efficient, yes it is
      b. Expensive
      c. not helpful at all stages (i.e. conceptual, analysis, perceived as too rigid) Too much precision too early in project
   5. Eventually we conformed and it became the industry standard (AutoCAD, Microstation, MiniCAD/Vectorworks, PowerCAD, BricsCAD, etc.)
   b. 3D modeling software
      i. The necessary evil?
         1. We know we need to use it, but...
         2. Challenges
            a. time to learn how
            b. client isn’t paying for it
            c. hardware needs to improve first
d. can’t afford new staff to be the “modeler”, etc.. There was a time when being a CAD monkey was also viewed as a dead end

3. Benefits
   a. visualize our ideas
   b. confirm spatial relationships
   c. analyze proposed elements for expected site improvements (i.e. shade where we expected it to be…visual screen blocking negative views/enhancing positive…moving water where we expected…slope relationships of proposed grade changes…quantification of volume…material selection…list goes on…client feels more assured their needs are met)

c. Documents as Cloud based resource
   i. Design teams see face to face meetings happen less frequently
   ii. Collaboration on international projects, across state lines, etc..
   iii. Files are maybe too large to email (not a new dilemma), even as memory capacities increase, so do our file sizes
   iv. Most applications offer viewer/reader versions to view/review/mark-up drawings (these versions are on the cloud, ahead of the possible use of full software from the cloud)
   v. Cloud facilitates large file exchanges without burdening desktops
   vi. Mobile device enhancements / proprietary applications and third party apps enable mostly limited (sometimes full) capabilities to interact with projects during all stages, including production and even as-builts.

d. Increases in 3D modeling proficiency
   i. From early, clunky form based modeling...
   ii. To intuitive push/pull and free form modeling...
   iii. To smart, parametrically managed hybrid objects
   iv. Implications:
      1. Some users only use 3D as the backbone of a hand rendered perspective
      2. Others use 3D after they have completed their DD plans/elevations
      3. Others use 3D to conceptualize and provide schematic geometry to carry on to DD and CD
      4. Others make use of hybrid design environment to conceptualize, develop and document (start to finish)
      5. As the systems proliferate, the images will change the way we conceptualize and will be limited by the software and especially by the available symbol sets (think sketch up library).

v. Presentations:
   1. Rendered perspectives become more achievable to those who are not comfortable in their own graphic conventions BUT will limit how they are presented and how we think about them.
2. Alternatives are easier for client to recognize alternatives BUT make clients less likely to pay for time during construction.

3. Fly-overs, Walk-throughs and other animations, put clients (and design team) into site to confirm their design intent BUT limit improvements during construction.

4. If there is better and more accurate (and expensive) representation early in the process, there is reluctance for clients to pay for time in the field.

   e. BIM systems with embedded attributes and rules evolution

3. Imaging and modeling sites from concept to construction
   a. GPS and laser based survey
   b. GPS and laser based survey developments in layout and direct machine control
   c. Sped up processes with little time between design and construction

4. State of the Art in 2013
   a. Contract, specs and documents in a SD, DD, CD and CA sequence getting more precise as the process goes on.
      i. Applications using BIM/SIM workflows can link notes with keys in drawings that are aware of their position in a document set.
      ii. I.e. detail callouts know on what sheet the detail is located, if it moves, the callout is updated; likewise a key to notes know when general, planting, other notes are updated...if a key symbol is removed, the list shows it to be empty and can me reassigned, or just removed and the note stack and keys are revised.
   b. Field Survey and Design software have evolved to establish new relationships between professionals and contractors based upon direct digital communication.
   c. Files sent direct to field even in small projects
   d. Paper document conventions don’t match the new reality. Are they still relevant?
   e. What is available to the contractor in the field and in what form?
   f. Quality control issues in the production of drawings, in collaboration with architects and engineers and with Contractors when there are no paper drawings on site.
   g. Design and construction tolerances are constricting
   h. Documents are becoming more precise but less representative of our design intent.

5. Future Documentation systems
   a. Embedded rules for placement of elements that hold up through the process
      i. Geo-referenced proposed objects may be cognizant of their location and perhaps smart enough to know the objects around them (surrounding are objects like plant communities, soil types, slopes for drainage)
      ii. Architectural elements like walls and roofs may know that there are plants nearby providing shade, or added weight, or be able to
recognize information from those objects that it might grow, and know if the size/weight will conflict with designed structure/infrastructure. The elements would quantify their effect on each other.

iii. Drains may be programmed to always be at low spots, walks tied to door locations, irrigation tied to planting beds, planting beds tied to particular slopes, expansion joints will follow preset jointing rules etc.

iv. Other to be defined

b. Attributes(specs, details, dimensions, relationships and requirements) associated with drawing elements

i. When elements are brought into a file, components are perceived, and specs become assigned to sheets pre-designed to hold them, while sizes of elements help to determine the best material and assemblies to accommodate their installations.

ii. Other to be determined

c. Quality control in a dynamic system

6. What should we be doing now to adapt?

a. Consider how best to describe relationships and not dimensions

i. Qualitative as opposed to quantitative

ii. Weigh and prioritize the relationships and rules

iii. Design as kit of interrelated moving parts

b. Communicate the design intent to the owner and contractor (Back of a napkin approach)

c. Build in “wiggle room” to make the project better during the construction process.

i. Preserve authority to make minor changes as the project is being built. Better ideas, change in context, and respond to forms of plant material.