Why this topic was selected for the presentation?

Importance of Technology In Building Department operations

- Productivity
- Demystify the Ten (10) technologies
- Meeting expectations
- Streamlining thru. coordinated technologies
Productivity and Technology

By Paul Krugman:
"Productivity is not everything, but in the long run, it is almost everything."

Importance of Productivity

- Direct impact on budgets and financial aspects.
- Customers are served faster and better.
- Staff feels a sense of service, accomplishment and purpose.
- A building department will thrive and the overall quality and performance of work produced will improve.

The role of the building official is to remove obstacles to productivity such as reducing bureaucracy and organizational drag.
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</table>

Measure of Productivity

\[
\text{Productivity} = \frac{\text{Output}}{\text{Input}} = \frac{\text{Permits Processed}}{\text{Building Staff}}
\]

\[
PPS = \frac{\text{Permits Processed}}{\text{Building Staff}} \times (1 - \% \text{of consultant work})
\]

PPS: Permits Per Staff Member
Permit per Staff (PPS) Statistics

- Average jurisdiction processes 235 permits per staff member per year.
- Median is 185.
- Standard deviation is 191.

The value of the standard deviation indicates that there is a high degree of variations among jurisdictions in terms of staffing.

The permit processing operation and complexity varies by jurisdiction. The PPS does not capture nor take into account the inner workings of a department, which can be a source of the variation in the data.

Inspector to Plan Checker Ratio

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<thead>
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### Link Productivity & Technology

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#### WHY AGENCIES STRUGGLE WITH THEIR TECHNOLOGIES
- Jurisdictions have difficulty finding the technologies that effectively match their needs.
- Jurisdictions not utilizing the technology/ies in an optimized way/full capability.
- New technology may require additional staff to operate and maintain.
- Staff turnover and having to learn the usage of the technology again by new staff.
- Jurisdiction may need to staff up and bring different skill sets upon technology implementation.
- Additional information and data will be needed to increase the robustness of the technology.

### Summary

Technology does not seem to have a positive impact on productivity.

Future analysis will rely on a larger data set which can possibly change the results of the analysis on technology and refine other measures.
The role of the building official is to remove obstacles to productivity such as reducing bureaucracy and organizational drag.

"Unfortunately, they're very good at what they do."
### TECHNOLOGIES NECESSARY FOR BUILDING & SAFETY OPERATIONS

1. Permitting/On-line processing
2. Queueing
3. Electronic plan review
4. Mobile/Online inspection
5. Archive/Data management
6. Cashiering/Financial
7. Electronic Code Library
8. Website
9. Social media
10. Other technologies
   - Drones
   - Robotics
   - Cloud
   - SaaS
   - ...

### CORE COMPONENTS

**Technology Checklist**

- Permitting
- Online Plan Review
- Online Inspection
- Social Media
- Queuing
- System
- Cashiering
- Document Management
- Online Processing
- Website
- Code Library
- Other Technologies

**Bang for Your Buck Checklist**

Software suites that provide bi-directional (API) connectivity to:

1. Customer Portals
2. Web-based Plan Review
3. Inspection applications, etc.

Provide the most benefit to agency and constituents.

≈30-50% gain in Efficiency
Reduction in costs up to 50%
BANG FOR YOUR BUCK CHECKLIST

Online Processing-Customer Portals Checklist

1. Online Permit Applications
2. Takes Payments online
3. Scheduling
4. Upload/Download files

Results:
✔ Reduce walk-in traffic by 90%
✔ Save time and money for constituents/Applicants
✔ Streamlines Document Retention.

BANG FOR YOUR BUCK CHECKLIST

Electronic Plan Review Checklist

1. Plan Review with real-time collaboration
2. Plan Review should be easy to learn
3. Manages document versions
4. Manages comments
5. Supports paper plan reviews

Results:
✔ Streamlines Document Retention.
✔ Save Time and money for your constituents.

BANG FOR YOUR BUCK CHECKLIST

Field Inspections Checklist

1. Mobile Devices (iOS/Android)
2. Easy to use
3. Access to Plan Review documents
4. WiFi w Offline Sync
5. Scheduling
## Permitting Systems / Online Processing

### Permitting System Overview
- **Hosting Options**
  - Windows vs Web applications
- **Costs and Benefits**
- **Technology Fees**
- **Best Practices**

### Hosting Options
- **On-Premise vs. Off-Premise** – Items to Consider
  - Data loading speed
  - Disasters
  - Hardware and IT support
  - Shared Environment
## Windows vs. Web Applications

- Loading speed
- Installation
- OS Compatibility
- Updates

## Costs & Benefits

- NPV spreadsheet
- Execution time
- Number of steps
- Number of clicks

## Keeping Database Clean

- Important for Reporting and Searching
- Use drop down lists.
- Check entries from time to time.
- Create a policy or clear standards to users.
Extracting Data

Understanding of the database

Tools needed:
- Report writer
- Report viewer

What to ask for to access your database.

Online Permitting

The Way to Go

- Time Saving to jurisdiction and the public.
- Convenience
- Look for more than just web forms.
- Online search and status updates
- Make online requests and submittals.
- Overall better customer service.

Queueing System
What is a Queueing System?

A system of tracking customers and managing customer service

- Tracking number of applicants waiting queue
- Tracking applicants wait time
- Tracking applicant flow between various services
- SMS messaging of applicants
- Reports on customer service levels
- Customer feedback/satisfaction survey
- A system of tracking customers and managing customer service

Benefits of a Queueing System

- Benefits to Customers
- Benefits to Employees
- Benefits to Managers

Sample Systems – City of Anaheim
Sample Systems – City of Laguna Beach

Servers vs. Wait Time

Electronic Plan Review System
ELECTRONIC PLAN REVIEW
Best Practices – Key Functionality
1. Provides API connectivity to the Permitting system.
   • Optionally, integrates to a Customer Portal
2. Review with real time collaboration.
3. Provides configurable workflows tools.
4. Plan review tool should be easy to learn.
6. Securely manages comments.
7. Should support paper plan reviews.

ELECTRONIC PLAN REVIEW
Best Practices – Integrated or Stand Alone
Integrated to a Permitting is recommended when:
• Higher volume plan reviews, per year.
• API connectivity is available.
• The Permitting System can manage document versioning and
  Optionally, manage plan review assignments.

Stand alone works when:
• It's a short-term solution or
• Low volume plan reviews, per year
• Permit System is outdated.
• A Customer Portal is available.

ELECTRONIC PLAN REVIEW
Best Practices – Technology
Web-based products typically:
• Require no workstation software installation/maintenance.
• Accessible anywhere – even when you’re on vacation!
• Less work for your IT Dept.
• Should be fully supported on the most popular browsers.
**ELECTRONIC PLAN REVIEW**

**How Integration Works**

The Permit System connects via API calls to the Plan Review application.

- Permit System sends
- Plan Review returns
- Project Information
- Updated Assignment 'Status'
- Plans (Versioned)
- 'Reviewed' Plans
- Review 'Assignments'
- Comments/Correction Letters
- to Plan Review
- to Permit system

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**ELECTRONIC PLAN REVIEW**

**Best Practices – Preparing Documents**

File Format: The recommended format is PDF, not CAD (dwg). Assembling PDFs: Plans should be provided in ‘logical sets’ (by discipline), for easy distribution.

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**Minimizing Costs**

[Graph showing cost analysis for Electronic Plan Review Systems and Best Practices]
Mobile/On-line Inspection

Mobile Inspections
Getting the most out of going paperless in the field

The original "Eye-Pad".
Mobile Inspections
Benefits of going paperless in the field

1. Access to electronic plans.
3. Emailing correction notices to contractors.

4. Access to previous correction notices.
5. Instant scheduling of next inspections.
6. Text message alerts to contractors.

7. Driving directions
8. GPS coordinates.
9. QA/QC of inspectors.
Mobile Inspections
What to look for in a mobile app

1. User Interface (UI) & User Experience
2. Sync or wifi system access.
3. iOS / Windows / Android.
4. Native app or web application.
5. Design standards.
6. Get a demo of the app

Mobile Inspections
Apps for an Inspectors Mobile Device

- Simpson Strong-Tie Literature Library app
- UL Hazardous Location app
- Apple Compass app
- Leviton 2 Go app
- Wire Gauge Charts app
- Google Translate app

Archive/Database Management System
What is Database

- A structured set of data held in a computer
- A database management system handles the storage, retrieval, and updating of data in a computer system.
- Relations are often used to extract or update data. Programmatically this is done using SQL (Structured Query Language).

Off-The-Shelf Customizable Database

- Customizable Database Applications
  - Caspio.com
  - KnackHQ.com
  - TrackSoftInc.com
  - TrackVia.com

Application Programming Interface (API)

- A set of functions that allows access to the database without the application itself.
- Returns data in a commonly structured format
- Example: permitting system checking if a contractor has a business license

Example API

This XML file does not appear to have any style information associated with it. The document text is shown below:

```xml
<Database>
  <Table Name="Table1">
    <Record ID="1"
```
Going paperless

- Scanning/digitizing Documents
- Less storage space
- Ease of Public Access

Archives

- Consolidate all forms or applications in a common format
- Remove and repair files
- Verify identifying APN's and addresses
- Cleaning and grouping
- Indexing - Standardize file and document naming
- Scanning
- Repackaging for long term storage
- Boxes are banded and sent to storage

Cashiering
Cashiering Systems

Best Practices

- Simplify fee computations & collections
- Tests new fees as before going live
- Process payments electronically
- Centralize cashing to avoid mistakes and reconciling

Future Trends

- Integration of various systems with each other across multiple platforms
- Off-premise/cloud-based system (Software as a Service) – SaaS
- On-premise/owned systems
- Portals that make records & services available to the public
- GIS-based systems
- Apps – Make applications mobile-friendly

E-Codes Library
E-LIBRARIES OF CODES & STANDARDS

Providing building officials & construction industry access to codes via internet/cloud in various formats - pdf, hardcopy or other electronic formats.

Access & format varies by service provider, some provide note fields.

Some provided by Standards Development Organizations (SDOs) only cover their own codes and/or standards.

A few provide nearly every construction industry related codes and standards.

One available with instant interlinks to relevant sections of all codes & standards in library through secure connection to every type of electronic device – computers, ruggedized laptops, tablets, droids.

HOW ARE BUILDING DEPARTMENTS USING?

Narrow use:
Replacing or supplementing hard copy of a few codes & standards
Remote access in field for a few codes and standards

Expansive uses:
Complete electronic library of virtually all current codes & standards & older editions
Plan review staff can operate remotely
Inspection personnel use
On-line dialogue between architects and building department using same service on plan reviews & inspections

SUGGESTIONS ON ELECTRONIC CODE LIBRARIES

Which service covers your specific codes & standards needs?

Which provides maximum flexibility in terms of use on multiple devices, anywhere, anytime? Note fields? Expandable as needs change?

How complete is the library? e.g. Does it include state & local codes and referenced standards?

How long has this company has been in this field?

Are other jurisdictions using? If so how are they using? Would they renew?

Make sure you are doing an apples to apples comparison – a number copy promotional language of other services but do not provide the same service or coverage. Pricing varies.
Web Site

- Web site is the gateway to all technologies used by government.
- Different agency/Department websites shall have a consistent format.
- Main services shall have a link to the web site, i.e. "Permit System", "Electronic Plancheck", "Archives", & "Financial System". Web sites are judged by users & catered to users.
- Easy to read, digest & used by users – use bullet points.
- Proper use of fonts, colors & pictures.
- Three click rule to get to information.
- "F" pattern rule in reading.
- Mobile friendly (responsive website).

Social Media
Social Media

What does a Building Official need to know

- Use of various media - Facebook, Twitter, Yelp
- During disasters
- New regulations
- Information media can be detrimental
- Yelp Example

Other Technologies

Technologies being used in industry which building departments can adopt:

- Drones
- Virtual and Augmented Reality
- Collaborative VR, Lidar (Light Detection and Ranging),
- Robotics & combinations of new technologies
- Microgrids
- AI-Artificial Intelligence
- Exoskeletons
DRONES

- Rapid post disaster damage assessments
- Rapid overviews of construction progress in remote locations
- Spot inspections on tall structures
- Pipeline inspections

ROBOTICS/LIDAR & AUGMENTED REALITY

- Robotics - Inspections of difficult to access spaces
- LIDAR - Checking underground structures prior to excavation
- Augmented Reality – Training of specialty inspectors
- Comprehensive job site monitoring for safety with wearable sensors

TECHNOLOGIES USED IN CONSTRUCTION INDUSTRY IMPACTING SOON

- Artificial Intelligence & Sensors in buildings
- Virtual Reality for training
- Exoskeletons
Meeting Expectations

TECHNOLOGY IN THE (BRAVE) NEW WORLD

1. It’s complicated.
2. It’s expensive.
3. It’s painful.
4. It doesn’t work as advertised.
5. Now we’re stuck with it.

EXAMPLES OF CLOUD-BASED SAAS

- Outlook.com & Gmail
- Office 365, Google Docs
- Box & Dropbox
- Salesforce
- WebEx, GoToMeeting, and Zoom video conferencing
Cloud is web hosting, supercharged. The biggest players are Amazon (AWS), Google (Cloud), and Microsoft (Azure) and most vendors build their software on one of them.

Software as a Service (SaaS) is a pricing model where you pay for access (subscription) to the software, hosted and managed by a vendor.

Often times, we interchange SaaS and Cloud. A Cloud-hosted product is often called SaaS and a SaaS product is often hosted on the Cloud.

Most vendors are moving to the cloud (and moving their pricing models to subscription).

Another way of looking at it
BIGGEST BENEFITS TO THE CLOUD

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<th>Performance</th>
<th>Scalability</th>
<th>Availability &amp; Connectivity</th>
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</thead>
<tbody>
<tr>
<td>• Powerful servers crunching your data.</td>
<td>• Add more users, easily increase server capacity.</td>
<td>• From any Internet-connected device, anytime.</td>
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WHEN TO UPGRADE?
The Creep of Inefficiency

Bite the bullet:
• Choose products with API connectivity
• Choose products that support Mobile Devices when appropriate
• Become an advocate for change!

Results of Surveys Conducted in CA.

There are no two Building & Safety operations that operate the same.

A mandate from the agency’s higher leadership can resolve a lot of uncertainty and hesitation across various departments on utilization of technology.

A successful implementation of technology requires both:
• An active leadership of management
• Buy-in from staff who will be using the technology.

Less than a 33% feel their system’s integration is/was a smooth transition.
RESULTS OF SURVEYS CONDUCTED IN CA.

50% of agencies surveyed - do not have an online permit system and public can not apply for any kind of permit online. Implementation of a robust portal (web service application) is critical in providing online services and electronic plan submittal.

66% of agencies surveyed - have implemented an Electronic Plancheck system. To avoid double entries permitting system and electronic plancheck systems shall be on the same platform or communicate with each other.

50% of the agencies surveyed - are utilizing Mobile Inspection and Inspection On-line Services to some extent but laptop/tough book connectivity to their permit systems are problematic.

Almost all agencies surveyed have an electronic archive system and a website.

RESULTS OF SURVEYS CONDUCTED IN CA.

Various technologies used at Building & Safety are not coordinated or integrated with each other. Data is not shared and creates extra data entry and mistakes.

Technologies are not based on common platforms/protocols and do not link well.

There is a need for Best Management Practices and standardization of the ten (10) technologies.

Myths About Software Applications

The more expensive a software application, the better the application.

Software user fees need to be high in order to maintain support and service.

Since the current system worked for others in the past, it will work for you in the future.

You need to use different specialized applications to do different tasks.

The system is built around the end user

If the application is too simple or easy, it’s probably not worth having
We all wrestle with technology

- **Agency Issues**: competing priorities, diverse systems in sister agencies, funding, jurisdiction CIO

- **Management Issues**: systems & software changes can be political; dedicating sufficient time/staff to map your processes, prepare, adopt, test, implement

- **Staffing Issues**: resistance to change, “33/33/33 rule,” skill sets, B.O.’s own comfort with I.T.
We all are in the same boat

- **Software Vendors**: One size doesn’t fit all, lack of knowledge of your specific system/needs; many systems not capable of grouping of assignments; they bid the “A” team but give you the “D” team – new hires, industry consolidation.

- **Software Consultants**: Can be helpful but must have wide experience/knowledge of available systems; may have preferred systems that don’t fit your needs; tend to seek payment upfront rather than based on performance.

Guide on “how to evaluate, select, and bring in right technologies”

- Understanding of your operations workflow
  - Clearly define your processes and workflows

- Actively participate in assessment, evaluation, and implementation of technologies in the department.

- Build relationship with IT, by delivering your promise on time develop trust with IT.

- Need for more innovation in Public Government. Focus on cloud, mobile services and Artificial intelligence.

Fully developing a plan of how you do business, what steps are included, who does those steps and how, will set you on a path to getting software which helps you get your work done regardless of the platform or type of solution you choose.
Points to Ponder

• Not all uses of technology will reduce labor cost or save labor time. So don’t sell your governing body on these points. A good example is that you may opt to put a little more information into your permit system but in doing so you have now provided the information that is frequently asked by real estate agents and now they can access it themselves and directly without your staff doing the work now providing better service than before.

• Scanning in and retaining not only plot plans but construction plans can use time but allows you to offer superior service in the future when questions come up in regards to projects original size and configuration, it also may help other divisions within your agency in the future, Police Department, Fire Department, and Code enforcement to name a few.

Selecting & Managing Technology Vendors

Talk to existing customers by reference and back channel. Ask about the software:
• Loads in seconds (Performance)
• Has remained fast over time (Scalability)
• Is always accessible and online (Availability)

Ask the vendor for two product roadmaps; a short‐term and a long‐term. Do you like what you see?

Who is the last customer that switched away from their service? Why?

Who is their most recent customer that was deployed? (And go talk to that customer directly).

How is support managed? Is there a ZenDesk portal or online forum? Is there a phone number to call and when is that phone manned? What is the expected response time (SLA) for support to reply?

SERVICE LEVEL AGREEMENTS (SLA)

Is it easy to find? Is it reasonable?
An inherent benefit to Cloud applications is that they are more accessible and (should) come with an API to increase flexibility and extensibility.

It should be easy to have data flow between applications.

IS IT EASY TO INTEGRATE WITH OTHER

• If you fail to fully plan what you need and how to get there you will be at the mercy of a salesman that has the latest and greatest software on earth, and it does everything you need.
• If you don’t know what you need how do they know?

CONCLUSIONS

• Innovative Practices and Technology must always be used together to get the greatest efficiencies and to provide the best service.

• Keep in mind that old antiquated practices can defeat the best technology available.
NEXT STEPS

- Consider in your own state/ICC chapter establishing an Innovative Practices Committee to:

- Survey members to establish their use of I.T., their needs, identify best practices

- Release helpful articles in newsletter sharing information and best practices

- Design and offer training to help jurisdictions successfully prepare for, identify, solicit adopt & implement these technologies

- ICC Journal carry articles from states/chapters

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Questions