

# “Out of Office” Takes on a Whole New Meaning

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## Learning Objectives

- Understand the differences between the Cloud and other forms of collaboration.
- Learn how to identify potential obstacles in collaborative workflow.
- Discover the options available for intra-office and inter-office collaboration.
- Learn how to make better decisions for setting up projects for inter-office collaboration.

## Description

Our firm, experiencing strong growth over the past few years, currently operates 22 offices. Of those offices, 19 are in the United States and 3 are international in Canada, Mexico, and Panama. Working in collaboration with all these offices has presented its challenges regarding software licensing, data exchange, model sharing, and many other aspects. This session will share some of the obstacles and approaches our firm has encountered and applied. We will discuss network and internet issues, hardware solutions, cloud solutions, and some unique approaches.



## Speakers

### Rob van het Hof - Senior Project Manager, Ware Malcomb



Rob is a Senior Project Manager/BIM Specialist at **Ware Malcomb**. He has helped several firms adopt the BIM platform. He now aids in managing BIM projects. Rob is responsible for BIM standards and Revit instruction throughout the firm's 22 offices located across North America. His BIM knowledge started with basic 3D modeling, Autodesk® MAX/VIZ, and **Graphisoft® ARCHICAD**. Since 2003 he has been using and teaching **Autodesk® Revit**. He is a **Certified Revit Professional** and taught intermediate and advanced Revit courses at **Harper** and **Triton** Colleges in Illinois. Rob is a periodic guest speaker at local events and has produced professional online tutorial videos for **Black Spectacles®**. He received his Bachelor of Architecture Degree from the **University of Illinois at Chicago**.

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### Moses Gonzales - Associate Principal IT, Ware Malcomb



Moses is the Associate Principal, Information Technology and has over 20 years of experience in Information Technology. Since joining **Ware Malcomb** in 1999 he has been instrumental in helping build, grow, and manage the Information Technology Group which supports Ware Malcomb. Moses received his Bachelor of Arts Degree in Business Administration with an Emphasis in Operations Management from **California State University, Fullerton**. He also received an MBA Degree from the **University of Phoenix**.

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**Contents**

- Session Information ..... 1
- Speakers..... 2
- Definitions ..... 4
  - Local Area Network (LAN) ..... 4
  - Wide Area Network (WAN) ..... 4
  - Virtual Desktop Infrastructure (VDI) ..... 4
  - Wide Area File Services (WAFS)..... 5
  - Virtual Private Network (VPN) ..... 5
  - Cloud Collaboration ..... 5
- Possible Setups for Collaboration ..... 6
  - VDI ..... 6
  - WAFS..... 6
  - Cloud Collaboration ..... 6
- Identifying Obstacles..... 7
  - Location of Team Members ..... 7
  - Presence of WAFS ..... 7
  - Licensing ..... 8
  - Hardware Limitations..... 8
  - Network Limitations ..... 8
- Auxiliary Software/Tools..... 11
  - VOIP ..... 11
  - Chat Clients..... 11
  - Video Conferencing ..... 11
- Conclusions ..... 12

## Definitions

This section is meant to clarify terminology that is being used in this presentation and our industry in general.

Not all definitions have been included as some basic knowledge is assumed and it is also worth noting that terminology and methods change all the time! It takes some effort to keep up with it all.

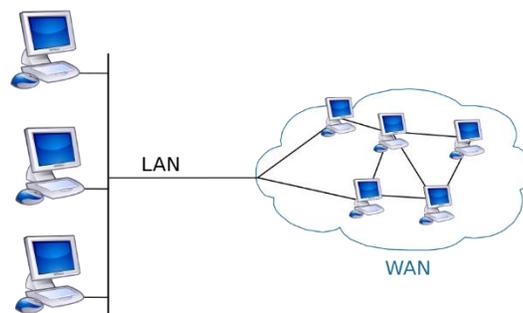
Should anything not be clear, please do not hesitate to ask us during the session or email [Moses](#) or [Rob](#) at a later date.

## Local Area Network (LAN)

Generally considered to be a network of linked computers within a building or one geographical location. Usually a LAN does not include the internet/telecommunications. LAN is typically hard-wired while a *wireless* network is usually referred to a WLAN (Wireless Local Area Network).

## Wide Area Network (WAN)

A network of several computers or LANs connected over a large geographical area via a private network or the internet. A WAN\* becomes necessary when there are multiple connected offices within a company.



\* Other similar terms/techniques are Multiprotocol Label Switching (MPLS) and Software-Defined Networking in a Wide Area Network (SD-WAN).

## Virtual Desktop Infrastructure (VDI)

One strategy to reduce the amount of data that needs to travel through the internet to other (remote) locations is to have a Virtual Desktop Infrastructure. This means computers running the required software are in the same location as the data/servers while the user can be located elsewhere and uses software to display the contents of the host computer on the 'terminal' they're using. This reduces the amount of data transferred over the internet to visual data only.

Benefits of this workflow are that the terminal computers really do not have to have a lot of power or software installed. They are visual/control terminals only, controlling the "work horse" in a different location. Still, internet speeds and latencies can affect this way of working. Mouse clicking, keyboard strokes, and other input still needs to make its way across the internet.

## Wide Area File Services (WAFS)

Geographical distance can be your enemy. If users in various offices need to use particular files, accessing these files remotely could seriously slow down the user depending on hardware limitations, software limitations, internet speeds, latencies, and other factors.

One very good way to eliminate at least the distance factor is to “virtually bring the offices closer together”. This is where Wide Area File Services come in. There are many differences in exact operations of these systems, but the basic principles are the same:

1. Servers (hardware or virtual appliance) are installed at each physical location and connected (through the internet).
2. Folders, files, and data structures are created in one or more of those locations.
3. When a user tries to access a folder structure or file not local to him/her, those items are copied locally on an as-needed basis.
4. Files are monitored with the same type of ownership rights as local server files would be.
5. The user perceives this as one single filing system.

With legacy files (like word processing, spreadsheets, etc.) this can work very well. Users may need to wait while larger directories or files cached to their local servers the first time they access them, but each time thereafter only changes are transmitted.

Benefits of this type of system are that access speeds are greatly reduced. There is definitely a cost for the WAFS hardware and software. Also, for files requiring high level of real-time collaboration this workflow may still not be the perfect solution.

## Helpful References

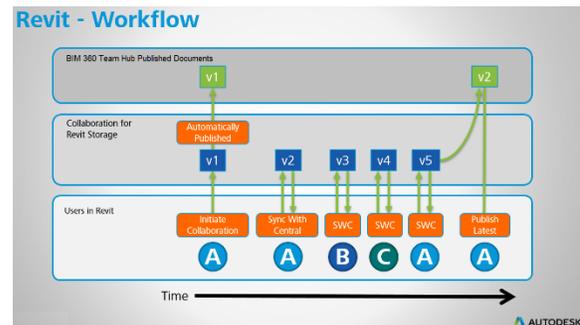
Panzura ..... <https://panzura.com>  
Nasuni ..... <https://www.nasuni.com>  
Egnyte ..... <https://www.egnyte.com>  
GlobalScape ..... <https://www.globalscape.com>

## Virtual Private Network (VPN)

A setup that allows users to access a private network from a remote location. This is often necessary when people need to work from a location where the company’s LAN/WAN is not present. The user logs into the VPN through the internet and can then access software and data residing on company servers.

## Cloud Collaboration

Especially for shared files/models like Autodesk® Revit® uses, limitations with other collaborative work flows may quickly point towards this solution. Unlike data being located on local (private) servers, models and files are now stored in a Cloud with multiple users having simultaneous access. Autodesk’s solution to this is BIM 360 (formerly Collaboration for Revit or C4R).



### Possible Setups for Collaboration

Of the many possibilities, we would like to consider three major ones: VDI, WAFS, and Cloud Collaboration. Ware Malcomb has used (and is still using) all three.

While none of these solutions is perfect for every situation, the chart below may give a good indication of what solution may work for your company. An important factor to keep in mind is that whatever solution is selected, planning for growth is important. Scalability of these solutions can vary.

SOLUTION	PRO	CON
<b>Virtual Desktop Infrastructure</b>	<ul style="list-style-type: none"> <li>• Scale performance at the server end</li> <li>• Local members/hardware can be lighter</li> </ul>	<ul style="list-style-type: none"> <li>• Dependent on internet speeds</li> <li>• Cost</li> </ul>
<b>Wide Area File Services</b>	<ul style="list-style-type: none"> <li>• Modernizing infrastructure</li> <li>• Data protection</li> <li>• Better collaboration</li> <li>• Best for office-to-office</li> </ul>	<ul style="list-style-type: none"> <li>• Cost</li> <li>• Recovery time for hardware</li> </ul>
<b>Cloud Collaboration</b>	<ul style="list-style-type: none"> <li>• Speed and access</li> <li>• Easier access for consultants</li> </ul>	<ul style="list-style-type: none"> <li>• Data security</li> <li>• Local machines need to have sufficient power</li> </ul>

The solutions above can be used collaboratively as we sometimes do at Ware Malcomb. For example, a lower-powered laptop can take part in Cloud Collaboration through a Virtual Desktop Infrastructure.

## Identifying Obstacles

Identifying obstacles, or in a more positive light, “opportunities”, is an important part of selecting the right work flow.

All of these solutions are complex and have many components to them. Any or all of these can stand in the way of production. Typically the lowest common denominator becomes the ‘bottle neck’ for the entire workflow.

## Locations of Team Members

Where team members are physically located has a big impact on your workflow. See the sections below on [Internet Speed](#) and [Latencies](#). Also, [Auxiliary Tools](#) in the next section becomes important when people are not physically in the same office or even when an office is big enough where simply walking over to another desk is cumbersome.

## Internet Speed (Bandwidth)

How all the systems are connected plays a very big part of how well collaboration will function. General internet speeds and/or bandwidth are the first component. Due to local infrastructure, cost, and other factors speeds may not be the same for each of the offices you try to connect. Currently internet speeds are expressed in megabits per second (Mbps). See some charts in average internet speeds [by state](#) and [by country](#) on pages 8 and 9. Singapore currently boasts download speeds *twice* those of the United States!

It is also extremely important to consider the right carriers, especially when dealing with international offices like Ware Malcomb does. Some carriers only offer one entry point from country to country while others offer multiple entry points. All of this can quickly become a bottleneck.

## Latencies

Internet speeds by themselves do not make up the entire equation. Latencies are a big part of the entire speed picture. Latency is affected by geographical distance (the farther away, the larger the latency) and by infrastructure (glass fiber offers much lower latencies than copper wire).

In [this chart on page 9](#) we show some latencies between countries where Ware Malcomb operates. Note, for example, that a project in Seattle collaborating with Panama will experience greater latencies (at over 113ms) than a project between Chicago and Toronto (at about 17ms).

## Presence of WAFS

As mentioned before, WAFS can help in greatly reducing access times for particular files. If these systems are not in place, each remote file access becomes a full download of that file. For example, if someone in a Chicago office has to work on a 35Mb file located on a Seattle server, that user has to wait before the full file is loaded each time he/she needs to work on it.

## **Licensing**

Licenses cost money. The more licenses are needed, the more money it costs. It seems simple, right? Realize that some setups require different license structure and can help save money.

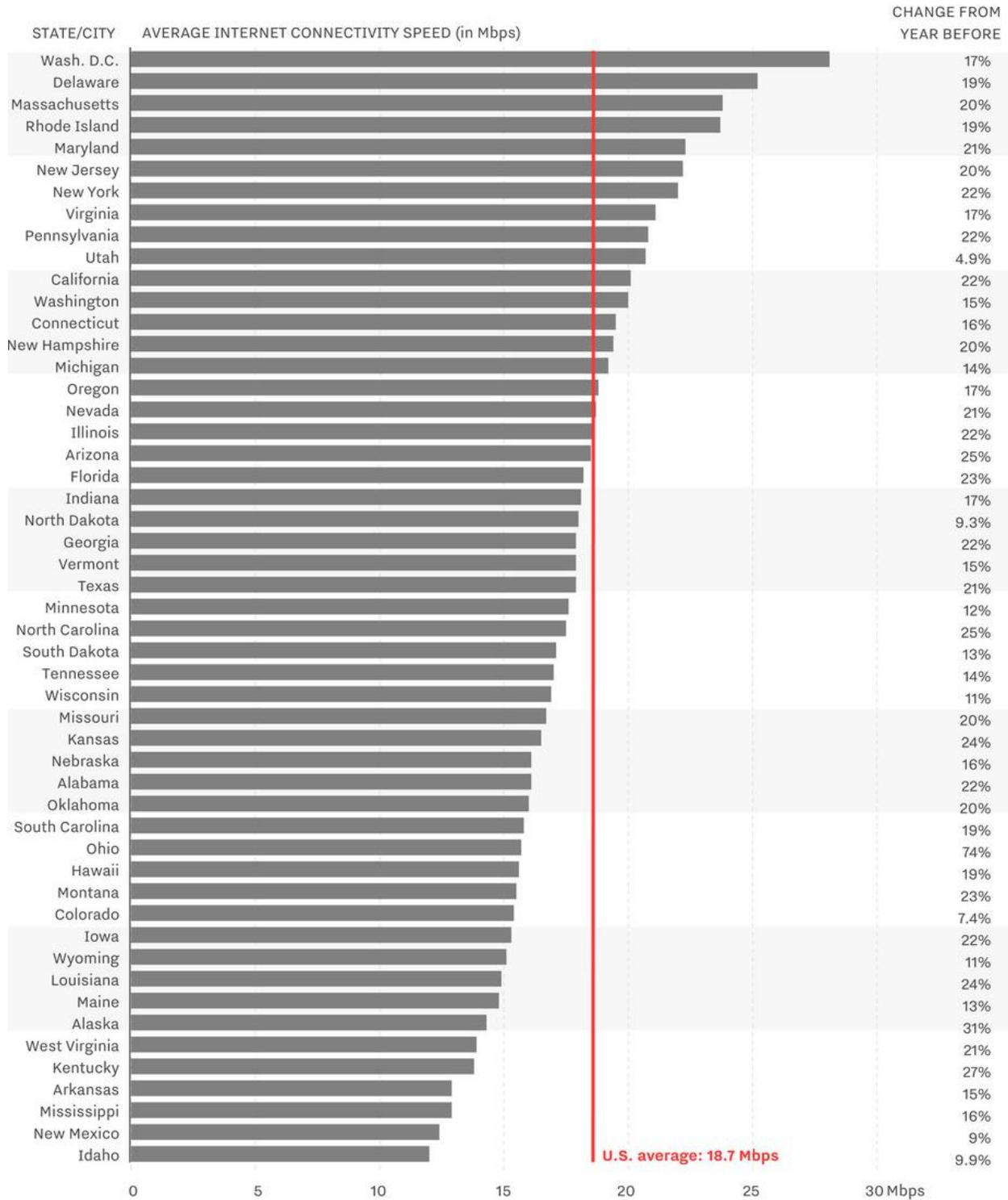
## **Hardware Limitations**

Assuming laptops are being used, there is a great variance in power/capacity. Generally the “work horses” required for heavier work, bigger models, and more processing power are also larger and heavier. These laptops do not travel well or are not favorites. Lighter “netbook” type laptops will probably require a VDI solutions to do the heavy lifting while these computers are much more portable.

## **Network Limitations**

Networks within your building will also have an impact to your workflow and speed. Up-to-date equipment such as routers, switches, etc. are important, but also the very cabling and connection points. The more wire (i.e. copper) there is, the slower your network will be. Do not let the area within your four walls be the weak link of your organization!

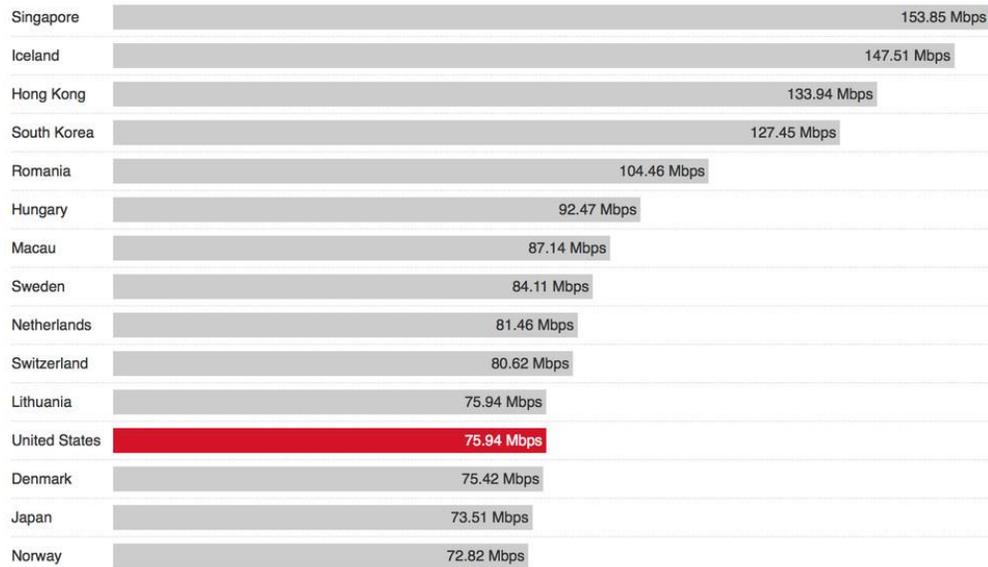
# Internet Speeds by State



Source: Akamai | Data for Q1 2017, Internet Protocol version 4



## Internet Speeds by Country



Source: Ookla

## Internet Latencies between Cities

	Mexico ✖	Panama ✖	Toronto ✖
Atlanta ✖	● 45.139ms	● 63.428ms	● 38.428ms
Boston ✖	● 75.008ms	● 72.515ms	● 20.278ms
Chicago ✖	● 55.235ms	● 85.791ms	● 16.875ms
Denver ✖	● 47.004ms	● 100.224ms	● 35.418ms
Houston ✖	● 33.011ms	● 80.522ms	● 47.433ms
Los Angeles ✖	● 50.448ms	● 95.512ms	● 62.559ms
Miami ✖	● 53.826ms	● 48.119ms	● 39.891ms
New York ✖	● 67.987ms	● 69.929ms	● 22.774ms
Phoenix ✖	● 66.576ms	● 93.112ms	● 67.775ms
San Diego ✖	● 61.607ms	● 95.219ms	● 78.012ms
San Francisco ✖	● 59.045ms	● 103.303ms	● 68.383ms
Seattle ✖	● 69.379ms	● 113.579ms	● 58.002ms

<https://wondernetwork.com/pings>

## Components of Collaboration: Auxiliary Tools

Regardless of what tools are used to collaborate work on actual files and models, there is no doubt a need for additional software or tools. For every day communication, especially if people are not in the same geographical location, the default is email\*. However, flooding our already overfull email boxes with miscellaneous in-house communication is not optimal. For this reason, chat clients come in handy. There are plenty to choose from and the selection changes by the day. Some are also being incorporated into larger platforms.

NAME	COMPANY	COST	OS	URL	V	M
Adium			Mac	<a href="http://adium.im">adium.im</a>		
Amazon Chime			All	<a href="http://aws.amazon.com/chime">aws.amazon.com/chime</a>		
Azendoo			All	<a href="http://www.azendoo.com">www.azendoo.com</a>		
BASECAMP (CAMPFIRE)				<a href="http://basecamp.com">basecamp.com</a>		
Bitrix 24	Bitrix, Inc.			<a href="http://www.bitrix24.com">www.bitrix24.com</a>		•
ChatWork				<a href="http://go.chatwork.com">go.chatwork.com</a>		
Cisco Spark	Cisco		All	<a href="http://www.ciscospark.com">www.ciscospark.com</a>	•	•
Cisco Webex Teams	Cisco			<a href="http://www.webex.com/products/teams">www.webex.com/products/teams</a>	•	•
Comm100				<a href="http://www.comm100.com">www.comm100.com</a>		
eXo Platform				<a href="http://www.exoplatform.com">www.exoplatform.com</a>		
Fleep				<a href="http://fleep.io">fleep.io</a>		
Flock		\$3 / person / month	All	<a href="http://flock.com">flock.com</a>		
Flowdock	CA Technologies			<a href="http://www.flowdock.com">www.flowdock.com</a>		
Fuze	Fuze, Inc.		All	<a href="http://www.fuze.com">www.fuze.com</a>	•	•
Glip	RingCentral	\$5 / person / month		<a href="http://glip.com">glip.com</a>		
Google+ Hangouts	Google			<a href="http://hangouts.google.com">hangouts.google.com</a>		
GoToMeeting				<a href="http://www.gotomeeting.com">www.gotomeeting.com</a>		
Hive				<a href="http://hive.com">hive.com</a>		
Jabber	Cisco			<a href="http://www.cisco.com">www.cisco.com</a>		
Jostle				<a href="http://www.jostle.me">www.jostle.me</a>		
LiveEngage	LivePerson, Inc.			<a href="http://www.liveperson.com/liveengage/messaging">www.liveperson.com/liveengage/messaging</a>		
LogMeIn				<a href="http://www.logmeininc.com">www.logmeininc.com</a>		
Mattermost				<a href="http://mattermost.com">mattermost.com</a>		
Microsoft Teams	Microsoft	\$8 / person / month		<a href="http://products.office.com/en-us/microsoft-teams">products.office.com/en-us/microsoft-teams</a>		
Moxtra	Moxtra, Inc.			<a href="http://moxtra.com">moxtra.com</a>		
Redbooth				<a href="http://redbooth.com">redbooth.com</a>		
RocketChat				<a href="http://rocket.chat">rocket.chat</a>		
Ryver		Free		<a href="http://ryver.com">ryver.com</a>		
Samepage				<a href="http://www.samepage.io">www.samepage.io</a>		
Semaphor	SpiderOak	\$10 / person / month		<a href="http://spideroak.com/semaphor">spideroak.com/semaphor</a>		
Simplr				<a href="http://www.simplr.com">www.simplr.com</a>		
Skype (for Business)	Microsoft			<a href="http://www.skype.com">www.skype.com</a>	•	•
Slack		\$8 / person / month		<a href="http://slack.com">slack.com</a>		
Spark	Ignite Realtime		All	<a href="http://igniterealtime.org/projects/spark">igniterealtime.org/projects/spark</a>		
Troop Messenger		\$5 / person / month	All	<a href="http://www.troopmessenger.com">www.troopmessenger.com</a>		
Twist		Free		<a href="http://twist.com">twist.com</a>		
Workplace	Facebook	\$3 / person / month		<a href="http://www.facebook.com/workplace">www.facebook.com/workplace</a>		
Workzone				<a href="http://www.workzone.com/product-tour">www.workzone.com/product-tour</a>		
Wrike				<a href="http://www.wrike.com">www.wrike.com</a>		
Yammer	Microsoft			<a href="http://products.office.com/en-us/yammer/yammer-overview">products.office.com/en-us/yammer/yammer-overview</a>		
Zoho Cliq	Zoho	\$3 / person / month		<a href="http://www.zoho.com/cliq">www.zoho.com/cliq</a>	•	•
Zoom				<a href="http://zoom.us">zoom.us</a>	•	•

\* Remember that even communication through chat clients is fair game in legal battles and subpoenas. Any communication is...whether it's in email or not!

## Conclusion

No system is perfect for every situation. That is the “take-away” from this session. However, proper planning and paying attention to the specific needs of an organization and the offices and people within it will go a long way. It will always be an exercise to balance the right tools and equipment with the budgets available. Not having enough speed or the right tools can slow down a workflow. However, spending too much money on unnecessary infrastructure and software can be equally as negative.

We offer some general (hopefully useful) tips:

1. Do plenty of research. Knowledge is power. Either educate yourself or employ the right professionals who can offer their expertise to the decision-making process.
2. Create the right setup for the work at hand; do not under- or overdesign/purchase. There is no “one size fits all” solution.
3. Plan for the future. Is your organization likely to grow or open new offices? Make sure your solutions are scalable.
4. Have proper support. Every system *will* fail. Having the right support to have everything back up as quickly as possible and with the least amount of damage/loss is crucial to every operation.
5. Train your users. The better they know the systems they’re using, the less likely there will be issues to solve.
6. Practice good a work-and-life balance. This has nothing to do with this presentation but is definitely a good idea!