

# Productivity, Part 1: Getting Things Done, Using E-Mail, Scanners, Reference Managers, Note-taking Applications, and Text Expanders

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In an era of declining reimbursements and tightening of the job market, today's radiologists are forced to "make do with less." With the rollout of the Patient Protection and Affordable Care Act, commonly called "Obamacare," radiologists will be expected not only to interpret studies but to also take on many additional roles, adding a new layer of complexity to already demanding daily duties. These changes make it more important than ever to develop a personal workflow management system incorporating some of the most potent productivity tools. In this article, the authors discuss current productivity techniques and related software with the most potential to help radiologists keep up with the ever increasing demands on their time at the work place and help us lead more balanced lives.

**Key Words:** Productivity, workflow, time management

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This is an opportune time in radiology to focus on productivity skills. A study of the recent US recession of 2007 to 2009 found that overall productivity at the workplace increased, with each worker putting forth more effort and producing more output than in normal times, an effect deemed "making do with less" [1]. With the rollout of the Patient Protection and Affordable Care Act, commonly called "Obamacare," it is predicted that radiologists will have to do more than just read a large number of studies to succeed [2]. Although the specific details of "postreform" radiology may remain somewhat murky, it is clear that radiologists are expected to use informatics to deliver timely, content-rich reports; develop meaningful relationships with hospitals,

referring physicians, and patients; manage the utilization of imaging; and participate in the medical, social, and political structures of hospitals [3]. With increasing performance expectations and complexity, it is more important now than ever to be productive [4]. The good news is that productivity is a skill like any other that can be learned and honed through constant practice [5]. In this article, we focus on personal productivity techniques a radiologist could use to keep up with these ever increasing demands. Part 2 focusses on other productivity techniques [6].

## GETTING THINGS DONE

The past two decades have seen an explosion of "time management" or "personal productivity enhancement" methods in an attempt to teach people efficient routines for dealing with information overload. However, they fail to address the central problem: we are constantly bombarded by new information, which typically requires reconsideration of priorities, objectives, and resources, commonly rendering detailed planning ineffective [7].

With Getting Things Done, or GTD for those in the know, David Allen has proposed a simple and flexible method intended to minimize stress and anxiety while maximizing productivity [8]. The basic principle of GTD hinges on moving tasks out of the mind by recording them externally, thereby freeing the mind, enabling it to concentrate on actually performing those

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tasks. It proposes a productivity framework (Fig. 1), which involves gathering all of the “incompletes,” including anything personal or professional that has some type of “to-do” attached to it, and sorting them into essentially 5 categories (5 D’s) [5]:

- Delete it: If you don’t need it, delete it!
- Do it: If it can be done quickly (<2 min), do it now.
- Delegate it: An often-ignored strategy!
- Deposit it: Create an easily accessible and organized archiving system.
- Defer it: Schedule and track the tasks that will take >2 min to complete, such as future projects, and time-bound “to-dos.”

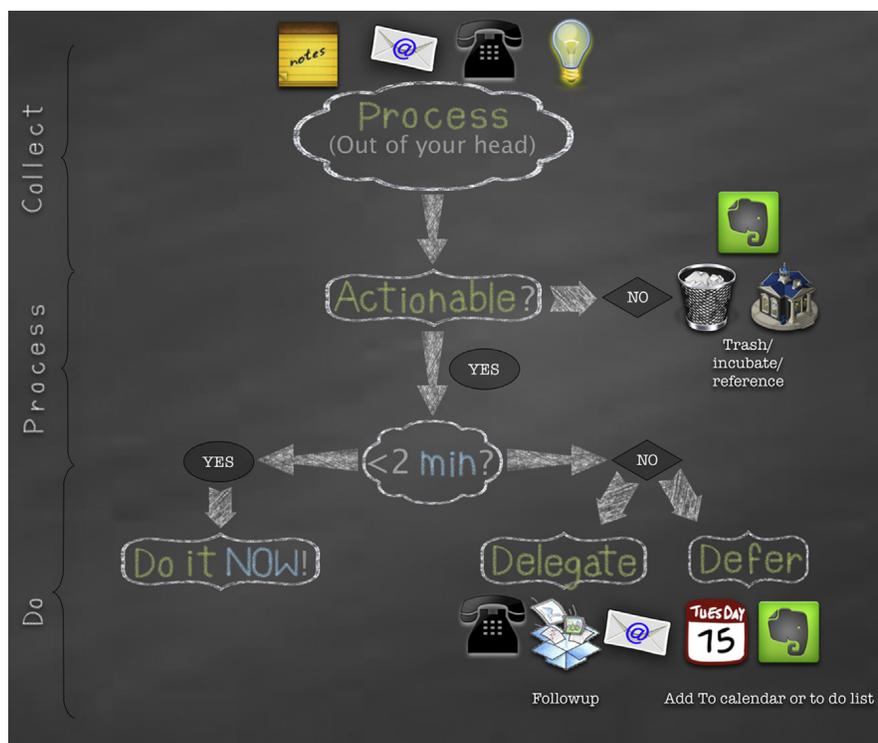
The “do” portion of the GTD model is the most difficult part of being productive. Staying motivated and healthy and achieving work-life balance is key to an effective productivity model [5]. Adopting a few healthy practices, such as daily exercise, goal setting, decluttering, taking regular breaks from work, and learning to prioritize, will lead to an almost effortless increase in energy and productivity [9]. These habits, along with limiting distractions, will thus allow more work to be done in a shorter amount of time. The Pomodoro Technique (named after the tomato-shaped kitchen timer) is a productivity method designed to enhance concentration by focusing on only one task at a time, resulting in reduction of the impact of internal and external distractions. With the aid of a simple timer, also available as simple applications on several smart phones, the user will spend short, 25-min bursts of focused energy on a task, followed by a 3-min to 5-min rest

interval. After 4 “Pomodori,” a longer break of 15 to 30 min is taken [10]. This method, one of the more popular time management techniques among productivity enthusiasts today, can thwart procrastination by streamlining concentration, thereby increasing output.

A both crucial and incredibly rewarding step in any workflow management system is the weekly review [5]. A small amount of time should be carved out weekly to get caught up (keep up with the paperless workflow, process inbox, capture notes), stay current (review actionable items, plan next actions), and be creative (brainstorm new ideas, set short-term and long-term goals, analyze the effectiveness of productivity practices) [11].

## DEALING WITH E-MAIL

E-mail is notorious for being a huge source of distraction and wasted time, but it can also be used as a productivity tool. An e-mail inbox often represents unprocessed items that need some decision. An overflowing inbox compromises focus, decreases efficiency, silently drains energy, and distracts from the task at hand [5]. Achieving “inbox nirvana” [11] is possible, and learning the “process” of regularly prioritizing incoming information can dramatically improve productivity. In a way, e-mail is a microcosm of an individual’s overall productivity framework, and the 5 D’s of GTD can, and should, be applied. For example, if an e-mail response will take <2 min to complete, doing it immediately eliminates the need for further processing, which would likely take more time than just getting it done now and out of the way. Processing e-mail in this way also provides a motivating “caffeine-like hit” of accomplishment. For



**Fig 1.** Illustration of the Getting Things Done workflow. Elephant icon represents Evernote application. House icon represents Papers 2 application. Open box represents Dropbox application.

most people, e-mail pours in constantly, and their multitudes of portable devices keep them connected at all times, creating a lifestyle without any real breaks from work. To avoid living in your inbox, push notifications must be turned off immediately, so that your inbox is updated at more reasonable intervals. It is best to check for new e-mail as seldom as your job and your patience will permit. If this is particularly difficult for you, start by setting it up for hourly updates. But do not be afraid to push the envelope, even for just half a day, and see the difference!

Getting inbound e-mail under control provides a huge productivity boost, but outbound e-mail communication has its traps as well. A well-written, concise message saves everyone time. A less than 5-sentence e-mail can be perceived as abrupt and rude, whereas more than 5 sentences can waste time. A good e-mail should have a single focus, have a compelling and actionable subject line, get to the point quickly, and avoid excessive details. It should answer these 5 questions [12]: Who are you? What do you want? Why are you asking me? Why should I do what you are asking? What is the next step? Most people need this information to make a decision. A powerful outbound e-mail time saver is using the “subject” line efficiently. A great “subject” line makes it easy for your recipient to immediately understand why you have sent an e-mail and to quickly determine what kind of response or action it requires, and it can even serve as the entire e-mail itself.

Innumerable derivatives of the GTD framework and associated techniques circulate on the Internet via blogs, articles, videos, and software. And although it is impossible for one single approach to guarantee productivity for everyone, by understanding your personal productivity needs and experimenting with different techniques, it is possible to develop a unique system that works. Myriad tools are available to aide in the incorporation of these efficiency techniques and habits into daily workflow. Some of the most powerful tools to enhance productivity are reviewed in this article.

## GOING PAPERLESS

Going paperless is a potentially life-changing event that eliminates clutter and stress by saving both space and time and allowing instant, ubiquitous access to all of your personal documents [13]. Most important documents are now available in electronic format, and the first step in achieving a paperless lifestyle is to stop the incoming paper by receiving as many items electronically as possible [14]. There will still be some amount of paper that enters your daily life, such as mail, receipts, and documents from colleagues, which will need to be accounted for [13]. Tools needed to begin this process include a physical “inbox tray,” a “waiting to be scanned” bin, a scanner, and associated software to help organize what is scanned. The specifications of what

makes a good scanner and software are discussed in detail in the next section.

First, it is important to set up a quick and easy daily routine. As paper comes to you throughout the day, quick decisions should be made about its destination. If it is useless, it should be discarded immediately. If no action is necessary, then ask yourself, should it be scanned? This answer will vary somewhat from person to person, but a good general rule should be to scan things that will be needed again and cannot be accessed elsewhere. For example, a personal letter from the dean’s office may be scanned, whereas a university newsletter can be discarded because it is available on the website. Items to be scanned should then be placed into the “waiting to be scanned” bin. Actionable items should be dealt with as described above in the “Getting Things Done” section, and after the appropriate action is completed, the paper can be discarded or shredded or moved to the “waiting to be scanned” bin. At the end of the day (or after an even longer interval), it should take only a few minutes to scan everything in the bin and start afresh the next day [13,14]. Once this daily digital workflow process becomes a habit, old archived documents should be dealt with in the same way as time permits. There may be an initial time and monetary investment in going paperless, but these are outweighed by many benefits, including increased productivity, decreased cost, easy portability, better security (from physical theft and destruction from fire or flooding), and easy sharing [5].

## SCANNERS AND SOFTWARE

### Utility

The hub of any paperless workflow system is composed of the hardware (scanner) and the software to organize what is scanned. Choosing the right scanner will greatly enhance productivity by allowing quick and easy upload. Although there are a multitude of different scanner types which offer a wide array of functions, a fast, duplex (captures both sides of the document at the same time), sheet-fed scanner with an automatic document feeder will be the workhorse of any paperless operation. The ability to scan directly into cloud software applications such as Evernote (Evernote Corporation, Redwood City, California), Google Docs (Google Inc, Mountain View, California), and Dropbox (Dropbox, Inc, San Francisco, California) is an added feature that many new scanners are incorporating. A very popular scanner that meets these criteria is the Fujitsu ScanSnap iX500 (Fujitsu Ltd, Tokyo, Japan) [15]. Some of the most popular sheet-fed scanners are compared in Table 1.

Just as there are several scanners with similar specifications, there are numerous file management applications. The major software requirement when going paperless is optical character recognition, electronic conversion of scanned images of handwritten, type-written, or printed text into machine-encoded text. It is a way of digitizing texts so that they can be electronically

**Table 1.** Some of the most popular sheet-fed scanners

Scanner	Price	Wi-Fi Capability	Additional Features
Fujitsu ScanSnap iX500 (Fujitsu Ltd, Tokyo, Japan)	\$495	Yes	Comes with a free 1-year subscription to Evernote Premium; comes bundled with the popular reference manager Paperless (Mariner Software, Inc, Minneapolis, Minnesota); can use a wireless connection to scan directly to iOS or Android devices, bypassing the computer completely; 50-sheet maximum capacity
Brother ImageCenter ADS-2500 (Brother Industries, Ltd, Nagoya, Japan)	\$699.99	Yes	Direct scanning to various cloud applications; can scan directly to Android devices; 50-sheet maximum capacity
NeatConnect (Neat Company, Inc, Philadelphia, Pennsylvania)	\$499.95	Yes	Direct scanning to various cloud applications including their proprietary NeatCloud (subscription included); 15-sheet maximum capacity
Xerox Documate 3220 (Xerox Corporation, Norwalk, Connecticut)	\$299.99	No	50-sheet maximum capacity
Epson WorkForce Pro GT-S50 Document Scanner (Seiko Epson Corporation, Nagano, Japan)	\$299.99	No	75-sheet maximum capacity

searched [16]. The application and details of reference managers are discussed further in the next section [17-20].

### Impression

Going paperless is a huge time, money, and stress saver, which involves using technology to generate less paper overall by collecting paper and imputing the content into a computer. A paperless workflow allows easy access to important documents from anywhere, better security, and easy sharing [5].

One limitation of going paperless is that the process can be slow in the initial learning phase. There is also a significant monetary investment upfront for a multiple-sheet-fed scanner (eg, the Fujitsu ScanSnap iX500 costs \$495) and a software suite with optical character recognition capability (eg, Papers 2 [Mekentosj BV, Dordrecht, The Netherlands], \$79). Another limitation of this system is that relegating a task to a folder that is not reliably reviewed can cause an important task to get ignored. This can be addressed by setting up reminders for important tasks and deadlines.

## REFERENCE MANAGERS

### Utility

Organizing innumerable journal articles available online for quick reference is a challenge. Currently up to 25% of radiologists opt for online-only journal subscriptions [21-23]. Reference management applications allow easy retrieval of material from online databases such as PubMed and Google Scholar, with the ability to save downloaded articles as PDF files, along with its associated metadata (title, authors, key words, abstract, etc). This feature allows material to be organized and used for bibliographic references and citations, saving significant time and energy when performing research and preparing manuscripts [24].

There are a large number of reference managers available to choose from. The majority of those currently available allow users to import already existing documents in various formats into a library by downloading directly either through search engines or through an institutional library. Users can organize references by subject, discipline, subspecialty, and so on. The software also allows users to annotate the documents in their libraries, with most reference managers also offering note-taking options. Some reference managers allow several users to share particular collections, resulting in ease of collaboration. All reference managers allow automatic citations in a manuscript, with the ability to quickly reformat the bibliography into various citation styles using just a few keystrokes. This is particularly helpful for those who perform interdisciplinary research or submit their manuscripts to various journals for publication. Several reference managers are also accompanied with mobile applications, automatic backup, and synchronization functions. Papers 2 is a file management software that allows you to search for, automatically retrieve, organize, annotate, and read PDF files on your PC or Mac [17]. Papers 2 handles scientific literature the same way iTunes deals with music, by using a similar iTunes feature (Smart Collections) as a means of organizing scientific research. Table 2 illustrates key features of the commonly used reference managers [25-27]. Several reference managers are available, many with overlapping functionality but slight variations in style. It is recommended to use the free trial period to determine your comfort with the user interface [28].

### Impression

Reference managers make the task of organizing large extensive libraries of journal articles easy and save significant time with their easy retrieval abilities. The creation of

**Table 2.** Some of the most commonly used reference managers

Software	Platform	Cost	File Formats	Citation Styles	Additional Features
Papers 2	Mac, Windows	Free 30-day trial \$79 for a single-user license 40% discount for students Volume pricing also available	Export: Endnote, BibTeX Import: BibTeX	APA, Chicago/Turabian, Harvard, MLA	Handles scientific literature the same way iTunes deals with music by using a similar iTunes feature (Smart Collections) as a means of organizing research.
EndNote	Mac, Windows	Free 30-day trial upon request Students \$113.95, others \$249.95 Volume pricing also available	Export: Medline, Endnote, BibTeX Import: Endnote, Medline, MODS, PubMed	APA, Chicago/Turabian, Harvard, MLA	Built-in search engine of hundreds of online resources to collect references; select a reference and EndNote will find the full text. Web version allows mobile access; password protection and network functionality.
Bookends	Mac	Free up to 50 references Single license \$49.99 Bookends On Tap (Apple mobile application) \$7.99 Volume pricing also available	Export: Medline, Endnote, BibTeX Import: BibTeX, Endnote, Medline, MODS, PubMed	APA, Chicago/Turabian, Harvard, MLA	Unicode-savvy, so you can mix Roman (English, French, German, etc) and non-Roman (Japanese, Greek, Hebrew, etc) characters. Bookends/Mellel (an advanced multilingual word processor for Mac OS X) bundle available for \$69; synchronization library with Apple mobile devices (requires separate purchase of Bookends On Tap from the iTunes App Store).
Sente	Mac	Free up to 100 references and 250 MB of attachments Premium (unlimited library and 1 GB synchronization space) Students \$29.95, others \$49.95	Export: Endnote, BibTeX Import: BibTeX, Endnote, PubMed	APA, Chicago/Turabian, Harvard, MLA	Automatic cloud synchronization of your libraries to any number of Macs and iPads anywhere in the world; create full-access copies for your own computer and restricted copies for sharing with students or colleagues; password protection and network functionality.
Zotero	Mac, Windows, Linux	Free up to 300 MB Upgraded storage: 2 GB \$20/month, 6 GB \$60/month	Export: MODS, Endnote, BibTeX Import: BibTeX, Endnote, MODS, PubMed	APA, Chicago/Turabian, Harvard, MLA	Automatically senses content in your web browser, allowing you to add it into your personal library with a single click; password protection and network functionality.
Mendeley	Mac, Windows	Free account Free iTunes application	Export: Endnote, BibTeX Import: BibTeX, Endnote	APA, Chicago/Turabian, Harvard, MLA	Reference manager and academic social network; import and organize PDF files from your computer, EndNote, Papers, or Zotero; open your PDF files and capture your thoughts through sticky notes and highlight; synchronize library with Apple mobile devices (requires separate free download from the iTunes App Store); password protection and network functionality.

(continued)

Software	Platform	Cost	File Formats	Citation Styles	Additional Features
BibDesk	Mac	Free (open source)	Export: MODS, Medline, BibTeX Import: BibTeX, Endnote, Medline, MODS, PubMed	APA	BibTeX front-end and repository; does not support copy/paste or drag and drop of references directly into Microsoft Word; password protection, but no network functionality.

Note: APA = American Psychological Association; MLA = Modern Language Association; MODS = metadata object description schema.

libraries available even on portable devices allows a quick review of references, facilitates collaboration, and can significantly improve productivity.

Potential limitations in using reference management software include an initial nominal cost in purchasing these software solutions. Optimizing and configuring this software might be cumbersome for some users. Collaboration with colleagues may be challenging if users have their libraries on different platforms.

## NOTE-TAKING APPLICATIONS

### Utility

To achieve productivity, a trustworthy, reliable system for recording thoughts, ideas, goals, and to-dos should be established [8]. Physically writing a note is certainly a quick option, but paper notes are often misplaced, and valuable time can be lost when searching for one specific piece of information. Electronic note taking saves time, as notes are easily searchable and available even on portable devices.

Evernote is a suite of software and services designed for note taking and archiving that has quickly developed a cult following of more than 60 million users since its release in 2008 [29,30]. Evernote allows users to capture and create notes in a variety of forms, including scanned documents, web pages, photographs, voice clips, and now even handwritten notes (Evernote with Moleskine). These notes are stored locally, but by using cloud technology, are automatically synchronized across all of the user's mobile devices for instant, ubiquitous access. Evernote has powerful built-in search capabilities as well. Even with thousands of notes, information can be retrieved within a few seconds, saving the user a tremendous amount of time [31]. Table 3 compares the most functionally rich note taking and archiving applications [32-34]. Finding an application that matches your personal needs and is the user-friendliest is key to ensure optimal use.

### Impression

Having a reliable thought collection and organization system is imperative, and electronic note-taking applications offer additional advantages of being ubiquitous, diverse, and easily searchable. The price for such software ranges from free to \$70, plus a small initial time investment to learn the basics of whichever application is chosen. However, the cost of a paperless note-taking

system is far outweighed by the tremendous amount of time and hassle eventually saved.

Some academic radiologists may feel overwhelmed by the numerous capabilities of note-taking applications such as Evernote. A trial run is encouraged to figure out which features are most important for your personal use. A limitation of electronic note taking is time spent waiting for the application to start up when a user wants to make a quick note [31]. Also, critical information, such as patient information, passwords, and so on, should not be stored if data are stored on a cloud server.

## TEXT EXPANDERS

### Utility

Text expanders are software applications that automatically replace abbreviations (snippets) selected by the user with their designated longer phrases or paragraphs. They automate typing of repetitive information, allowing the user to concentrate on new material. Some applications offer clipboard support. The user can copy a phrase into the clipboard and assign the phrase an abbreviation, and it gets added to the existing expansions.

Text expanders offer several benefits. By typing snippets of a phrase or paragraph, the user saves time and energy in performing repetitive functions such as reminders, orientation or follow-up e-mails. Snippets can include formatted text, images, and so on, facilitating the creation of a document. Form filling can be easily achieved by creating snippets for name, address, e-mail address, phone number, fax number, and so on. Common spelling mistakes can be circumvented completely using snippets. Some software products offer applications for portable devices as well. Text-expander software collects statistics on how many characters are saved using the software, allowing quantitative measurement of the saved time. Commonly used text-expander applications are summarized in Table 4.

### Impression

Text-expansion software circumvents repetitive typing, allowing the user to concentrate on creating new material. There is significant saving of time and energy that can dramatically increase productivity over time [35].

Initial configuration of the program can be a deterrent for the technologically challenged. However, most software products have excellent video tutorials to help new users. Commonly used words are not ideal snippets

Table 3. Some of the most commonly used note-taking applications

	Platform	Cost	Multimedia Notes	Handwritten Notes	Notes	Templates	Text-Formatting Features	Synchronization and Collaboration
Evernote	Windows, Mac, Android, iOS, BlackBerry, and WebOS; also web application	Free: 60 MB/month; premium: \$5/month	Allows files, audio, and video as attachments to notes; video notes are limited to premium users	Allows ink notes with the Windows desktop application; notes cannot be mixed or edited using other platforms	Limited template options: blank paper, yellow ink note or checkbox-based to-do list	Clean and easy free-text input but less flexibility; notes not arranged in pages; allows rich-text formatting	Automatic synchronization every 15–60 min to 24 h, not real time; allows note sharing but collaborative editing allowed only for premium users	
Microsoft OneNote	Part of Microsoft Office except Mac Office; supports mobile apps for iPhone, iPad, and Android	Included with Office (\$119–\$349); also available as stand-alone (\$79); web application is free	Also allows files, audio and video notes; notes can be moved, resized, hyperlinked and indexed with spoken words for a later search	Allows robust inking system; notes can be placed anywhere, mixed with other text/notes, converted to text and resized	Allows a variety of templates: meeting notes, calendars, to-do lists, charts, forms, and reports	Text is contained in boxes that can be dragged and reorganized around the page without having to cut and paste; allows complex formatting	Allows real-time background synchronization of notes; simultaneous sharing and editing and whiteboard functionality; old versions of the notes can be retrieved	
Google Keep	Can access via the web; however, limited to only Android 4 OS	Free	Allows text, voice, or photo note, or create a checklist; video not supported	None	None; does not organize related notes	Speech-to-text transcription for voice notes, home-screen widgets, and an archiving option	Real-time synchronization; limited sharing capabilities via email; does not integrate with Google Tasks	
SpringPad	All except Linux; has iOS and Android apps	Free	Yes; allows capture and storage of audio and video notes	None	None; however, offers note content–based tips and suggestions	Can create, edit, and save a variety of notes as snippets that can be organized into notebooks	Allows private or public note settings; users may follow public notebooks for information sharing	
Simplenote	Only Mac, iOS, Kindle, and Android platforms; can also be accessed via the web	Free; \$1.99 per month (pro account); pro account allows notes to synchronize to Dropbox	Not available; only text notes are supported	Not supported	None; only blank notes are allowed that can be tagged and grouped together	Sleek three-pane design with sidebar, notes pane, and note editor with search function; lacks other functionality	Excellent real-time sync feature; for collaboration, the note can be converted to a web page and link sent to the recipient for editing	

Table 4. Some commonly used text-expansion software			
Software	Platform	Cost	Additional Features
TextExpander	Mac	\$34.95	Generally regarded as the standard text expansion software; fill-in feature is a unique time-saving feature that allows the user to define multiple fields that will be fillable when the snippet gets expanded; the TextExpander library can be used by any other computer via Dropbox and MobileMe synchronization option; Apple mobile application also available
Typinator	Mac	\$33.45 (30% discount for students and faculty members)	Comes already bundled with automatic correction for English, French, and German, as well as File Maker 9 functions and 111 HTML snippets; Dropbox and MobileMe synchronization option
Typelt4Me	Mac	Free 30-day trial Students \$13.99, others \$19.99	Similar in functionality as TextExpander; password manager function; gives statistics about saved time in typing using the software
FastFox	Mac, Windows	Free 14-day trial; \$29.99	Because FastFox runs in the background, shortcuts can be used with any program, including word processors and e-mail; with intuitive auto-complete, FastFox learns the most commonly typed phrases and suggests them as the user is typing
Texter	Windows	Free	Runs in the background in the Windows system tray and thereby works in any application the user is typing in; last software update was in 2007
Phrase Express	Windows	Free for personal use	Performs mathematical calculations as the user is typing, thereby eliminating time wasted switching back and forth between a calculator; intuitive auto-complete; can synchronize snippets with TextExpander to provide a cross-platform text expander for Windows and Mac
Breevy	Windows	Free 30-day trial; \$34.95	Can synchronize snippets with TextExpander and Dropbox

because they get replaced with the designated phrase(s). With increased use, a user may not be able to remember all the snippets and their corresponding phrase or paragraphs. In such a scenario, the user must access the menu bar to select the required snippet [36].

## CONCLUSIONS

Productivity is a skill that can be learned. The rewards of an efficient and relaxed life far outweigh the amount of time and effort it takes to create and maintain an organized workflow. We encourage readers to go paperless! The initial investments will more than make up for the time and stress saved over the long term.

## TAKE-HOME POINTS

- Productivity is a skill that can be learned and honed through constant practice.
- GTD is a simple and flexible workflow management framework that can minimize stress and maximize productivity.
- E-mail can be a powerful productivity tool when used wisely; regularly processing your inbox using GTD principles can increase productivity.

- Going paperless is a potentially life-changing event that eliminates clutter and stress by saving both space and time and allowing instant, ubiquitous access to all of personal documents.
- Reference managers allow effortless organization of even large, extensive libraries of journal articles and save significant time with easy retrieval.
- Electronic note-taking applications offer a reliable system of recording thoughts, ideas, goals, and to-do items.
- Text-expansion software is a simple way to save significant time and energy by automating repetitive phrases and functions.

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# Productivity, Part 2: Cloud Storage, Remote Meeting Tools, Screencasting, Speech Recognition Software, Password Managers, and Online Data Backup

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It is an opportune time for radiologists to focus on personal productivity. The ever increasing reliance on computers and the Internet has significantly changed the way we work. Myriad software applications are available to help us improve our personal efficiency. In this article, the authors discuss some tools that help improve collaboration and personal productivity, maximize e-learning, and protect valuable digital data.

**Key Words:** Productivity, cloud applications, collaboration

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Performance expectations are at an all-time high for radiologists and are predicted to continue to rise in the future, making it an opportune time to focus on personal productivity. Productivity is not only about getting tasks completed on time but is also about simplifying one's life and removing unwanted distractions so that important tasks may be completed in a timely manner [1,2]. Ever increasing reliance on computers and the Internet has significantly influenced the way we work, but not optimizing their use can lead to distraction and wasted time. Myriad software applications have been developed to boost personal efficiency. In this article, we discuss some tools that help improve collaboration and personal productivity, maximize e-learning, and protect valuable digital data.

## CLOUD APPLICATIONS

### Utility

Loss of data often translates into great losses of time, money, and effort and is a common problem when users

rely on devices such as external drives or multimedia CD/DVD-ROMs for personal storage. Theft, fire, accidental deletion, and hardware failure can all contribute to lost files. The fallibility of personal data storage tools was addressed by the development of cloud applications. In simple terms, the "cloud" refers to a model of networked personal or enterprise storage whereby data are stored not only in users' computers but also in virtualized pools of storage, which are generally hosted by third parties.

The utility of cloud apps goes far beyond their capabilities as remote backup and file retrieval tools. To understand how that is accomplished, it is important to understand the distinction between cloud storage and cloud sharing. "Cloud storage" refers to storing a computer's files and folders, or in some cases the entire hard drive content, for future access. "Cloud sharing" refers to storing selected files from a computer on the Internet so that they can be shared with others. This is accomplished by having a folder on a user's computer; only the contents of that folder are shared and synchronized on the cloud server.

The ability to share the contents of a folder on a user's computer and synchronize files makes cloud apps important productivity tools. In the past, collaboration would have to be completed face to face or via e-mail. This was highly inefficient, resulting in delay and duplication of work. There are also limitations to the amount of data that can be transmitted via e-mail. Cloud sharing allows the collaboration of several users spread all over the globe, working together simultaneously on a particular task, while using different devices (Fig. 1). A potential use of cloud sharing in academic radiology is the creation of a universally accessible and safe repository of educational materials. An online cloud-based library of lectures, video files, presentations,

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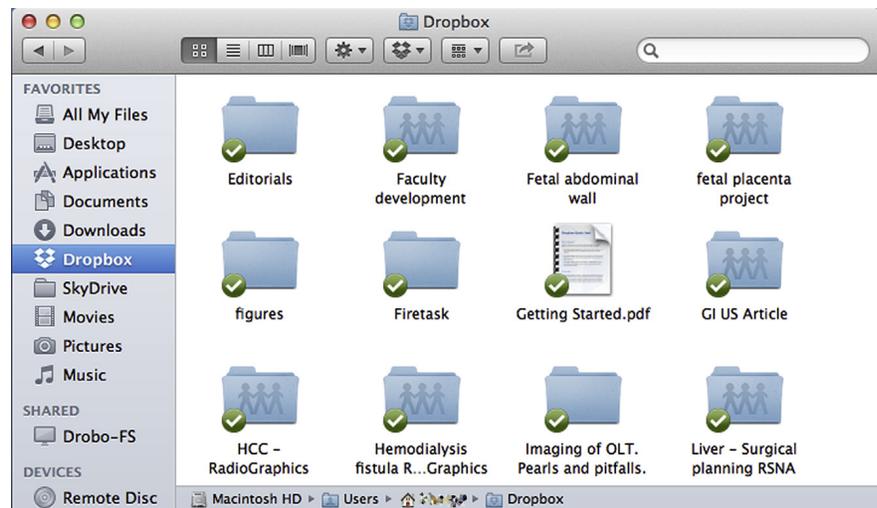
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**Fig 1.** Screenshot from Dropbox shows how multiple research project documents can be shared with other users' to enhance collaboration.



articles, test-taking modules, and so on, can be created, catalogued, easily updated, and synchronized to be accessed not only by a host of computers but also from the convenience of a tablet computer or smart phone [3]. Some important features of various cloud apps are summarized in Table 1 [4-7].

### Impression

Cloud apps have dramatically changed the way data are transmitted and stored and have opened new opportunities for collaboration, thus increasing productivity.

Cloud sharing increases efficiency by reducing the delays and duplication of work that are an inherent part of collaboration when only face-to-face, phone, or e-mail communication is used. The creation of a universally accessible and safe repository of educational materials is a unique use of cloud apps with tremendous potential to increase productivity in academic radiology [2].

A limitation of cloud apps is that they potentially pose new security risks. Critical information such as patient information and passwords should not be stored on a cloud server.

**Table 1.** Some of the most popular cloud applications

Application	Platform	Pricing/Plans	Maximum File Size	Backup Facility	Additional Features
Dropbox	Linux, Mac, Windows, Android, Blackberry, iOS (all)	Free up to 18 GB; Pro (100–500 GB, \$8.25–\$41.60/month); Business (1 TB for \$795/year for 5 users)	300 MB	Only pictures, music, and movies	Encrypted data storage, but no personal encryption; offers file versioning for 1 month
Box	All except Linux	Free up to 10 MB; Starter (100 GB, \$5/user/month); Business (1 TB, \$15/user/month); Unlimited (call for pricing)	250 MB (free); 2 GB (paid)	Media and data files on the drive	Encrypted data storage, but no personal encryption; offers file versioning
Google Drive	All except Linux	Free up to 15 GB; paid (\$4.99/100 GB/month)	10 GB	Data files on the drive	Real-time collaboration and simultaneous editing with Microsoft Office; encrypted data storage, but no personal encryption; offers unlimited file versioning for data files, 1 month for others
SugarSync	All except Linux	Free up to 5 GB; Personal (60–250 GB, \$7.49–\$24.99/month); Business (1 TB, \$55/month for 3 users); Unlimited (call for pricing)	100 MB (web); no limit (client application)	Complete system backup	Personal encryption facility; offers file versioning with up to 5 older versions of the file available
SkyDrive	All except Linux	Free up to 7 GB; paid (up to 100 GB, \$10/\$25/\$50 for extra 20/50/100 GB/year)	2 GB	Data files on the drive	Encrypted data storage, but no personal encryption; offers file versioning

## REMOTE MEETING TOOLS

### Utility

Remote meeting tools are applications that allow meetings between individuals or audiences at different geographic locations. Although e-mail or conference calls are usually relied upon for a majority of long-distance communications, a virtual meeting may be more efficient and offer higher impact, especially for an important initiative. Web conferencing allows anyone with an Internet connection to collaborate and interact online in real time, often at short notice, saving time and money [8-10].

For large radiology groups with specialists spread among different clinics and hospitals, a remote meeting can be a vehicle for difficult case consultation between colleagues, or as a less disruptive way to conduct multidisciplinary conferences. Practice leaders can also quickly bring the entire group together to discuss important business details such as finances in a remote meeting. Teaching institutions can use remote meeting tools by hiring outside expert teachers to deliver quality educational content without the cost or time of travel.

A range of remote meeting tools are available, with slight variations in functionality and user interface. Individual features of some of the most popular remote meeting tools are highlighted, using GoToMeeting as a prototype (Table 2) [11-14].

### Impression

Remote meeting tools have the potential to increase productivity by allowing real-time collaboration without the hassle or cost of travel. Busy radiology groups can benefit from the ability to interact with colleagues at various locations for difficult case consultations, multidisciplinary conferences, or group business meetings. Educational webinars also become time and cost efficient.

A potential limitation of this type of application is the cost and administrative expertise required for setup and operation of some of the more elaborate tools. Given the potential to enhance productivity by enhancing communication, some of the cost may be defrayed by the hospital or care network in an overall effort to improve patient care with less waste. Security is an important consideration when confidential information is being discussed or shared, for which most providers offer a host of standard security features.

## SCREENCASTING

### Utility

Teaching a colleague how to do something on the computer either on the phone or via e-mail can be frustrating and time-consuming. Screencasting can increase productivity when used as a “how-I-do-it” tool, allowing an “expert” to easily teach by example. A screencast is a screen capture of the actions on a user’s computer screen [15]. In simple terms, it is a video counterpart of a

screenshot, with the added dimension of time, capturing what happens on a monitor over a specified period. It is typically associated with accompanying audio such as the sound from an application being demonstrated, a narrative from the presenter, or background audio from another application.

Screencasting can also be used as a remote learning tool (Fig. 2). Prerecording a lecture for a situation in which physical presence is not required allows the presenter to tackle other responsibilities and creates a fixed presentation that can easily be accessed within a screencast library for future use. An advantage of screencasting for learners is the ability to control the pace of the educational content to suit their personal styles of learning, with the ability to revisit confusing topics, something a classroom cannot always offer.

Several screencast tools are available that offer a host of useful functionality, platform compatibility, and ease of use. Key features of some of the most popular screencasting programs are further discussed in Table 3 [16-19].

### Impression

Screencasting can increase productivity when used to show, rather than tell, a colleague how to do something on the computer. A busy faculty member can save time by creating a library of prerecorded lecture material, from which learners also benefit by being able to listen and learn at their own pace.

Learning by watching a screencast of a lecture or presentation lacks direct audience participation, which is a well-recognized limitation of this tool.

## SPEECH RECOGNITION AND DICTATION SOFTWARE

### Utility

Most radiologists today are proficient with the use of speech recognition software for dictating radiology reports. Radiologists can use the same applications to simplify their lives and increase productivity in all facets of their academic lives. For a busy radiologist trying to maximize time, typing skills are outrun by the speed of the mind and getting words onto paper. Speech recognition software provides an enhanced level of personal productivity by allowing interaction with the computer by voice alone. To-do lists, e-mails, and presentations can all be handled with these applications [20-22]. Voice recognition software provides the benefits of “immediacy” and thought organization, making radiologists more productive by changing the way we interact with and organize information. Currently, Dragon, Nuance NaturallySpeaking, and Nuance 360 (Nuance Communications, Inc, Burlington, Massachusetts) are the market leaders in this category [23].

Dictating research ideas and to-do lists immediately when they are formed is very useful, because it is easy to

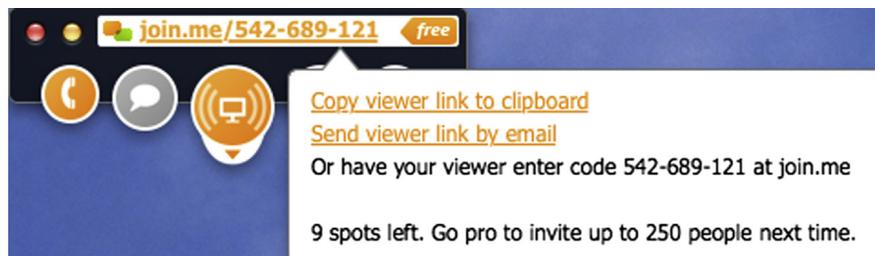
Table 2. Some of the most widely used remote meeting tools

Remote Meeting Tool	Software and Platform	Pricing/Plans	Invitation Tools	Collaboration Tools	Additional Features
GoToMeeting	No software required (web based); Mac and Windows; no Linux support	Free 30-day trial; GoToMeeting, \$49/month or \$468/year (up to 25 people); GoToWebinar, \$99/month (up to 100 people) to \$499/month (1,000 people); GoToTraining, \$149–\$349/month (200 people)	Automated e-mail templates* and webinar registration pages; start scheduled or spontaneous meetings from Microsoft Outlook, IBM Lotus Notes, or various instant-messaging services	Screen sharing via desktop and applications; with mouse and keyboard controls; multiple presenters, annotating tools; text chat, teleconferencing, and free VoIP; has added mobile access and HD videoconferencing	Recording capability; polling and survey capability; can generate postmeeting reports including length of stay and interest metrics
Watchitoo	No software required	Free 30-day trial; free for up to 5 people for 5 hours and up to 5 rooms; 3 different paid versions: Meeting Pro, Streaming Pro, and Learning Pro	Multiple embed locations, internal e-mail invitations	Screen sharing with up to 25 presenters while playing any form of rich media, text chat, questions, Twitter and Facebook posting, mobile access, video conferencing, video editing, whiteboard and website integration	Recording capability; polling and survey capability; can generate postmeeting reports
Elluminate (now Blackboard Collaborate)	Requires software download; Mac, Windows, or Linux	Free 30-day trial; \$499/year for licensing 1 room with up to 50 users, with pricing option for smaller rooms	Various	Share applications, files, documents, and desktops; multiple (up to 6) video feeds; annotating tools, text chat, teleconferencing, VoIP, video conferencing; virtual breakout rooms are available for larger audiences/conferences	Recording capability; polling and survey capability; can generate comprehensive reports
join.me	No software required; will run on any Internet server or smart phone, Mac or Windows	Free 14-day trial of join.me pro; free for up to 10 participants; pro, \$19/month or \$149/year (250 participants)	Meeting Scheduler and Meeting Lock facility is available in the pro version only	Screen sharing, desktop applications; multiple presenters;† annotating tools,† text chat; teleconferencing, VoIP, mobile access; no videoconferencing; send files, share control, multimonitor, annotation, † window sharing†	No recording capability; no polling or survey capability; can generate postmeeting reports (pro version)
WizIQ	No software required; Mac and Windows; needs Adobe Flash	Free 30-day trial; free membership as well as paid plans for individuals, organizations or facility to integrate virtual classroom in own website; educators can create paid courses	Needs registration to join session, but educators can allow access to their content without signup; can import contacts from various e-mails and send bulk invites; can schedule meeting using the Calendar Tool	Screen sharing, supports multiple whiteboard, chat, multiple "classes" that can be created/joined, VoIP, webcam; can also share files: documents, video, audio, even embedded YouTube videos	Recording capability; polling and survey capability; can generate postmeeting reports including detailed attendance reports

Note: HD = high-definition; VoIP = voice-over-Internet protocol.

\*Not available for Mac users.

†Only in pro version.



**Fig 2.** Screenshot from join.me shows how users can share their screens with others. There are options to view a user's screen using a meeting number or a web link.

forget such items during a busy day. Dragon Notes is a quick note-taking application, optimized for Microsoft Windows 8 devices, that allows recording, organizing, sharing lists, and ideas using voice dictation, thereby providing a simple way to capture notes and ideas in the office, at home, or on the go. Dragon NaturallySpeaking Premium 12 Home and Dragon Dictate for Mac offer a fast, fun, and convenient way to interact with a PC or

Mac. Usable with virtually any Windows application, a very high degree of accuracy can be achieved with regular use [23].

### Impression

Speech recognition software can be a major time saver by recording thoughts much faster than writing or typing. These tools allow voice interaction with the

**Table 3.** Some of the popular screencasting applications

Applications	Provider/ Platform (Cost)	Recording Features	Editing Features	Sharing Features
Adobe Captivate	Adobe Systems/ Windows and Mac OS X (\$799)	Full-screen HD capture with full motion recording; can record in multiple recording modes for demo, simulation and assessment; full PowerPoint integration; can add interactive elements to solicit audience response and scenario branching for different learner paths; drag and drop feature, in-course web browsing and YouTube help feature	Allows use of project templates, master slides, themes, table of content builder, and host of other workflow enhancements, such as ability to add learning notes and autotext captions; imports video in popular formats (avi, mov, flv, mpeg) and synchronizes video with selected slides; adds audio and animations to e-learning projects	Publish projects to the web, desktops, notebooks, and tablets; deliver e-learning content to iOS and Android devices; collaborate more efficiently by leveraging <a href="http://Acrobat.com">Acrobat.com</a> and using the Twitter widget from Adobe
ScreenFlow	Telestream/Mac OS X (\$99)	Full-screen capture keeps file size small; can capture HD video and audio, Keynote and PowerPoint presentations, fast-moving video games; recording timer and pause feature	Multilayer track editing, zoom and pan effects, trim clips, freeze frames, closed caption, transitions, adjust audio levels	Exports videos in both Windows and Mac formats; can publish to YouTube, Vimeo and Flash; supports timeline exports
Camtasia	TechSmith/Windows and Mac OS X (\$99)	Capture web page, PowerPoint or Keynote presentation, with full-screen, window, or region capture option; SmartFocus automatically zooms video into the active key stroke or mouse position	Several useful editing features, such as freeze region, extend frame, control clip speed, spotlight, mask, cursor effects, and annotations make it quite user friendly	Export straight to YouTube or free hosting site, <a href="http://Screencast.com">Screencast.com</a> ; video hyperlink and embed code can be shared via email, tweet or blog post; supports a multitude of devices
Snagit	TechSmith/Windows and Mac OS X (\$49.95)	Allows single click "grab" of entire desktop, a region, a window, or a scrolling window from any web page or application; has other features like delay capture, auto store, capture tray and spell check screenshot	Markup tools: customizable arrows, colorful speech bubbles, unique stamps Special effects: can add effects such as a special border, shadow and perspective to the entire capture Combine Images: allows creation of custom graphics by taking multiple captures and putting them together	Save, share, or send your image and video captures in variety of outputs; share through Facebook, Twitter, and Evernote; can also send to <a href="http://Screencast.com">Screencast.com</a> , YouTube, FTP for easy sharing

Note: FTP = file-transfer protocol; HD = high-definition.

computer, expediting the creation of to-do lists, e-mails, and presentations without using the keyboard.

Accuracy is the limiting factor when choosing speech recognition software. Some users may experience problems, especially if they do not speak clearly (ideally speaking like a news reader is best while using these applications) or if they use low-quality microphones. Accuracy of transcription improves after training the software using built-in training modules and with 4 to 6 weeks of regular use [23].

## PASSWORD MANAGERS

### Utility

New-age hackers and cyber thieves use highly sophisticated algorithms to crack passwords. With this increasing cybercrime and greater online vulnerability, using stronger passwords and frequently changing them has become critical. Using different passwords at different sites is now imperative to protect data. However, stronger passwords are often complex and cannot be remembered easily, especially when dealing with multiple websites and frequently changing passwords [24]. Managing so many passwords can be cumbersome and frustrating, but more important, it can significantly compromise productivity [25].

Password managers (PM) are software that securely organizes passwords and personal identification numbers and also works as form fillers (automatically filling out online forms) [26]. Furthermore, PMs can also safeguard against phishing (the act of attempting to acquire information such as usernames, passwords, credit card information, etc, by masquerading as a trustworthy source in an electronic communication) and pharming (redirecting a website's traffic to another, bogus site) by storing or incorporating an automated login script of the original website. If the login script of an existing website does not match that for the stored website, the login data will not be filled in by the software. This measure is crucial for protection because hackers often use visual imitations and lookalike websites to steal confidential information and passwords. With this built-in feature, PMs can be exceptionally valuable, even if multiple passwords are not used for different websites.

PMs can be broadly classified as online or web based and desktop or browser based [27]. Online or web-based PM software securely stores login details on a server and can be used on any computer with a web browser and a network connection. These PMs are better suited than more conventional desktop or browser-based versions. Desktop or browser-based PMs cannot be used on other computers, and the information is stored on the local hard drive, which can be easily lost through theft or damage to that system. On the other hand, online PMs are often dependent on third-party hosting websites, and the key logger is not installed on the computer the user is operating. Moreover, such servers and clouds could be

potential targets of cyberattacks. An ideal PM should be easily incorporated into any computer system, not require extensive computer or server modifications, be able to tackle the more complex login processes (especially those now enforced by many financial institutions), safeguard against key loggers or keystroke-logging malware, and should provide foolproof and scrupulous security measures [28].

The security features of a PM could be decisive for many guarded or cynical users. Security measures such as user-selected master passwords or passphrases offered by PMs such as 1Password could significantly encrypt protected passwords. Obviously, the level of security is governed by strength of the chosen master password, and a vulnerable master password could compromise all of the protected passwords. Additionally, some online PM systems allocate their unique source code, which can be verified and installed separately. Besides, a robust PM will not allow more than a limited number of false authentication entries before it is locked down. Likewise, it will also allow exchange of its memory into the computer's hard drive (which might be susceptible to attackers and allow extraction of unencrypted passwords) and will create truly random but strong passwords for users. It is noteworthy that an ideal and strong password goes well beyond 11 characters, contains uppercase and lowercase letters and numbers, and does not follow a pattern. Key features of the two most commonly used PMs are described in Table 4.

### Impression

PMs can significantly increase productivity by eliminating the time and frustration associated with creating, remembering, and frequently changing passwords. There are multiple options when choosing a PM, which range in price from \$12.99/year to \$49.99.

None of the PMs available on the market perfectly meet all the requirements described above [29]. However, if used wisely and appropriately, they are unquestionably a productivity asset and improve online security.

## ONLINE DATA BACKUP SERVICES

### Utility

Have you ever thought of losing your digital data? What if you lose all your important files and valuable multimedia collection because of an unanticipated event such as a hard drive crash, a natural calamity or disaster, theft, or accidents? Backing up your digital data and files could be a lifesaver in such circumstances [30]. An external hard drive or rewritable DVD could be an economical but time-consuming backup option. Moreover, regular manual backup not only can be cumbersome but is also not always feasible. Besides, events such as accidents, thefts, and natural calamities may wipe out both your computer and backup data concurrently, especially if they are at the same location.

**Table 4.** Comparison of the two most popular password managers

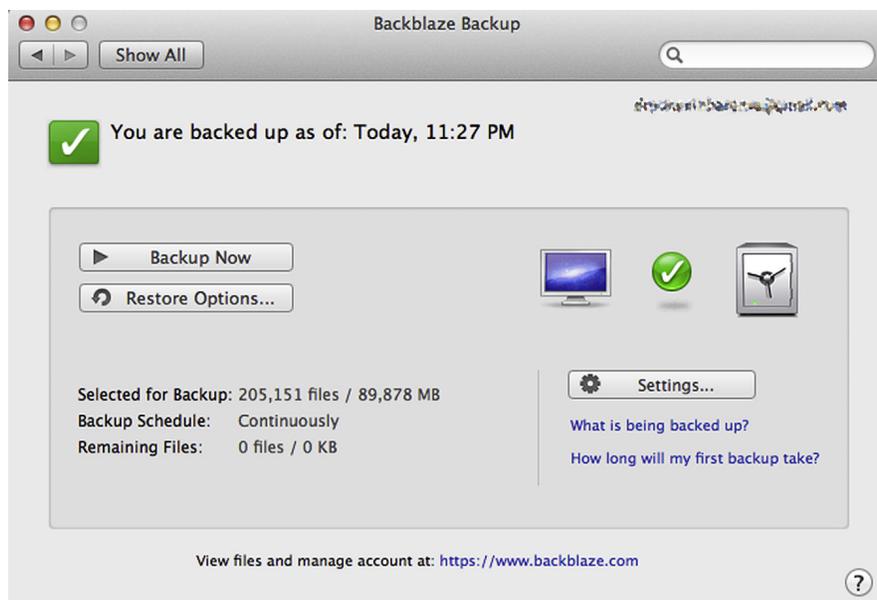
Software	Platform	Cost	Synchronization Support	Additional Features
LastPass	Mac, Windows Premium subscription supports iPhone, BlackBerry, Windows Phone, Windows Mobile, Android, Dolphin browser, Firefox mobile, Symbian S60, HP Webos	Free Premium, \$1/month (billed annually)	Automatic synchronization with its own encrypted servers	Can generate strong random passwords with options that can make the password pronounceable or to avoid ambiguity; supports multifactor authentication via USB thumb drives (LastPass Sesame), and YubiKey
1Password	Mac, Windows, Android, Chrome, Firefox, and Safari	Single user, \$49.99 Family, \$69.99 Mac/Windows bundle Single user, \$69.99 Family, \$99.99	Built-in support across all of their applications for Wi-Fi as well as Dropbox synchronization	Can generate strong random passwords; both iPhone/iPod Touch and iPad apps (\$7.99)

Note: USB = universal serial bus.

An online data backup service (ODBS) could be a practical, easy, and secure way to automatically back up data at an offsite location [31]. It is important to understand that an ODBS does not back up your program files and is different from a routine “computer backup” [32]. The backed-up intact data can be retrieved from another computer anytime and anywhere in the world through the Internet. Besides, some ODBS also offer mobile applications, permitting access to files from mobile devices. Fundamentally, an ODBS actually works as a secure and automatic cloud service. The first and foremost requirement of an ideal ODBS is high levels of security. Encryption during the synchronization, backup, storage, and retrieval is crucial. Moreover, an ideal ODBS should be economical and should offer unlimited space. An instinctual and simple user interface, allowing automatic transfer and synchronization, makes an ODBS more practical. Furthermore, the backup should be ideally performed on a daily and

ongoing basis [33]. Adequate help and support options, such as a developed customer care base, online user manual, frequently asked questions page, and proven customer satisfaction record should also be available.

There are multiple ODBS options available in the market. Two of the most popular and time-tested ODBS are Backblaze (Backblaze, Inc, San Mateo, California) and Carbonite (Carbonite, Inc, Boston, Massachusetts). Backblaze is a simple and user-friendly online backup tool, which offers unlimited storage at a reasonable price (\$50/year), with the option of continuous backup monitoring (Fig. 3). There is no restriction on maximum file size or upload speed, and backup of an external hard drive is allowed. It also allows adding a personal encryption key and can locate a lost computer. Online retrieval is free, but there is a fee for retrieving data on a hard drive (\$89–\$199). Carbonite also offers unlimited storage with the option of continuous backup monitoring, but at a slightly higher cost than Backblaze



**Fig 3.** Screenshot from Backblaze (an online data backup service) shows continuous backup from the user’s computer that can be double encrypted (one password for website access and another for entry into encrypted files). Backup is automatic and continuous. Lost data can be retrieved either via direct download from Backblaze or through an external storage device.

(\$59.99/year). However, files larger than 4 GB need manual backup. Moreover, the maximum upload speed is throttled after 200 GB. It allows access on smart phones and mobile devices. However, external hard drive backup is available only with premium service (\$99.99/year).

### Impression

Loss of digital data results in a significant amount of frustration and wasted time. Protecting valuable digital data is imperative, but traditional methods of performing a regular, manual backup to an external hard drive or rewritable DVD are not only extremely time consuming but also susceptible to many of the same threats such as theft and natural calamities. ODBS is an easy, secure way to automatically back up data at an offsite location. Backblaze and Carbonite are two of the most popular ODBS. For \$50 to \$60 yearly, users can obtain full encryption, unlimited space, and a simple user interface allowing automatic data transfer and synchronization.

While selecting any ODBS service, encryption policies of the service should be carefully reviewed and exceptions should be added to sensitive files kept on a linked computer.

### CONCLUSIONS

We have reviewed the utility of some of the most effective personal productivity tools designed to help us work smarter. We encourage readers to experiment with different products to improve their productivity. Taking the time to ultimately build a personalized, simple, and reliable productivity system ultimately allows us not only to excel in our radiology practice but also to spend more time with family and people who matter.

### TAKE-HOME POINTS

- Cloud storage solutions have dramatically changed the way data are transmitted and stored and opened new opportunities of almost real-time collaboration.
- Remote meeting tools play a pivotal role in the gamut of web conferencing by allowing meetings between individuals or audiences at different geographic locations.
- Screencasting not only increases productivity when used as a “how-I-do-it” tool, allowing an “expert” to easily teach by example, but can also be an easy vehicle for e-learning.
- Speech recognition software can be a major time saver, even outside the reading room, by recording thoughts much faster than writing or typing.
- PMs can significantly increase productivity by eliminating the time and frustration associated with creating, remembering, and frequently changing passwords.

- Online data backup services are an easy, secure way to automatically backup data at an offsite location.

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