

The 21st Century Spreadsheet

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ABSTRACT

It has been 20+ years since personal computers and electronic spreadsheets forever changed the way we work with our numbers. I will describe a common use of spreadsheets in order to introduce a 21st century approach that can dramatically improve on current spreadsheet value.

This is not an extensive technical discussion, rather it is meant to speak to current users of spreadsheets regarding issues that will be familiar.

1.1. History – Some Background

It has been 40+ years since the first electronic spreadsheet was created. Increasing availability of low cost “Personal Computers” in the early 1980s and the introduction of commercial spreadsheet software packages enabled the explosive growth of this new technology.

It was a natural transition for businesses to move from rows and columns in their ledger books to rows and columns on their computer screens. This transition was accompanied by significant improvement in efficiency for those that already worked with ledgers and numbers. For others, this ease of use, lowered the threshold to entry. Individuals, who would not have used paper ledgers, began to gather and manipulate data that would have been too time consuming previously.

More information could be gathered and quickly analyzed than ever before. Businesses realized tremendous value from this improved view of their day-to-day operations.

The 80s and 90s were the “spreadsheet war” era, where spreadsheet vendors added new features largely to impress reviewers, sell upgrades, and gain market share. These incremental improvements did little to increase effectiveness or efficiency for the majority of spreadsheet users.

Spreadsheets remain one of the most significant tools to come out of the Personal Computer era. Are significant improvements (the kind *actual users* will find value in), still possible in this area?

1.2. The Future – A Premise

We have arrived at another point in time where we can dramatically lower the cost while increasing effectiveness when gathering and analyzing our numbers. As with spreadsheets, this leap has become possible due to new

technology arriving at a level of suitable maturity. The Internet, while not a new phenomenon, has recently arrived at a level of maturity where network applications can be made available to a large audience. It’s this large audience, combined with high service speeds, low costs, and a multitude of access points that are the measure of this maturity.

Just as commodity Personal Computers and spreadsheets dramatically changed the quality of business intelligence 20 years ago, spreadsheet technology specifically designed for Internet use will provide the next leap. The technical name of this leap might be Multi-user Spreadsheet, but I think a change like this deserves better. I’ll call it a “Community Spreadsheet” and try to show why.

1.3. Today – Spreadsheets as They Are

Currently available spreadsheet software includes OpenOffice.org calc, Microsoft Excel, Gnumeric, Quattro Pro and numerous lesser-known alternatives. Many of these are available as free downloads. They are more alike than different; certainly anyone of them would perform admirably for the most common spreadsheet applications.

1.3.1. Spreadsheet – What is it?

A blank spreadsheet is a collection of cells with a minimal organization or structure in the form of rows and columns. To create a useful spreadsheet, the author must define:

1. input cells where incoming or raw data is entered and stored for processing.
2. output cells presenting the results in some useful way.
3. formula cells responsible for processing input cells and populating output cells.
4. structure that adds meaning to what might otherwise be just a collection of numbers.

Spreadsheets are personal, i.e., they may only be used by one person at a time. Using a spreadsheet requires that a personal copy of the spreadsheet software also be available.

Sharing spreadsheets with others requires another level of organization or structure:

5. synchronization providing suitable protection against multiple users creating conflicting changes.

Of course spreadsheets have many more complex aspects, but those are details of their use; rather than key components of what makes them what they are.

1.3.2. Types – It’s just a spreadsheet. Isn’t it?

Because spreadsheets have a very minimal built-in structure they can be used for everything from scratch paper, to sophisticated financial modeling and accounting;

thus their wide appeal. Let me describe some categories that will be useful to consider.

- Type 1 These are the classic ledger style spreadsheets where multiple entries in a row or column have something in common, i.e., they come from the same time period or are entries in a particular account.
- Type 2 Free form, where cells are used individually and organized by the author into a structure uniquely defined for a specific problem.
- Type 3 Everything else. These would include lists of text such as an address list, forms such as invoices, and any other uses that are not of type 1 or type 2.

For this short presentation, I will focus on type 1 spreadsheets.

1.3.3. Type 1 Spreadsheet – The Workhorse

In figure 1, we see a portion of a typical Type 1 spreadsheet. The rows contain category values collected periodically; in this case, weekly. Some row values are entered directly by the user, while some row’s values are the result of calculation. In figure 1, “Cash”, “Accounts Receivable”, “Accounts Payable”, and “Inventory” are collected and entered weekly. Working Capital is calculated using the entered values. Each week a new column is added.

	A	B	C	D	E
1		08/13/04	08/20/04	08/27/04	09/03/04
2	Cash	37354	35458	42516	47890
3	Accounts Receivable	36375	39055	47770	52657
4	Accounts Payable	25487	37709	65207	52985
5	Inventory	136583	113119	117797	117511
6	Working Capital	184825	149922	142876	165074

Figure 1. Type 1 Spreadsheet

Spreadsheets like this are the “workhorse” of the spreadsheet world. They are used to summarize current status while maintaining a history that may be used to spot trends and discover relationships between categories.

What is involved in using this spreadsheet once it is created? The owner or maintainer of the spreadsheet must first create a new column for the current week, duplicating the formulas from the previous week while being sure to update any formula or chart references that may not include the new column. Next, she or he must acquire and enter this week’s input values from their sources. In this example, three of the values might come from the accountant, while the inventory figure might come from the operations manager. And finally, the results must be delivered to the appropriate people.

1.3.4. The Process – A closer look

Each week and new column must be created. Typically, this means copying formula cells from the previous week and setting formatting of the new week’s blank cells. If there are charts, we need to check that the

new week is included in the chart’s references. This step is a common source of spreadsheet errors.

Now that we have an empty column, how do we go about getting the new numbers? Do we call or visit the various sources, email them a request, email the spreadsheet for them to enter the numbers, or wait for their prearranged weekly email and enter the numbers as they come in? This step is both error prone and time consuming. All of these approaches are insecure, making the numbers available to the ears and eyes of unanticipated parties.

Presenting the results is, in many ways, similar to gathering the inputs; i.e., we need to communicate them to multiple parties in some useful form. While, in our example, we had two sources of input; it is likely that there will be others that need to see the results. The original data sources should see, at least, their portion of the results in order to verify the numbers. In addition, other stakeholders will need to see some or all of the results. Again, the common delivery methods are cumbersome and insecure.

1.4. Back to the Future – There is a better way.

Notice that in describing the normal usage of a very simple spreadsheet, five or six participants are identified. This group of participants is the worksheet’s community. Worksheet communities may range in size from one to many. A spreadsheet without a community has no value.

When a spreadsheet’s community includes more than one member, important new issues arise.

- Who owns the spreadsheet, i.e., who is responsible for it’s maintenance?
- How do community members communicate their input numbers for inclusion?
- If we pass the spreadsheet around in the community, how do we know that errors are not created along the way?
- How are the results distributed and in what formats? Who sees what?

1.5. BizDash™ – The Community Spreadsheet

BizDash LLC has created a hosted solution specifically designed to enhance the notion of the community spreadsheet. Our server-based software was born out of a need for a versatile, easy to use, method for tracking and reporting a business’s Key Performance Indicators (KPI). Systems for tracking KPIs are often referred to as “Business Dashboards”, hence the BizDash™ name.

With our combined 50 years of business analysis and software system design experience, we focused on creating a system that brings increased value to current spreadsheet based solutions and at the same time providing a spreadsheet-like solution requiring only the BizDash™ Service and a Web browser.

1.5.1. Community – Where the value lies

From our experience, helping companies better manage their operations, we bring the idea that the stakeholder’s (a.k.a. community member) relationship with their numbers is as important as the numbers themselves. There is tremendous value in defining and supporting these relationships, i.e., *who measures is as import as what is measured.*

Thousands, if not millions, of community spreadsheets are currently in day-to-day use by small, medium and large companies. These are used in what might be described as an “ad-hoc” manner. The spreadsheet’s community members rely on it for it’s numbers and/or supply it with numbers, but their relationship to the numbers is often not considered in the process.

1.5.2. Relationships – The team’s numbers

In describing the figure 1 example, I suggested that values for the categories (or KPIs) “Cash”, “Accounts Receivable”, and “Accounts Payable” might be supplied by the accountant. Certainly the accountant would have these numbers, but additional value is realized when the numbers are supplied by someone that can influence what is being measured. For example, the person responsible for handling “Accounts Receivable” would be a better choice for supplying this number. You might describe them as the “owner” of this one value. This approach follows the idea of delegating responsibility and providing the feedback to optimize the performance of that responsibility.

While it is very useful to have the accounts receivable manager take ownership of the “Accounts Receivable” number and have appropriate report feedback, there is no need for them to have access to the other values in this example. With a spreadsheet solution, it is difficult to securely collect and report from/to community members in a selective manner. With BizDash™, it is very easy to manage these relationships.

It is a simple setup to have four members supply their numbers, the numbers that they “own”. The accountant supplies the “Cash” value, the accounts receivable manager supplies the “Accounts Receivable” number, “Accounts Payable” is supplied by it owner, and “Inventory” is supplied by the operations manager.

It is also simple to provide individualized views of the results. The CEO and accountant see a full report. Each of the other community members see a subset report selected for their needs.

1.5.3. The BizDash™ System – A quick spin

The BizDash™ service is accessed over the Internet using a Web browser. Using the Web interface, you can quickly create and define a multi-user Type 1 spreadsheet and it’s members, a “community spreadsheet”. No additional software is required.

BizDash™ can also tie into your existing Type 1 and Type 2 spreadsheets to either supply them with numbers or collect numbers from them.

Community member’s relationships, or permissions, can be defined down to the individual KPI (or cell) with independent permissions for entry and reporting. Each member then has his or her own entry screen and report screen, as defined by their relationship.

A company may create any number of spreadsheets, supporting any number of communities. Members can belong to multiple communities.

Reports are built-in. There is no need to individually define charts as in a spreadsheet, although you may customize where desired. The default report consists of one or more BizDash™ charts like the one shown in figure 2.

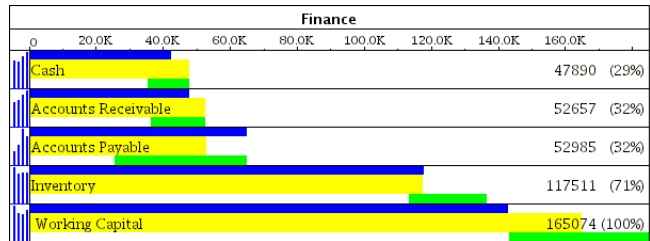


Figure 2. A BizDash™ View of Figure 1 Data

The vertical bars (blue) show the history, one period (weekly in this example) per bar. The top horizontal bar (blue) is last week’s value. The center horizontal bar (yellow) is this week’s value. The bottom horizontal bar (green) shows the historical range from low to high. The horizontal bars, in the same chart, are on the same scale (they are comparable). The history bars are individually scaled to identify trends.

All access to the BizDash™ service is via encrypted connection. The servers are managed 24/7 using industry best practices for high reliability and security. If you have additional concerns about your data privacy, you may create spreadsheets without any identity information associated with them.

The time periods (or columns) may be of any length, from minutes to years. The time zone of the spreadsheet and time zones of the members are automatically accounted for by the service. For example; you have headquarters in Chicago, USA with offices in London and Hong Kong. You want the weekly report complete at Friday 5:30PM Chicago time. The London and Hong Kong members may have their inputs synchronized to meet this requirement.

Formulas are defined in a very simple and readable way. The value of “Restaurant Sales” might have the following formula.

$$\$Food\ Sales + \$Beverage\ Sales + \$Other\ Sales$$

Where a Type 1 spreadsheet would require one copy of this formula for every column, BizDash™ needs only a single copy significantly reducing the likelihood of errors both initially and throughout the life of the spreadsheet. Novice spreadsheet authors will like its simplicity and

clarity. Experienced programmers will enjoy its simplicity and power.

Maintenance is reduced. There is no need to copy cells to extend the worksheet. BizDash™ does this automatically; eliminating a common source of errors.

1.6. Conclusion – Just the beginning

I hope I have made a case for the community spreadsheet, and piqued your interest. It is often said, “seeing is believing”. Here it is “using is believing”.

Using a system like BizDash™ can change how you look at measuring your world and the measures will change how you see your world. Just as the original spreadsheet/PC combination changed the quality of our view, lowering the cost and effort for teams to measure their world can provide another leap in quality of vision.