



## Summary

Both TIBCO Spotfire and Tableau allow users of various skill levels to create attractive visualizations of data, displayed as charts, dashboards and other visual constructs. But this is where the similarity ends. Tableau is a pure-play data visualization tool, whereas Spotfire is a deep product that embraces many other forms of analysis, and optionally plugs in to TIBCO's well regarded data and process integration technologies. Spotfire is quite happy on a standalone desktop, or embedded into an extensive enterprise analytics environment.

As organizations, TIBCO and Tableau are quite different. Tableau is purely focused on the visual side of analytics, almost to the exclusion of everything else. Great emphasis is placed on the ease with which its products can be used, and the visual appeal of the platform. Tableau's sales and marketing execution is virtually flawless, using the same attractive visual messages to attract customers. It can all be seen as a bit superficial, but the approach has payed off handsomely. Not only is Tableau growing very rapidly, but it is also used by many other suppliers who need a visual front-end to their own products. This betrays Tableau's real positioning very well. It's an add-on to more substantial analytical tools, and can in no way be seen as a full blown business intelligence or analytical platform. The strength of this positioning is that Tableau does what it does very well. The weakness is that it presents a hard-stop when users want to embrace more sophisticated forms of analysis as their skill levels develop. There is also another issue relevant to the use of Tableau. Once a user has discovered insights from their data - what happens next? It is one thing to see an opportunity or problem, and quite another to be able to do something about it. Data visualization tools are great for diagnostics, and completely impotent when it comes to remedial action. And it could be argued that this is not their role, which is quite correct, but it does help if an infrastructure is in place to aid remedial actions.

Spotfire actually preceded Tableau by more than a decade, and was acquired by TIBCO in 2007. The product was used for data visualization before most of us had heard the term. This accounts to a large extent for the depth of its functionality, and the mature technology infrastructure of which it is a part. TIBCO had to respond to the popularity of Tableau, and this was achieved in version 7 - released earlier this year. Version 7 includes recommended visualizations, easier data navigation and simpler filtering options. Work was also done to improve the visual appeal. The data visualization capabilities of the two products is now pretty much on a par. In effect TIBCO has had to pretty up the front-end of Spotfire to appeal to the current fascination with all things visual. TIBCO actually provides a full repertoire of analytical technologies. Spotfire itself accommodates statistical analysis, predictive analytics, text analytics, and geo-spatial analysis, as well as data visualization. TIBCO is also a major player in event-based analytics, and particularly complex event processing and streaming data analysis. So the analytical roots go very deep, and combined with data and process integration technologies, actionable analytics become a reality.

The relatively low profile of Spotfire is purely down to marketing effort. Most readers will have seen Tableau advertisements on relevant web pages, and may never have seen a Spotfire advertisement. This is probably a cultural thing - TIBCO is very good at business to business,



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but data visualization has taken on something of a consumer flavor, such is its popularity.

So there is a central choice to be made here. Tableau provides an excellent point solution for data visualization needs. However as soon as other forms of analysis are needed it becomes necessary to use additional technologies. Somewhat ironically however, Tableau does have integration with R, the open source analytics language - although it is not exactly easy to use! Spotfire on the other hand accommodates most of the analytical techniques an organization might wish to use, often in a visual interface, and users take as much or as little as they need.

Spotfire and Tableau will address the data exploration and visualization needs of most organizations. Users who choose Tableau have to be pretty sure that the needs of business users and analysts are not going to expand into other forms of analysis, unless they already use additional analytical tools. Spotfire users on the other hand have a fully extensible analytic environment that will go as far as they want to go.

### A Note on Qualitative and Quantitative Analytics

Data visualization is the first step in business analytics, and the most popular. Its appeal comes from its immediacy and the fact we are visual creatures - we like pictures. This is a qualitative approach to analysis based on human interpretation and insight. A whole generation of dashboard and visual analytics tools are available to give insights into data, but there are numerous issues associated with data visualization which should be borne in mind. The most important issue is that of interpretation. Give a visualization to ten people and you will probably get ten different interpretations. Different features will be picked out as significant, and different conclusions reached. Some will see a trend, others will see outliers, and yet others will conclude there is nothing to see. Establishing what is significant is not a trivial problem, and other methods can help here (particularly statistical methods). This point is being made to illustrate the fact that a visualization, as a qualitative approach, is just the first step in a journey of understanding - not the complete process. Of course visualizations are useful, but it just too easy to reach the wrong conclusions.

Just to illustrate the point consider a sales manager creating visualizations of customer income, versus products purchased, versus region. A group of customers in a certain age range in several regions, seem to purchase a particular product. Is it significant or not? It would be so easy to jump to a conclusion. In reality a much more robust analytical approach might be found through predictive analytics - clustering particularly. This is why we also need quantitative analysis tools - they are less easily misled by random data. An easy to use clustering tool would give much more insight. Individuals and organizations will move on from pure data visualization as they realize its limitations, and so, just to stress the point once again, a platform that accommodates multiple analytical methods, both qualitative and quantitative, is very important.



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## Spotfire

Spotfire comes in three flavors: Spotfire Desktop is a stand-alone Windows program with connectivity to a large number of data sources, Spotfire Platform is a server based implementation for departments and businesses, and Spotfire Cloud provides the same business author and consumer clients as Spotfire Platform (with a couple of analytical tools absent), but hosted in the cloud. It needs to be emphasized that Spotfire has an architecture capable of handling visualizations with hundreds of thousands of data points - without breaking into a sweat. Here is a brief summary of the functionality provided by each:

Spotfire Desktop runs on a Windows desktop computer and can access both local and remote data sources. These sources are too numerous to list here, but whatever a user might have it's likely it will be accommodated. The user interface and ease-of-use factor was significantly improved with version 7, providing recommended visualizations, easier data management and more attractive visualizations. It is difficult to see how the user experience could be more accommodating, even for complex visualization tasks. Some advanced chart types are supported including heat maps, treemaps and maps. The analytical tools really distinguish Spotfire Desktop, and typically do not require any code at all. Predictive analytics, location analytics, hierarchical clustering, forecasting and a large number of data functions come as standard. Dashboards and charts can be exported to PDF, Powerpoint and data file.

Spotfire Platform is server based and provides an enterprise data exploration and visualization environment with several powerful analytical tools. A web based interface supports business authoring of visualizations, and a consumer client allows viewing through the web browser. As with the desktop version, a large number of data sources can be accessed, and network graphs (for network analysis) are added to the chart types. Platform comes with the same analytical tools as Desktop with the addition of the R Runtime Server - an optimized environment for running R analytics tasks. Several services are also available including:

- Advanced Data Services - for integrating data from diverse sources.
- Automation Services - for scheduling analysis and reports, with email distribution.
- Location Analytics - for analysis that involves the location of objects, people and events.
- Statistical Services - with support for R, S+, SAS and MATLAB native functions.

Various mechanisms exist to share reports and dashboards, and a Guided Analytics facility is available in all three versions to tell a visual data story. A collaboration panel allows users to view web pages in Spotfire, and particularly if a web based collaboration tool is used (TIBCO offers tibbr - one such tool).

Spotfire Cloud is targeted at workgroups and comes with the business authoring and consumer web based clients. Users can build their visualizations completely within the web based client, and consumers can equally view them in the browser. A secure area is provided to share visualizations and collaborate, or if desired they can be broadcast publicly to as many consumers as necessary. An Enterprise version of Spotfire Cloud is available as a dedicated instance.



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### Spotfire Architecture

The speed of Spotfire is greatly enhanced by its clever memory and data management. For more modest data sets the in-memory processing ensures very high performance. Larger data sets can be processed in-database, and a hybrid approach called On-Demand optimizes the data held in local memory and that held in the database. This is unique to Spotfire.

For more advanced analytics there is the TIBCO Enterprise Runtime for R (TERR), providing a high performance production environment to run R scripts, and TIBCO Spotfire Statistics Services (TSSS). This integrates R, S+, SAS, MATLAB and in-database analytics into the Spotfire ecosystem. The accommodation of R is worthy of note since the execution of R scripts has been parallelized and the TERR engine is compatible with the RStudio IDE (much loved by many R analysts).

The Spotfire Server manages a library of analysis files, takes responsibility for authentication and authorization, persists links to external data sources and runs on Linux, Solaris and Windows. A core component in this is the Web Player. This cleverly normalizes data access by routing users to Web Player instances already accessing relevant data sources. New instances can be created as needed, giving virtually unlimited horizontal scalability.

### Spotfire Summary

The central feature of Spotfire that distinguishes it from nearly all the competition is the ability to start with easy to use desktop data visualization tools, and as needs and skills develop, to migrate to a full enterprise analytics environment. It satisfies the needs of novice users, business managers, analysts and data scientists in one homogeneous environment.



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### Tableau

In common with Spotfire, Tableau provides a number of implementation modes. These include:

Tableau Desktop which can connect to a wide variety of data sources, and provided data can be loaded into memory, offers good performance. It delivers an easy to use interface for data visualizations, but may prove inadequate as needs become more sophisticated. Resulting dashboards can be shared using Tableau Server or Tableau Online. It comes in two editions - the Professional Edition supports more data connections and the sharing options mentioned previously. The Personal Edition has fewer data connections and results can be shared by packaging up the data and visualizations in a file. The claim of 10 to 100 times faster than existing solutions is just marketing speak in my opinion. There are many reviewers who see similar analysis speeds using Microsoft products.

- Tableau Server comes with additional facilities for managing a distributed analytics capability. It supports scheduling of data refreshes, authorization and authentication, and broadcasting of visualizations to the community of users. Mobile support includes native iPad and Android apps.
- Tableau Online is a cloud hosted version of Tableau Server with access through a web browser.
- Tableau also offer Tableau Public, which is a web based facility for creating visualizations which can then be incorporated into a web site, and Tableau Reader for viewing Tableau visualizations.

In essence Tableau is a very simple product, which may be part of the appeal. It certainly does not serve the analytics needs of even moderately sophisticated businesses, but is a point solution for a very specific problem - visualizing data. This it does very well.

### Tableau Architecture

For local processing on a desktop computer Tableau Desktop uses an in-memory column database on both Mac and Windows. This is not unique to Tableau, but it is ideal for the multi-dimensional analysis Tableau needs to execute when users visualize data. Once the data has been stored in Tableau's in-memory column database, users can expect sub-second response for most of their data manipulation. This is less true when it comes to getting data into the column database since, depending on the nature of the data, the conversion from row based data to column data can be a fairly intensive process. A million rows of data containing many attributes may take many minutes (or more), even on an ideally configured computer.

Tableau Server uses connectors which send dynamic SQL or MDX statements directly to a source database. Detailed data is retained in the source database, and the results of queries sent to Tableau.



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Tableau Server is composed of four server processes:

- The Application server deals with server admin and permissions for the Tableau Server web and mobile interfaces, and handles content browsing.
- The VizQL server sends client requests to the relevant data sources and returns the result rendered as images. Multiple users can share a VizQL server, although these are quite memory hungry and it is common to hear of users experiencing memory problems because of this.
- The Data server supports the management of metadata - data source filters, connections, drivers, and this is where IT can assign permissions to data sources.
- Finally the Backgrounder refreshes scheduled extracts and multiple other background tasks.

Interactive dashboards are sent to web or mobile browsers using HTML5. Native iPad and Android apps are available.

Users with fast analytics databases will find that Tableau can connect directly to these data sources, and where data is in its raw state (a transaction database for example) Tableau will load data into memory, and the user can decide which mode to use. For very large datasets Tableau can extract data and store it locally. These extracts can be refreshed as needed, but it does limit flexibility.

Embedding of applications can be accomplished using Tableau's JavaScript API. This allows customization of the embedded Tableau objects with highly bespoke visuals such as buttons, calculations and so on.

### Tableau Summary

The decision on whether to use Tableau is quite straightforward in essence. If a business already has a Business Intelligence and/or analytics capability, and is looking to supplement it with a visualization tool, then Tableau is certainly one alternative. However users should not expect that Tableau will satisfy their reporting and analytics needs if they are looking for a one-stop solution, because it will not.



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### Conclusion

That technology fads and fashions are strong influences on the business use of technology is well understood. Data visualization is currently flavor of the month, and there is something of a race to the bottom taking place. Who can offer the easiest, most attractive data visualization tools? Whether such a paradigm is a good basis for business decisions seems to be a secondary concern at the moment.

These fashions disappear as quickly as they appear, and 2015 will be seen as the year of data visualization 'irrational exuberance'. So when businesses discover that charts and dashboards alone cannot give them the information they need for decision making, where will they turn? Well, obviously we need to complement data visualization with other forms of analysis, and take a somewhat more mature approach. As such we will need analytics platforms with broader capability and the ability to integrate with a business-wide analytics environment.

Having said all this, it should be obvious that Spotfire is much better positioned than Tableau for the inevitable turn in sentiment that will likely occur soon. In reality Tableau has always looked like a good acquisition target for a supplier lacking a data visualization component in its portfolio of products. But it really is not a platform that can currently take a business beyond dashboards and charts, and should be seen for what it is. And as stated earlier, it does what it does very well - but it just isn't enough.



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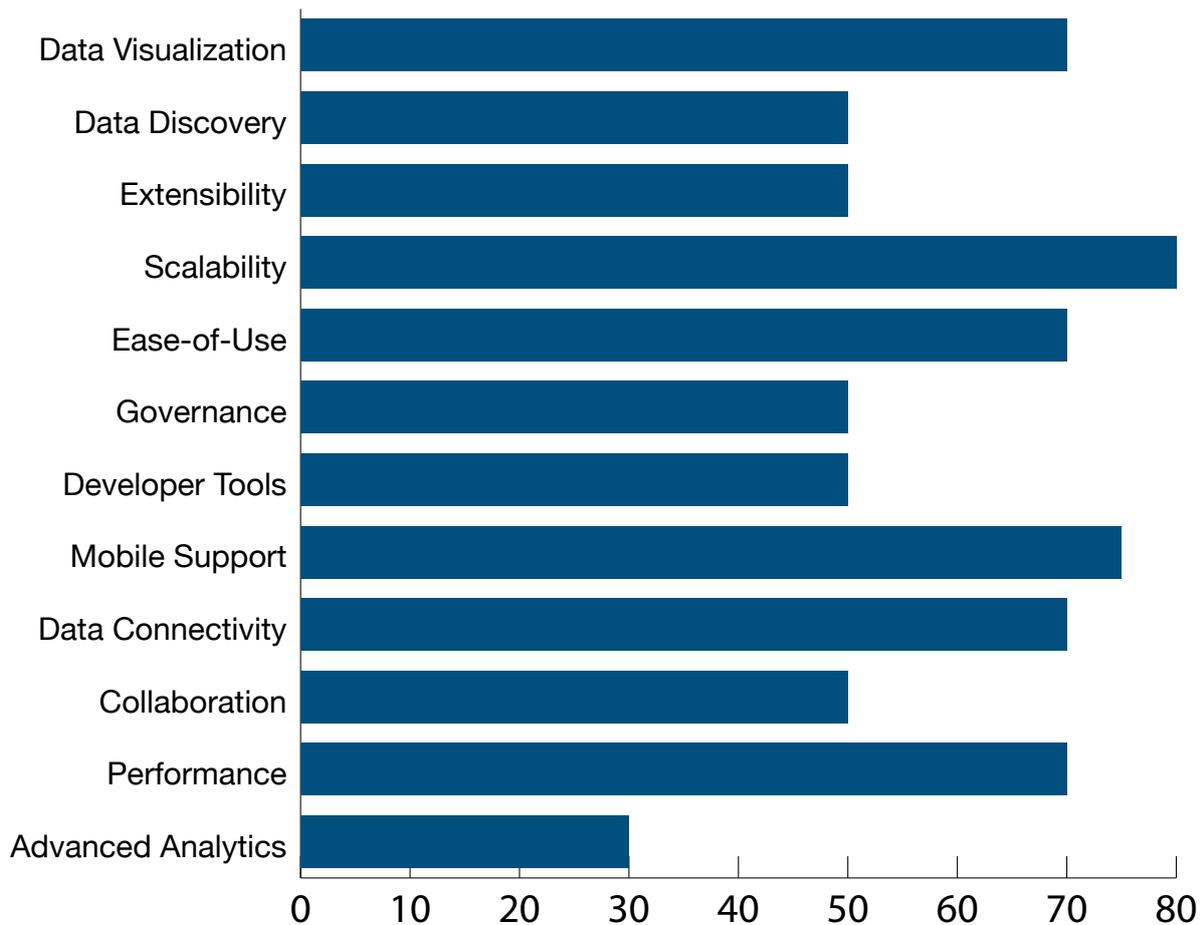
## Ratings

It is important to understand that these ratings score Tableau and Spotfire for what they do, and not what they might do. So for example, Tableau is given a low rating for advanced analytics because simply providing some level of integration with R is not particularly state-of-the-art. However Tableau makes no attempt at text analytics and so no rating is given. The other thing to consider is that 50% is average. Anything above that is above average - and clearly desirable.

The ratings decide the tier a product is placed in. 0 - 25% tier 4, 25 - 50% tier 3, 50 - 75% tier 2 and 75 - 100% tier 1



Tableau Rating - Tier 2



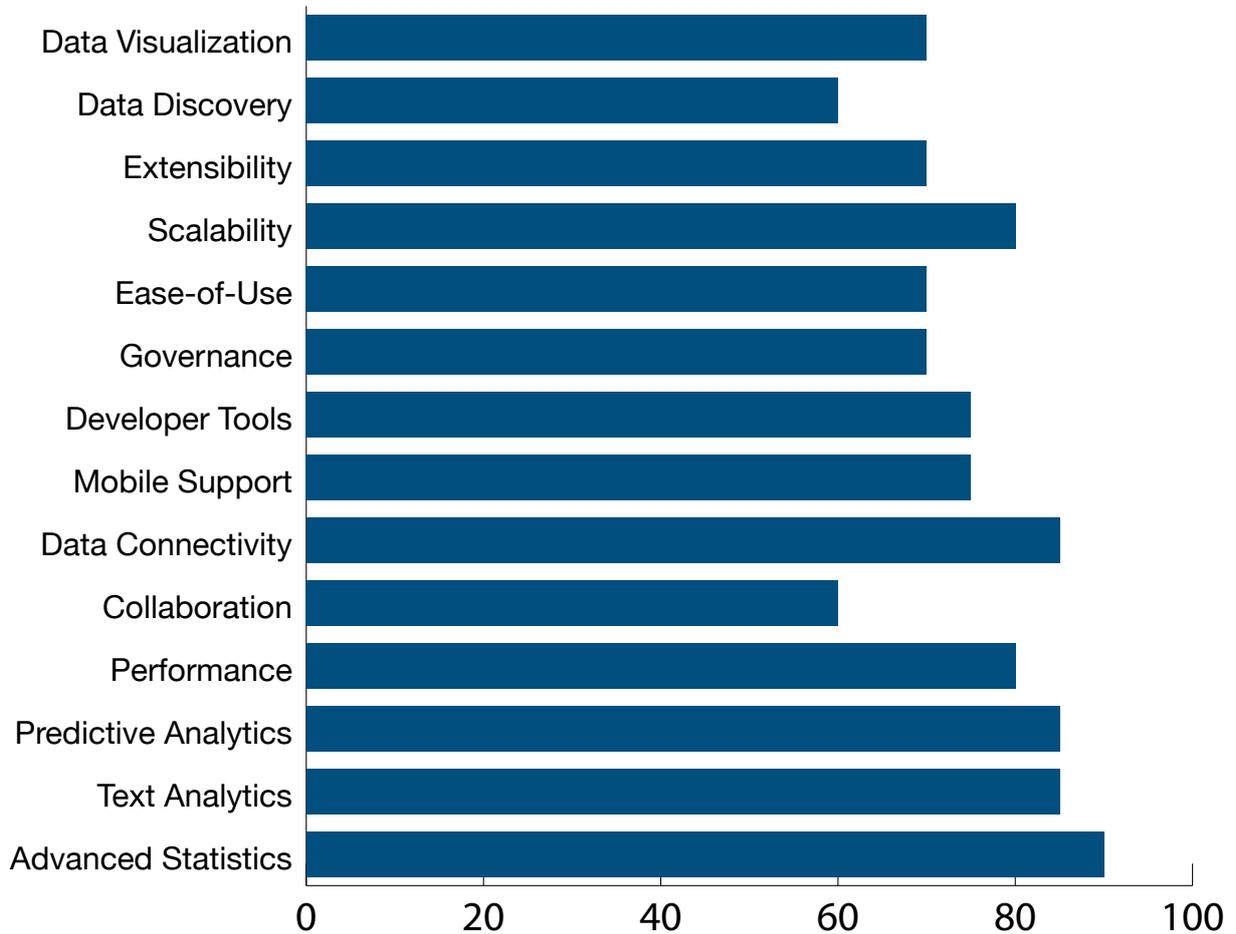
Rating Average for Tableau 59.6%



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Spotfire Rating - Tier 1



Rating Average for Spotfire 75.4%



## About Butler Analytics

Butler Analytics is a boutique IT analyst firm specializing in business analytics technologies and methods. It was founded by Martin Butler, best known as founder of Butler Group which, prior to its acquisition, was Europe’s largest indigenous IT analyst firm.

Business Intelligence, predictive analytics, big data, fast data, Enterprise Decision Management and all other technologies which aid business decision making are covered.

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