From Web Based to On-Line Decision Support

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The paper tries to identify some causes and implications of the web phenomena into the decision making field. It also includes examples in order to better justify the ideas. The literature and the practice are very rich in examples of Decision Support Systems (DSS) and Business Intelligence products but they are rather considered complex applications made to interact over the internet but not entirely running within the Internet. In order to arrive to this title we have also tested a few on-line products starting with simple office tools (Google docs – spreadsheets) or more specialized ones (Nesstar - analytics). And why this counts in this article? - Partially because when thinking of solvers and trend charts a spreadsheet may be considered a basic form of DSS. The main question is whether or not the on-line applications developers implement such functionalities in their products. Beyond the practical approach and the obvious criticism, the main idea of the paper is to make us realize the trend of many applications that serve decision making. The main implication of the trend-line mentioned in our article is related to the fact that in terms of technology any decision will become easier to be made when thinking of the mobile devices available nowadays. Thus the paper needs to be considered in relation with this topic. The main idea when speaking of originality is basically to show something previously not seen, not tested or not proved. In this case, the originality mostly consists in seeing beyond the traditional approaches of the decision support systems. The on-line category is one belonging to the places beyond these borders.

Keywords: DSS, Business Intelligence, Web and On-Line Applications, Conventional and On-Line DSS

INTRODUCTION

When speaking of decision making in business we obviously deal with something that has a certain scientific history - at least a half of a century of theories and ideas starting from applied mathematics to psychology and bounded rationality.

Similarly the applications trying to offer support for various decision-making steps have their own history - actually a rich one starting from text and image oriented decision support applications to model-based and artificial intelligence-based ones.

In fact this way we can touch another hot area of decision support - where it starts and where it ends in terms of functions and boundaries? As example, the artificial intelligence is honestly far away from the traditional idea of support. Why? - Simply because it integrates the trigger and puts the human actor somehow away from the deciding scenario. The same for just texts and messages as the only support especially now when the real sense of the saying "a picture paints a thousand words" is more and more exploited in media, electronics, and in all the subareas of software development.

The decision support systems are still in vogue as functionality and usage, while the original concept (the core acronym DSS present in its various types: spatial - SDSS, group - GDSS, etc.) could be perceived as well-known and with less impact. The replacement acronym could be Business Intelligence (BI), although some authors (Laursen and Thorlund, 2010) recommend using it especially when speaking of high level / importance decisions (analogy to the former Executive Information Systems). Since 90s, many developers of BI applications exploited the idea of executive reports and used it to create different levels of reporting pliable on the management levels and better integrated in ERPs and web-based applications.

Toward the end of the 1990s, the BI term (Vercellis, 2009) began to be used to generally address the architecture containing DSSs, analytical methodologies and models used to transform data into useful information and knowledge for decision makers.

We cannot step further not mentioning about historical data. They usually serve to the strategic decision levels under the form of data warehouses (Withee, 2010), OLAP (On-Line Analytical Processing) or spreadsheet pivot tables and they should easily interact with other specialized systems (usually report generators but also Geographical Information Systems - GIS, spreadsheet generators).

With or without OLAP functionalities we need filter options to apply them to historical data in order to fulfill some strategic information needs.

There are also cases when it is even more useful to accept less analysis functionalities with the gain of mobility. Partly this has much in common with the case of this approach treating features of the DSS evolving from web-based to on-line forms.

FROM WEB TO ON-LINE APPLICATIONS

A web application is an application using a web browser as a client meaning that we do not have to install and configure it. There are some accessible examples from simple to complex as it follows: a calendar, a guest sign-in message application on a website, an on-line word processor or a spreadsheet.

Most web applications are based on the client-server architecture. In fact the client enters information while the server stores and retrieves information - e.g. internet

web-based email clients and search engines (stored indexes of pages) offered by Yahoo, MSN or Google.

Anyway the new trend of web applications is to cross the border to those applications that do not normally need a server to store the information (e.g. Word processors). They can provide the same functionality and the gain of working across multiple platforms, of storing information and allowing the download to a personal hard drive. Much of this complexity is the result of using AJAX as a programming model for creating more responsive web applications (webtrends, 2011).

BUSINESS INTELLIGENCE APPROACHES: CONVENTIONAL, WEB-BASED, WEB-ENABLED AND ON-LINE

To deliver online software is a big trend today mainly because the BI software is still primarily installed on a server or a desktop in a conventional way, rather than delivered over the Internet. But that could change considering the reliable, secure and scalable cloud computing infrastructures available today providing support for cost-effective and scalable BI applications (see the Amazon Web Services providing a platform for SaaS BI – Software as a Service Business Intelligence).

On-Line Business Intelligence (OLBI) means to provide an advanced BI platform that runs in the cloud, and ensures all relevant BI features and even more. In addition to data loading, transformation, analysis and reporting, OLBI must also provide collaboration features allowing team members to analyze data together. And this is considered a major advantage because of moving BI from the solitary state to collaborative one (gooddata, 2011).

A web-based DSS application usually delivers decision support information to DSS consumer users (managers or business analysts) using a web browser (or client) like Netscape Navigator or Internet Explorer which accesses the Internet or an intranet. A server linked to other computers (users) via any network hosts this DSS application. Web technologies can be used to implement any category or type of DSS. Web-based means the entire application is implemented using Web technologies. Web-enabled means that key parts of an application like a database remain on a legacy system, but the application can be accessed from a Web-based component and displayed in a browser (dssresources, 2011).

PRACTICAL EXAMPLES TESTED WITH NEW AVAILABLE ON-LINE TOOLS

The examples considered by us in order to formulate any conclusions concerning the trends mentioned by the scientific literature and also by software providers were centered to some on-line products with office and analysis purposes.

As the office (spreadsheets) on-line was concerned we have tried to identify whether or not those products are able to replace the decision support functions implemented in their traditional competitors (e.g. – data filtering / formatting, solvers and trend lines from Excel spreadsheets).

The first observation is that Google Spreadsheets (an office on-line product chosen for test) has no filtering option although it was used even on a traditional PC (personal computer). In terms of data filtering / formatting it only allows us to format a data set according to a condition / rule (see figure 1).

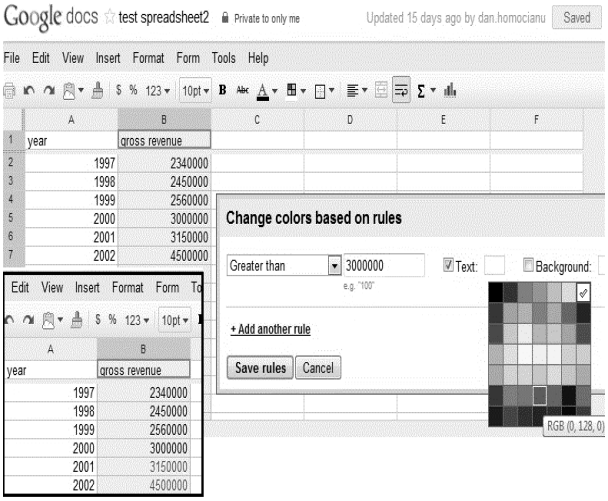

Figure 1: Google spreadsheets conditional formatting on Internet Explorer – Windows 7 (W7) running on PCs

The result of all these formatting rules is certainly visible on most smart phones and also on simpler ones. But to apply those using mobile browsers (we have tested Opera Mini 4.0.9 in tandem with a Java mobile OS running on Nokia 6300, respectively Internet Explorer on Windows Phone 7 OS or WP7 using a HTC Trophy) is still a challenge. Under Opera Mini browser apparently we did not have access to the corresponding menu options unless we have previously activated the *basic html* view setting (Gmail log-on). Then even after activating the *desktop* view mode we were not able to get access to the formatting options (they were not visible - see figure 2). Under Internet Explorer these options were very easy to be found on the screen, but not so easy to be activated by touch (less precision). So we excluded the possibility to do the formatting of an entire set of data from scratch on a mobile platform, because it would take too much time. In addition, the editing possibilities were limited (pcworld, 2011) - at least for WP7 because of missing multitasking, multiple selection, copy / cut and paste options).

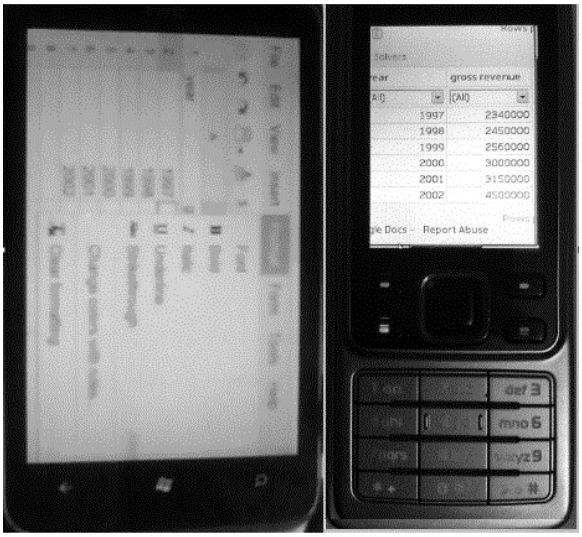

Figure 2: Google spreadsheets formatting options – Internet Explorer on Windows Phone 7 (not so easily accessible) vs. Opera on Java (inexistent)

Simple evolution graphs are available in Google spreadsheets but there is no option allowing us to add a trend line in order to view a tendency over a defined period of time. This lack only makes any predefined trend-based decision scenario more difficult for mobile devices (see figure 3) using this product.

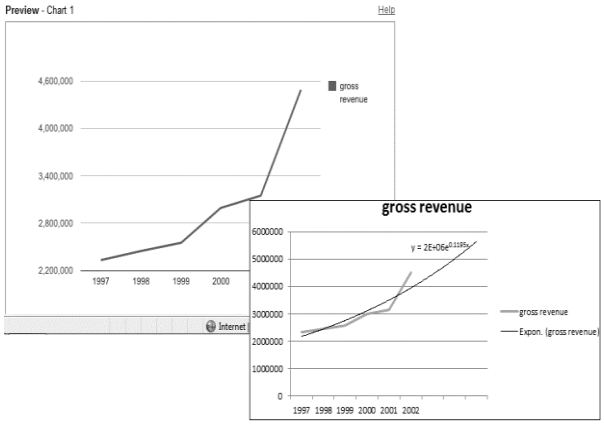

Figure 3: Google spreadsheets evolution chart vs. traditional Excel evolution chart with logarithmic trend line

The charts made with Excel were not readable with Google on-line products. Moreover, the charts made on PCs using Google spreadsheets were not visible using the same on-line application on our device using WP7. We have only tested one HTC, but the "black list" seems to be bigger - the problem is probably due to a missing java script library (code.google, 2011).

In terms of solvers we have tried a similar scenario on both platforms. The result was surprisingly good because Google Spreadsheets actually integrates a certain type of solvers based on linear calculations (see figure 4) but still acceptable. On the traditional Excel for PCs (we have tried Office 2010), there are obviously more options implemented in such decision instruments.

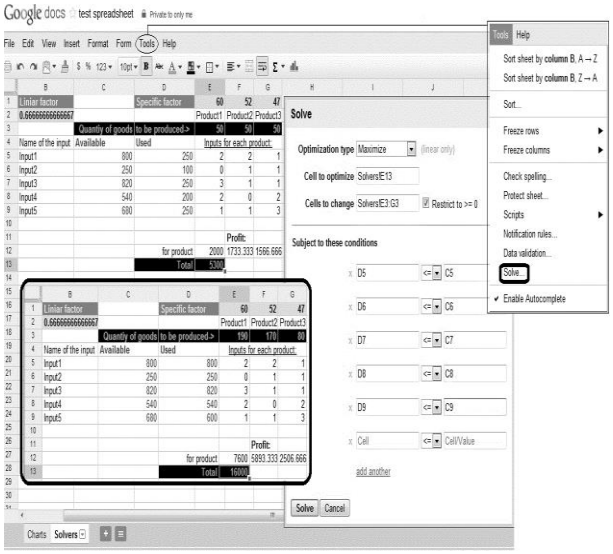

Figure 4: Google spreadsheets linear solver

Another product tested was SkyDrive (Microsoft Office on-line). For spreadsheets (Excel) it has proved complementary functions for Google Spreadsheets (a simple example was the filter options – see figure 5). The big problem was that unavailable features although visible (supposing that we have created them using Google) required a locally installed Excel in order to edit any other part of the workbook. Another difficulty stood in the lack of support for any type of solver. So, in terms of decision support SkyDrive only offered the advantage of data filtering and nothing else.

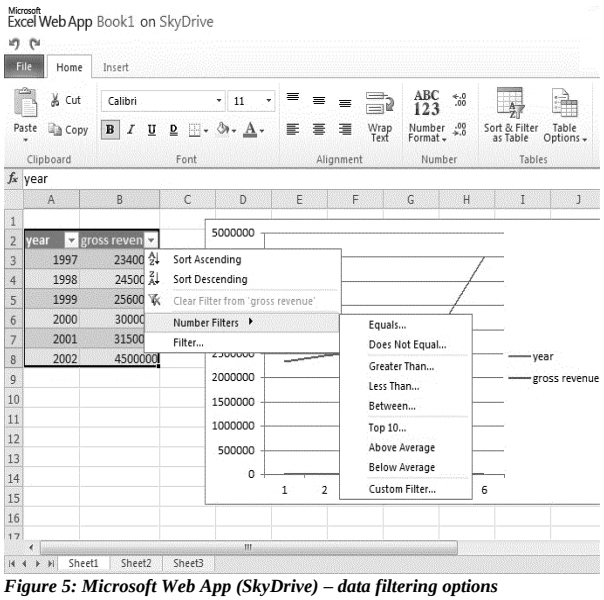

Figure 5: Microsoft Web App (SkyDrive) – data filtering options

Another product tested by us was an on-line tool belonging to Nesstar (see figures 6, 7) available only for a test data set (demonstration) which concerns the life expectancy at birth around the world. Our test included data filtering on both axes (bi-dimensional analysis), axe interchange (or pivoting in OLAP terms), chart creation (histograms and time series) and chart / data on-line conversion in .pdf / .xls report files.

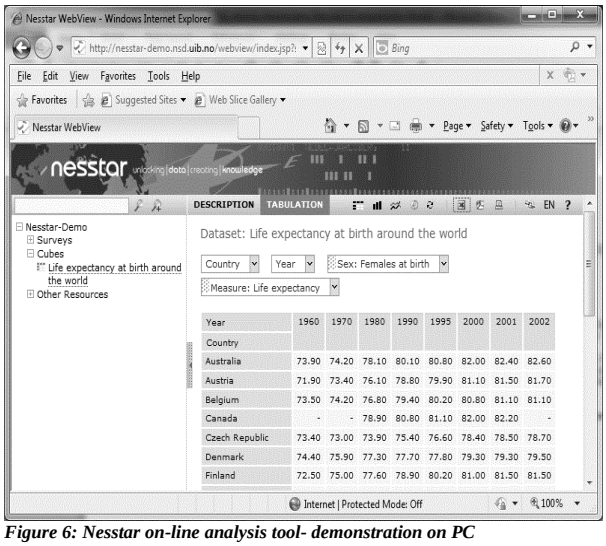

Figure 6: Nesstar on-line analysis tool- demonstration on PC

We have tested it on both PCs and Windows Phone 7 devices and the results were promising in terms of flexibility of analysis and easiness of generating charts and .pdf reports (see figures 6, 7).

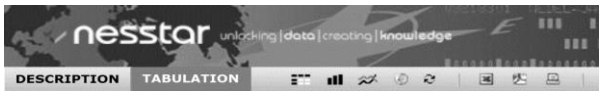

Figure 7: Nesstar tool – chart types exportation options

The big disappointment came from the WP7 device that was unable to open the data exported as an Excel spreadsheet (the error specified an inexistent file path, probably due to Nesstar specifications – see figure 8).

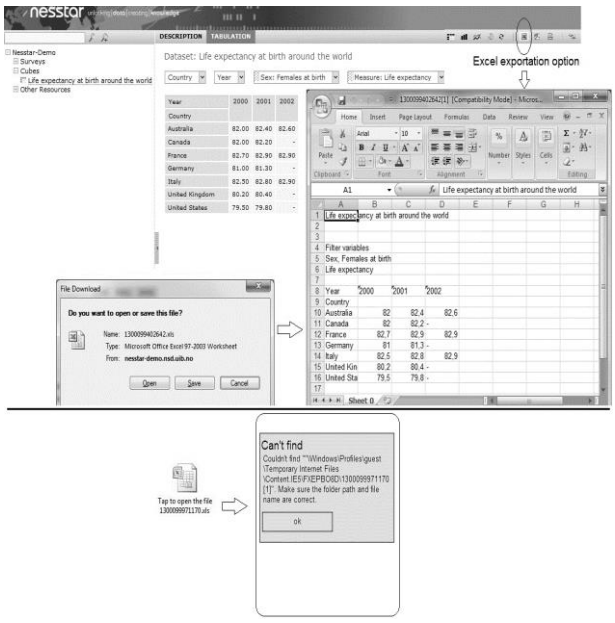

Figure 8: Excel exportation in Nesstar – Internet Explorer on W7 (PC) vs. Internet Explorer on WP7 (smart phone - error)

Using Opera running on Java, the other device was not able even to access the filtering, pivot, chart generation and exportation options. The only result was a simple or zoomed view of the original tabular data (see figure 9).

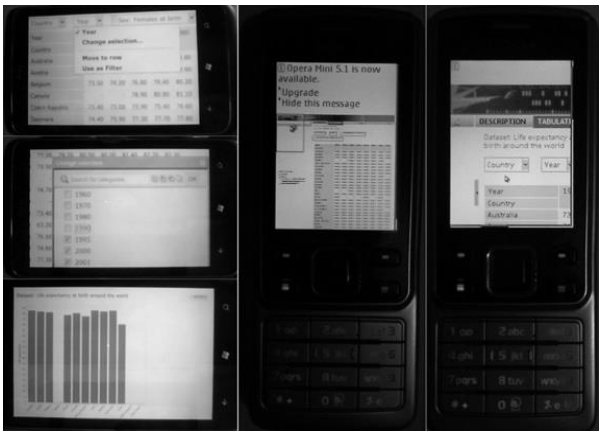

Figure 9: Nesstar tool – Internet Explorer on WP7 (available) vs. Opera on Java (unavailable configuration options)

The worst part was that the on-line Nesstar demonstration product did not offer real OLAP functionalities (roll-up, drill-down, slice operations) although it claimed the use of a data cube and it showed a published first page slogan "An effective knowledge system for evidence based decision making" - on the main page of the site (nesstar, 2011).

Anyway we have to keep in mind that such results are still worthy because the gain has so much to do with terms as costs or price of mobility. By that we mean a simple way to avoid the costs of the expensive licenses and a facile access to cheap mobile and internet enabled devices and also to a complex infrastructure available.

CONCLUSIONS

The first conclusion of this paper is one about the future of DSS applications and their possible evolution towards on-line applications.

Another idea to highlight is that such on-line applications still do not have all the functionalities available in the case of the traditional ones running on personal computers. And if they have some they are not always usable in other similar products. In other words there is a major problem of compatibility between such on-line applications which only complicates any decision scenario to be developed. So we may wonder when it is actually reasonable to use them for decision scenarios considering theirs costless options available for any kind of on-line use.

Anyway, their main advantage is related to the possibility of benefiting from simple decision models easy to be implemented even on mobile devices. But when there is about complex models it seems to be more appropriate to develop them when having access to full computing resources and to complete features of traditional applications and just configure those using on-line applications and mobile devices.

Beyond mobility there are also advantages related to the collaboration perspectives opened by the on-line BI products based on platforms running in cloud.

Acknowledgement

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