

# Inforum in 2012: Information and Technology

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## Abstract

Several key developments in Inforum's software and web site are reported in this summary of work that was completed between the conference in South Africa and the conference in Florence, Italy. Highlights include a redesigned and extended software documentation system, with extensive documentation now available for browsing online. Web site development includes the adoption of analytic tools that provide information about what is viewed and downloaded, detects problems with the site, and that generally helps us to improve the site and to deliver useful information to visitors. Software development efforts were focused on *G7*, with a few improvements also made to *Compare*. Most notable is the new ability to create graphs in Excel documents using either *G7* or *Compare*.

Inforum research depends heavily on data and economic models. Specialized software is required to manage the data and to construct and assemble the models. Additional software is required to present data and results in useful forms. Inforum has developed such software that is well-suited to building and operating macroeconomic and macroeconomic-interindustry models and to developing and managing the associated time-series data.

Development of this work can be traced to the 1960s. Currently-employed software has taken shape over the past decade or two, but it steadily evolves to meet new requirements. This report describes recent developments to the primary tools employed at Inforum and by others users around the world. In addition, development of the Inforum web site also is reported. The web site provides an important means of distributing economic data, software, and research materials, and it often is the means by which research sponsors and other parties first learn about the organization. The web site also evolves continually, and important additions and changes are noted below.

## 1 [www.Inforum.umd.edu](http://www.Inforum.umd.edu)

Maintenance and development of the Inforum web site continues steadily. An important improvement to the web site is the software documentation described

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below, with those materials presented in PDF and compiled Help formats. A key extension to the web site, though, is the introduction of HTML documentation that may be viewed online as an alternative to PDF and compiled Help documentation. Other portions of the site also are updated and maintained regularly. These include the news page, the EconData repository of economic databases, and the software distribution site. New pages have been added for the Nineteenth Inforum World Conference and the 2011 Inforum Outlook Conference. The collection of Inforum publications has expanded to include papers from the Nineteenth Inforum World Conference, recent sponsored research publications, and updates of Clopper Almon's The Craft of Economic Modeling.

Several tools have been used to detect problems and to improve reliability of the site. These include Google's Webmaster Tools and LinkChecker. These tools enabled the detection and then the correction of many broken and outdated links, both links within the site and links to external locations.

Features of Google Analytics have been incorporated in the Inforum site to monitor demand for each web page and to record file and document downloads. A variety of information can be analyzed to learn characteristics of site visitors and traffic patterns throughout the site. All data are aggregated so that nothing can be identified for particular visitors. Aggregate statistics are available for geographic location, type of browser and operating system, language, whether mobile devices are employed, the referring site, how much time is spent on the site, and whether visitors are new or returning to the site. References to the Inforum site that are provided by Google Internet searches also are compiled and listed by keyword.

Work to incorporate the tools of Google Analytics remains incomplete, and so current monitoring of the Inforum web site does not provide a complete count of downloaded documents. In particular, papers and other resources that are listed on conference pages or international partners pages are not monitored yet, though they are monitored on the main documents repository. Once this work has been completed, we will be able to compile counts of all file downloads and page visits. This will help to gauge the interest of visitors for the various materials that are offered, and ultimately we can improve the site to meet the needs of the visitors. Other software from Google and other parties has helped us to discover and to fix many broken links and other problems, though again more work remains. These improvements make the site more reliable and help to improve the experience of visitors, in part by making it easier for them to obtain desired materials and information.

The collection of International Partners pages recently have been updated with new information provided by each partner. The collection of economic data known as EconData continually is maintained and gradually is expanding. A number of items have been added to the News page in the past year, and some of these have been featured on the Home page. Finally, the Software section features Downloads, Documentation, and Demonstrations pages that have been updated with the materials reported here.

## 2 Software Documentation

Past editions of software documentation have been provided as a collection of documents. At times, some of these have been bundled into a single document or a consistent collection, but typically only a portion of the documentation has been maintained and used regularly while other materials has languished. A wide collection of this software documentation now has been consolidated. While the earlier work was presented in a variety of forms, with little standardization and no consistency, the new efforts have focused on making the documentation easier to maintain and more accessible to the users of Inforum software.

These materials have been converted from their earlier forms for use in a new documentation system. So far, material for *G7*, *Compare*, *Build*, *IdBuild*, *Fixer*, *MacFixer*, and *Banker* have been incorporated. The benefit that immediately is obvious is the improved appearance of the materials, but the new system also provides an array of additional benefits to users and developers. Users now will discover information easier to find since it may be found in one place. Developers will discover that maintenance and extension of the documentation now is much easier, where maintenance of previous materials sometimes was difficult, and this will lead to additional benefits for the readers.

The documentation system allows several types of files to be created. We currently present finished documents in three forms. First is a document in book layout that is stored in the PDF file format. This format is best for printing or for reading the complete document. The second form is HTML. These files are presented on the Inforum web site and may be viewed with any web browser. Finally, the complete set of documentation is available in a compiled Help system that is linked to the latest version of *G7*. This compiled Help file relies on a new system that fully is supported by Microsoft Vista, Windows 7, and Windows 8. Earlier versions of *G7* employed a Help system that no longer has built-in support by these operating systems.

All documentation types have full indexing and cross referencing, though work on references remains incomplete. Search is available in each document format.

New material has been added for recent changes to the software; these are summarized in the introduction. Some particularly outdated material in the earlier documents has been replaced or heavily revised, and minor editing has been completed to improve quality and consistency. Because all documentation now is in one system, and because that system is easy to use, we expect that many more improvements will be completed within the next year. In particular, we plan to borrow material from other existing sources to update and extend the current work.

## 3 *G7*

*G7* is used to construct and analyze data, to estimate econometric equations, and to build large-scale structural econometric models and report the results in text, graphs, and spreadsheets. We summarize here some of the most significant changes completed in the past year. See the “G7: New for 2012” page in the Help files for additional details.

Preliminary testing of *G7* under the Windows 8 operating system has shown no problems so far. This testing will continue with the preliminary versions of Windows 8, and we will begin testing with the full version of Windows 8 once it is released. This testing included use of the new *G7* Help documentation, and all seems to be in order; note, however, that while older versions of *G7* also work under Windows 8, only the new Help documentation running under the latest version of *G7* can be viewed.

### 3.0.1 New Help System

Perhaps the single greatest development in *G7* in 2012 is the new Help files that were described earlier. These resources may be launched from the main menu at the top of the main window, or they may be launched by pressing F2 in the editor window. The same material also has been added to the web site to allow online browsing. The previous Help system was not supported by the newer operating systems, though Help viewers were available for Windows Vista and 7 so that the older *G7* documentation still could be used. The new system has native support in recent operating systems, including Windows 8, 7, and Vista.

### 3.0.2 Graphical Interface Improvements

Improvements to the graphical interface have been made in several areas. First are changes to the show command. The show routine is used to display vector and matrix data in a spreadsheet form. Users may paste or type data into the form. Once changes have been made, the user now will be prompted to save the work, or the user may save the changes by selecting the appropriate menu item. In earlier versions, these changes were saved automatically and sometimes inadvertently. The show window may be closed by pressing the escape key. In the past, this also would stop the execution of a *G7* script because the same shortcut is employed for that purpose. Behavior now has changed so that the show window may be closed by pressing the escape key, but a running *G7* script will be interrupted only if the escape key is pressed a second time.

A second set of changes was made to the look command interface. Startup performance has been improved; this especially is important for browsing large compressed banks that have stub files with many thousands of lines. When a row in the display is selected, data for the specified series are printed to the output window and displayed in a graph. The frequency of the series now is detected and the dates for printing and graphing now are adjusted automatically. This

especially is convenient for banks that contain collections of series with monthly, quarterly, and annual frequencies.

A third set of interface changes was made to *G7* graphs. The layout of graph legends has been improved so that the spacing is even across the bottom of the graph and longer series names may be displayed. This allows series names to be specified that are more descriptive, but even with longer names there now is less trouble than before with overlap or truncation of the displayed information. Up to seven series now may be graphed reliably, where the previous standard was six. The results of algebraic expressions may be displayed by providing an expression surrounded by parentheses in place of one or more of the series names that ordinarily follow the graph command. Finally, display of line styles has been improved, though this feature remains imperfect.

Finally, a series name or algebraic expression may be selected in the editor. By clicking the right mouse button, a menu will appear. By selecting “Type Data” from the menu, the data for the series or the results of the expression may be printed in the output window.

### **3.0.3 Excel Interface Improvements**

*G7* can read data from Excel spreadsheets, and *G7* also can modify or create new spreadsheet documents and fill them with data and formulas. The reading techniques provide key tools for the development of databases for EconData and to support model development. The set of features again has been extended to allow improved document formatting and graphing.

*G7* now can freeze a spreadsheet at a specified location and can adjust the panes to provide a convenient view of the data and the row and column titles. This allows convenient scrolling within published documents while keeping series labels, dates, and other key information within view. Background colors now may be set for cells, and two or more cells now may be merged. Text and numbers now may be assigned additional text as subscripts or superscripts.

An important new feature is a tool to create charts within a workbook. The charts currently are in the form of new sheets that are added to the workbook. To support these graphing features, but also available for use elsewhere, *G7* now can write a series of dates to a worksheet with the dates recorded in the Excel dates format. Including the series for the horizontal axis, up to thirty data series may be displayed. While time often is displayed on the horizontal axis, any other data series may be employed instead. While only a few features have been introduced so far, graph titles, subtitles, and vertical axis titles may be set through use of the existing *G7* commands. Additional capabilities will be introduced in the near future so that formatted graphs may be created that are ready for publication.

### **3.0.4 Other Improvements**

An experimental set of commands has been introduced that eliminate some of the limitations of the *G7* workspace banks. The most severe restriction is the

limited number of series that may be recorded in the workspace. While the number is not fixed, users typically find that no more than 4,000 to 7,000 series may be stored. A second limitation is slow access the data, both when reading and writing. Access is slow because all data are stored on the hard drive and little is retained in memory. When first employed, the new features begin by loading into memory all data from the existing workspace. After this loading process, work in *G7* continues normally, and workspace data may be modified and new series may be added. All of these operations affect the set of data that is held in memory. Experiments show that well over one million series may be added. A limitation does remain, however. The new restriction is that 32-bit programs are limited to two gigabytes of memory. Once the workspace grows sufficiently large so that *G7* requires two gigabytes of RAM in total, any attempt to store more data in the workspace will fail. Still, this allows an increase of several million data series when compared to the standard workspace banks. An added benefit is that execution speed is greatly increased for scripts that rely heavily on the workspace. Note that other bottlenecks remain to limit the execution speed of scripts, such as frequent access of Vam banks or access to Excel files. This alternative version of the workspace cannot be stored to file in binary form. Two options exist to provide data storage. The first is to employ a companion routine that will store data from the workspace to the hard drive in text form. The second is to shift data from memory into the standard workspace file located on the hard drive, but this operation will fail if the capacity of the standard workspace bank is exceeded. Additional testing and development is needed, but the routine already should prove useful for assembling large data sets from Excel documents or other sources, printing them to a text file, and then using *Banker* to compile compressed binary banks for subsequent distribution and use.

Strings, keywords, and a new set of functions were introduced about two years ago. Since then, this list of features has grown steadily and the tools have become more powerful and more reliable. Several new keywords recently have been added to allow the user to recover the settings of the “format” command. The “s” function that is used most often to recover the definitions of named strings has been improved, and a new operator, +=, was introduced to allow existing string definitions to be extended easily.

Finally, an “if” function has been added to allow the conditional execution of a portion of a line of text. If the condition is determined to be true, then one or several words will be employed, and an alternative word will be employed otherwise. For example, a particular data series may be specified employed if one condition is met, but an alternative series may be used otherwise. While similar capability existed earlier with the *if* command, this new “if” function allows routines to be built with fewer lines of code and less repetition.

Last year, the capability was introduced to record, display, and repeatedly execute the commands that are typed into the *G7* command box. Controls for those features were placed in the *G7* menu. An alternative set of controls now are available in the *G7* scripting language.

Several of the @-functions have been improved. These include improvements

to @mean, @stdev, and @ggr that allow greater control and better reliability. In addition, problems were fixed in the chain weighting routines, and now up to 1500 data series may be employed in the weighting process.

A variety of bug fixes and other minor improvements are listed in the “G7: New for 2012” page of the Help files. Notes with some additional information are available in the logs on the Download page of the Inforum web site. Other minor new features include the ability to clear user-defined functions and a new timer command.

The current version of *G7* may be found on the conference CD and on the Inforum web site. Full documentation may be found in the same locations.

## 4 Compare

*Compare* is a data presentation tool that principally is used to build tables and spreadsheets as text files, in printer format, and as WK1 spreadsheet files. Recent versions of *Compare* also can create formatted spreadsheets with multiple pages in the Excel document format. Additional features gradually are being added to provide greater control over these documents.

*Compare* now can freeze a spreadsheet at a specified location and it can scroll the resulting panes to meet to the specified preferences. This allows convenient scrolling within published documents while keeping series labels, dates, and other key information within view.

*Compare* also can create charts in a workbook. The charts currently are in the form of new sheets that are added to the workbook, with the new sheets added to the left of the active data worksheet. *Compare* automatically will record a series of dates to the worksheet with the dates recorded in the Excel dates format, and these dates are used as labels for the horizontal axis. Up to 29 series may be graphed, including the alternative series that are displayed when multiple banks are loaded. Graph titles, subtitles, and vertical axis titles may be specified, along with labels for each data series. A list of available graph types is provided in the *Compare* section of the documentation files. Work so far establishes proof of concept, but more work is needed to provide tools suitable for professional use. Additional capabilities will be introduced soon so that formatted graphs may be added to documents that fully are ready for distribution.

The current version of *Compare* may be found on the conference CD and on the Inforum web site. Full documentation may be found in the same locations, and the web site now provides online help.

## 5 Conclusion

The materials described here may be found on the Inforum web site and on the conference CD. Some of the CD contents is not be available on the web site,

such as the *InterDyme* modeling software. The full CD and other conference materials may be found on the Inforum SFTP server.

We look forward to cooperation with Inforum partners to further improve and extend the work. Additional support is available; please contact me directly or send email to the Inforum webmaster at [Inforum.Webmaster@gmail.com](mailto:Inforum.Webmaster@gmail.com).

## References

- [1] Inforum. *Software Documentation*.  
[www.inforum.umd.edu/software/documentation.html](http://www.inforum.umd.edu/software/documentation.html).
- [2] Ronald Horst. *Inforum in 2012: Information and Technology*. (Slides)  
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