



@RISK 5.5 Compared with Crystal Ball 11.1.1.3

(updated January 2010)

Summary

@RISK differs from Crystal Ball in many significant ways. Key differences include:

- **@RISK distribution functions are native to Excel**, while Crystal Ball's are external to Excel. @RISK's native Excel function provide maximum modeling flexibility.
- **@RISK has unlimited modeling capacity**, whereas Crystal Ball has limits on the number of distributions and other variables that may be defined.
- **Simulations in @RISK are performed within Excel**, giving greater confidence in accuracy of calculations. Crystal Ball uses a third-party product for its Extreme Speed simulation engine, which can cause inconsistent and potentially inaccurate results.
- **Sensitivity analysis in @RISK pre-screens the model** to remove any @RISK distributions which do not affect the model output, ensuring accurate results. Crystal Ball does not perform this check, allowing for distributions that are unrelated to model outcomes to erroneously appear significant.
- **@RISK offers a comprehensive Excel Developer Kit** that allows total customization, automation, and standardization of risk models in Excel. Palisade also offers custom development services to write interfaces and applications to suit your needs. Crystal Ball's Excel developer kit is much more limited, with no development services. In addition, Palisade offers the @RISK Developer Kit that allows users to write applications using @RISK features *outside* of Excel, including web-based applications. Crystal Ball offers no such developer kit.
- **@RISK offers the @RISK Library**, which enables the storage and sharing of custom distributions and simulation results via a SQL server for many @RISK users. Crystal Ball has no such feature.
- **@RISK is available in a variety of licensing options**, including concurrent network licensing to allow many employees access on an as-needed basis. Clients have reported that Oracle does not offer a Crystal Ball network version.
- **@RISK reports and charts can be exported to Excel** in native Excel format for further customization. Crystal Ball charts may be exported as unchangeable graphics only.
- **@RISK is available in multiple languages**; Crystal Ball is not.
- **Palisade remains a strong, independent company** with 25 years of experience and a high level of service. Crystal Ball is a very small part of Oracle.



Differences in Detail

Availability in Multiple Languages – All editions of the latest version of @RISK are available in Spanish, Portuguese, German, French, and Japanese. Full language support is provided – dialogs, menus, help, tutorials, and documentation. In addition, the full DecisionTools Suite is currently being translated into these languages and will be available in early 2010.

Crystal Ball does not offer any non-English versions (see p. 6 of the Oracle Crystal Ball 11.1.1.3 Installation and Licensing Guide).

Native Excel Functions - All @RISK probability distributions and functions are in native Excel format. They are treated by Excel like any other Excel function. You can see them in the Excel formula bar, copy and paste them, embed them within Excel functions, and manage them using standard Excel commands. You can include them in blank cells, cells with values, or cells with formulas. Arguments can include mathematical expressions and cell references/ranges, which can be typed in or entered using the @RISK graphical interface. This provides maximum ease of use and modeling flexibility and transparency when auditing models.

Crystal Ball distributions are external to Excel, cannot be seen in the formula bar, and cannot be used in cells with formulas (see page 38 of the Crystal Ball 11.1.1.3 User Manual). As a result, it is impossible to embed uncertainty into any element of an existing model formula. Cell referencing is limited, and proprietary Crystal Ball commands are required to perform simple tasks such as copying and pasting cells.

Greater Capacity – There is no limit to the size of models that @RISK can handle. @RISK fully supports Excel 2007's enlarged worksheets. Clients simulate models with 100,000 or more distributions, multiple worksheets, and multiple workbooks. Crystal Ball imposes restrictions on capacity and model complexity. The Crystal Ball 11.1.1.3 User Manual (page 64) states: "*You should define less than 1000 assumptions, decision variables, and forecasts per worksheet.*" With @RISK, you don't have to "dumb down" models to fit the software.

Support for Copying and Pasting - @RISK uses standard Excel copy/paste commands because all @RISK distributions are true Excel functions. Excel's Fill Down command is fully supported. This means learning @RISK is easy.

In Crystal Ball, Excel copy/paste not supported. Limited proprietary Crystal Ball copy/paste commands are required to copy/paste Crystal Ball distributions and data. Although Excel copy/paste is not supported, it appears to work by copying the Crystal Ball distribution cell formatting. There is no support for the Fill Down command. This can be very confusing for new users.

Support for Cell Referencing - @RISK fully supports Excel's capability and rules for absolute and relative cell referencing. This includes allowing off-worksheet and off-workbook cell referencing like all Excel functions do. @RISK can use LookUp and Table functions that allow the dynamic use of data tables.

Crystal Ball handles absolute and relative references inconsistently. Furthermore, cell references off the active workbook are not supported. This means more restrictions and confusion in modeling. (See page 42 of the Crystal Ball 11.1.1.3 User Manual.)



More Distributions - @RISK offers over 40 different probability distribution functions for describing any possible uncertain variable. This means that risks can be modeled with greater accuracy. Crystal Ball offers only 21, limiting the accuracy of modeling many types of uncertain variables.

Simulation Speed and Accuracy - @RISK simulations are calculated 100% within Excel, supported by Palisade sampling and statistics proven in over twenty-five years of use. Palisade does not attempt to rewrite Excel in an external recalcuator to gain speed. A single recalculation from an unsupported or poorly reproduced macro or function can dramatically change your results. @RISK uses an optimized simulation engine, multiple CPUs and multi-core processors to give you the fastest calculations. With @RISK, you can be assured of the most accurate calculations.

In Crystal Ball, all calculations are performed external to Excel. Crystal Ball's Extreme Speed feature was developed by a third party and as a result is not native to Crystal Ball's calculation engine. Extreme Speed can produce different results than normal speed, and has significant limitations such as lack of compatibility with multiple workbook models, user-defined macros, many cell ranges, and other issues, all of which give it limited applicability to real-world models. According to the Crystal Ball 11.1.1.3 User Manual: "Not all models are compatible with Extreme Speed. Also, small differences in the last few decimal places of certain built-in function values should be expected, due to minor algorithmic differences in the way formulas might be computed." (p. 312) A November 2009 post to the Crystal Ball Users Group (CBUG) on Yahoo! Groups featured this problem. The post, from a Steve Sacks, read: "I find that in Extreme Speed I sometimes find really aberrant results and sometimes only slightly aberrant results, and sometimes reasonable results."

Excel Developer Kit - @RISK (and other DecisionTools Suite software from Palisade) comes with a full-featured Excel Developer Kit (XDK) which allows you to access all @RISK functions and features to create customized, sophisticated applications in your spreadsheet. You can create customized interfaces and applications for your models, minimizing user interaction with the core model in Excel and simplifying the definition of inputs, simulation parameters, and reporting processes for all users. With a custom @RISK application, users don't even have to learn how to use @RISK. They can simply enter parameters and inputs that the company wants them to input. The result is standard, reliable analyses and reports, easily deployed and communicated across the company. The @RISK Excel Developer Kit comes with its own comprehensive user manual and example programs. This allows any developer to fully understand how to implement each feature.

Palisade offers custom development services with a team of experts who can create any custom @RISK or DecisionTools Suite application to meet your needs.

The Crystal Ball Excel developer kit is much more limited and allows automation of only select Crystal Ball functions. The result is that its use is limited to only the simplest simulation models. Documentation in the Crystal Ball user manual is a few pages, and "examples" on the Oracle web site consist of a 2006 PowerPoint given by a user at a conference. Oracle does not advertise any custom development support or services.

In addition, Palisade offers an @RISK Developer Kit that allows you to add @RISK functionality to applications *outside* of the spreadsheet environment. This can be any stand-alone Windows application, including web-based programs. Crystal Ball has no such developer kit.

Compound Function - @RISK offers the RiskCompound function which combines frequency and severity distributions into a single function, saving thousands of separate distributions in insurance and



other financial models. RiskCompound also supports cell references and formulas for more complex modeling. Crystal Ball has no such function.

Sensitivity Analysis - @RISK's Smart Sensitivity Analysis feature pre-screens inputs based on their precedence in formulas to outputs in your model. Inputs that have no link to an output are removed from the sensitivity analysis, thus avoiding erroneous results. @RISK provides two methods of sensitivity analysis – Rank-Order Correlation and Multivariate Stepwise Regression.

Crystal Ball sensitivity analysis does not offer screening out of unrelated model inputs. This means that any cell with a Crystal Ball distribution attached to it can show up as significant to the output result, even if there is no model logic that links the cell to the model result. In this way, false relationships can appear in sensitivity results, confusing the analysis. Furthermore, Crystal Ball does not offer the regression method of analysis.

Correlations of Distributions - @RISK input distributions may be correlated with each other to represent real-world relationships. @RISK supports multiple named correlations matrices, and may be entered via a graphical matrix in the formula bar in Excel. You can define coefficients by typing them in or by using a convenient slider bar that updates correlation scatter plots in real-time. @RISK allows correlation instances, where the same matrix can be used to correlate different groups of inputs for quick model setup. There is no limit on the number of correlated cells. After simulation, you can see scatter plots and coefficients of actual correlations simulated. You can also correlate a time series that has a similar set of distributions in each time period.

In Crystal Ball, correlation coefficients may be assumed between variables that you did not specify. For example, if you specify correlation coefficients between A and B, B and C, and C and D, Crystal Ball may assume a coefficient between A and D automatically, without telling the user. In addition, there is no support for correlation instances. Finally, the limit on assumptions (distributions) inherently limits the size of the correlation matrix that can be built.

User Interface – The @RISK interface is modeled after Excel 2007 and is designed to be intuitive and easy to learn for any Excel user. @RISK is totally integrated with Excel, and features right-click menus, pop-up graphs, handy model summary windows, live simulation updating, drag-and-drop graphing, and a user-friendly Excel Ribbon toolbar. With @RISK, you will save valuable time not having to learn a new interface.

The Crystal Ball interface includes nested dialogs with conventions that do not match Office. There are no summary windows, and it can be difficult to determine which dialog corresponds to which cell.

Model Sharing and the @RISK Library - @RISK offers a number of ways to make sharing models easy.

@RISK comes with the @RISK Library, a SQL database where you can store custom probability distribution functions and archive simulation results. These distributions and results may be shared with other @RISK users through a centralized database to ensure consistent modeling across an organization or within particular workgroups. Results may be later audited for validation. @RISK Library distributions are available in the Define Distribution window, and Library itself is accessible via the standard @RISK interface.



Results from models generated by different subsidiaries or groups can also be loaded into the @RISK Library. In this way, distributions of simulation results can be resampled and used in a larger aggregate model without the need for running all models at the same time to generate the overall result.

For staff that may not have @RISK installed, @RISK functions may be removed with a single click. This allows models to be shared with and edited by these non-@RISK users. @RISK users can later restore @RISK functions again with a single click while retaining changes made by non-@RISK users.

Furthermore, @RISK simulation results and graphs may be saved directly in the spreadsheet model. This makes sharing results as easy as saving any other Excel file.

Crystal Ball has no model sharing functionality like the @RISK Library or the ability to save results in workbooks.

Single Integrated Solution – In addition to being fully integrated with Excel, @RISK is integrated with all other products in the DecisionTools Suite. This includes RISKOptimizer for optimization under uncertainty using Monte Carlo simulation; decision trees with PrecisionTree; sensitivity “what if” analysis with TopRank; forecasting and statistics with StatTools; intelligent predictions using neural networks with NeuralTools, and genetic algorithm optimization with Evolver. @RISK functions are recognized across multiple programs, and all programs share common interface conventions. This allows you to combine risk analysis with other types of analysis for greater combined insights than can be achieved with any one product. All DecisionTools Suite programs come with Excel Developer Kits like @RISK, allowing for automation and customization of a wide range of analyses.

Crystal Ball is not as well-integrated with Excel and lacks a comprehensive analytical suite of tools.

Graphing and Excel Reporting - @RISK allows the creation of custom templates in Excel for user-defined reports with custom formatting, desired statistics and graphs. Reports and graphs may be generated automatically in Excel after simulation using reporting functions, or may be sent to Excel from an @RISK window at any time with a single click. Excel-formatted @RISK charts can use all Excel graph formatting options. @RISK also offers a much wider selection of chart and report types, with greater flexibility in each option.

Crystal Ball charts may only be copied and pasted into Excel as pictures, not native Excel format charts. Limited report customization allows for no formatting, but selection of content categories only.

Licensing Options and Support - Palisade offers @RISK with a range of licensing deployment options to meet your needs. Choose from stand-alone desktop licenses, concurrent use network licenses, or enterprise deployment licenses, to name a few. All purchases include full, unlimited technical support for the first twelve months.

With Crystal Ball, support must be purchased in addition to the software. Support is administered through Oracle, and Palisade has received anecdotal complaints about Oracle’s poor product knowledge and responsiveness from Crystal Ball customers. Crystal Ball is a very small part of Oracle’s business. Furthermore, some Crystal Ball clients are switching to @RISK because they have been told Oracle no longer offers nor supports any form of network licensing for Crystal Ball.

Company Partnership – Palisade Corporation has been developing risk software solutions for 25 years, and remains a strong, profitable independently owned private company. We have the same core software



development engineers since the company's founding in 1984, ensuring consistency and reliability in the products we sell. Our independence gives us the flexibility to react quickly and effectively to customer needs.

Crystal Ball is owned by Oracle Corporation. In 2007, Crystal Ball was acquired by Hyperion, which was then acquired by Oracle shortly thereafter. Thus, Crystal Ball remains a very small part of Oracle's business.

Backward Compatibility - Models developed with the current version of @RISK are interchangeable with previous versions (except for the use of new features). Similarly, models developed in earlier versions of @RISK can be run in the current @RISK version without modification. Previous versions of Crystal Ball models may not run properly or accurately in the current version of Crystal Ball. In addition, according to pages 27-28 of the Crystal Ball 11.1.1.3 Installation and Licensing Guide, "*Models created or saved in the current version of Oracle Crystal Ball cannot be opened and used in versions of Crystal Ball earlier than Crystal Ball 7.0.*"

Disclaimer: All comparison information presented here is accurate to the best of our knowledge. All software was used according to vendor specifications and versions tested were those available at the time of publication (January 2010). Any comparison errors are unintentional. We welcome corrections or suggestions.

Please submit corrections or suggestions to feedback@palisade.com. Crystal Ball is a product of Oracle, Inc.

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