A Usability Comparison of the Top Three Data Modeling Tools

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Introduction

Today's CIOs must do much more than safeguard company data -- they must also understand it in the context of the business while continuously improving its overall quality. Several tools in today's environment contribute to that overall process, including the DBMS itself, front-end applications, ETL tools, back-end reporting tools and data modeling tools. It is, however, the data modeling tool that provides the most comprehensive picture of where the data is, what it looks like, and how best to manage it. The data modeling tool is best suited for filling this role because it houses key metadata and can provide the cleanest, clearest conceptual view of business-critical systems. And, as non-technical business users become frequent users of data modeling toolsets and the valuable visualization capabilities they provide, ease of use becomes a key consideration. For these and other reasons, selection of the right data modeling tool is critical.

This review will compare CA ERwin Data Modeler r8 (CA ERwin), newly released in February 2011, with two other popular modeling tools   Sybase's PowerDesigner v15.3.0 (PowerDesigner) and Embarcadero Technologies' ER/Studio Data Architect 9.0.1 (ER/Studio). All three tests involved modeling for a Microsoft SQL Server 2008 environment.

Key Requirements for Any Data Modeling Tool

Every profession has a set of tasks that are especially important to it, and data modeling is no different. For that reason I am taking the approach that each of these tools should allow me do the following four tasks in a fairly simple and straightforward way: 1) build a logical data model, 2) build a physical data model based on the logical one, 3) create DDL from the physical data model, and 4) build one or more reports that help me effectively describe and share the model with others, including business users.

In today's increasingly heterogeneous environment – particularly with the advent of cloud computing – it is important that data modeling tools have some other more general characteristics. They should: 1) be flexible and have the ability to interchange with other tools 2) include a strong set of documentation and online resources, and 3) feature an intuitive, well-designed user interface.

Data professionals face rising complexity and are asked to accommodate an ever-widening array of development methodologies and tools – including popular Business Intelligence (BI) tools, DBMS-specific tools, UML tools, other data modeling tools and ETL tools. Thus, a data modeling tool's ability to support other third-party tools is critical.

The need for comprehensive documentation and online support resources is also important.   Help documents and manuals that are poorly formatted, unclear, or incomplete will impair the end-user experience. It is also increasingly important for tools to be backed by a vibrant online community where experienced users and support staff make themselves available to answer technical questions and share best practices. In my experience, a strong online community has made the difference in whether I stick with a given tool or abandon it.

It is especially important for a data modeling tool to be equipped with an uncluttered and contextual interface that helps guide the selection of features and functions depending on the given tasks an end user is trying to accomplish.

Closely tied to the user interface is ease of use. Since data modeling is a very detailed and technical discipline, the ideal tool will be simple enough to operate that users can focus on the task at hand rather than the tool itself. Just as a Java programmer relies on a certain feature set and expects that same feature set to be accessible in a fairly intuitive way, data modelers expect all the basic functions that they use every day to be easy to learn and intuitive to find. Furthermore, as the lines between business and IT blur, and as companies strive to do more with fewer resources, non-technical users must be able to come up to speed on the tool quickly and easily. While there will always be a learning curve for fine-tuning and perfecting workflows, the basic modeling functionality should always be within easy reach.

A Look at the Modeling Tools

PowerDesigner

After installing PowerDesigner and running it for the first time, users are presented with several options on a welcome screen. I found the desired logical data model selection easily enough, but along the way it became apparent that PowerDesigner allows users to create a huge variety of different kinds of models—many of which, it is doubtful a data modeler or even a data architect would ever have a need to create. For example, do data modelers also create business process models or use cases? I have certainly had occasion to consult or review them, as they can be invaluable in gleaning information about how the logical data model should be put together, but I would never build one myself.

After selecting a model type, I begin creating entities, attributes and relationships. This portion of the UI is what one would expect and the task bar icon presentation is straightforward enough. After spending some time fleshing out a basic logical data model I decided to see how the physical side of the model looks, but I quickly run into trouble. Up to this point PowerDesigner's ease of use has been acceptable. Now it is outright painful.

Creating an empty physical data model is easy enough, but synching it with a logical model was problematic, as logical entities cannot be dragged into the physical model and cutting and pasting does not work. While the help documents are nicely formatted and arranged in general, they are strangely silent on this topic regardless of the various search keyword combinations I try. Putting myself in the shoes of a novice user, it took an exceedingly long amount of time to figure out that a physical model is generated from the logical model, using an option found in the Tools menu. Given the tight linkage between a logical and physical model it begs the question as to why this important function is not more accessible either on the menu bar or on a context menu that could be invoked with a simply right-click on the logical model.

Additional problems began to surface during the logical to physical conversion itself. For one, a couple of tables did not transfer into the physical mode. I also encountered difficulty getting an attribute that I added on the logical side to be reflected on the physical side, as the steps required to perform this basic task were not obvious in the least.

I then turned my attention to generating data definition language (DDL). After a few false starts, I figured out how to complete the task, and after going back into the model for a few more tweaks I ultimately create DDL that implemented without any issues.

Next, I attempted to compare the model to the database that was just created. This proved to be another cumbersome task, and after spending a good deal of time in the help document and experimenting in the tool, I finally figured out how to go about comparing the two.

In general, it seems unnecessarily difficult for users of average skill to perform routine data modeling tasks in PowerDesigner, as they are not intuitively presented or readily accessible in the tool's UI. Given this lack of user friendliness, PowerDesigner users should be prepared for a lot of documentation reading.

The UI itself is nice, clean, and well polished. The entities are well presented and very readable. One criticism is that the tool editors use a grid paradigm that seems a bit out of place. While it may help facilitate quick editing, it is inconsistent with the feel of the rest of the application.

Reporting functionality was also tested. I created a basic logical data model report in HTML format and accepted the default options. I was very satisfied with the report created, finding it easy to navigate, pleasing to the eye, and containing the right amount of information. Reports can also be generated in CSV, RTF, and XML, but I was a little surprised that PDF was not an option, given the popularity and ease-of-use for that format.

Lastly, I took time to explore the online PowerDesigner community. Among other materials, there are some videos available to help with the tool usage and they are of good quality. For whatever reason, the PowerDesigner community seems to prefer a newsgroup approach to the site. This format may not appeal to some users, although it does appear to be fairly active, professional, and helpful. There is also a typical variety of white papers available, although it took a bit of digging to find those that pertain to PowerDesigner versus other Sybase products.

PowerDesigner Summary

In summary, PowerDesigner has a certain visual appeal around the UI, but trying to ferret out the basic functionality of the tasks a data modeler must complete on a daily basis proves difficult. Users are likely to find themselves spending much more time than they should have perusing help documents. The tool may be sufficiently powerful and versatile, but most users simply will not have enough time to figure out how to use it. **PowerDesigner Overall grade: "C +".**

Figure 1:
PowerDesigner Feature By Feature Summary:

Features	Sybase PowerDesigner v 15.3.0
Overall Usability	D
Model Formatting & Layout	B
Logical Model Creation	C
Physical Model Creation	C
Forward-Engineering/DDL Creation	B
Reporting	B
Customization	C
Standards Creation & Reuse	C
Model and Database Comparison Tools	C
Documentation	C-
Online Community	A-
Undo/Redo	B
Metadata Interchange with Other Tools	C

ER/Studio

ER/Studio is a capable tool. As a first-time user, I was able to figure out how to accomplish normal tasks within a reasonable amount of time. Compared to PowerDesigner the interface is less cryptic and more intuitive.

From a documentation perspective, ER/Studio's content would seem to be helpful and appropriately filled in the gaps when needed. But poor formatting made it more difficult to read then it should have been. People often skim reading material in search of a topic, but ER/Studio's documentation formatting does not facilitate that at all, forcing me to spend more time in the help documents than I should have. Help documentation is vital but can easily get neglected in software development. While ER/Studio's help documentation seems to contain the right information, the usability is lacking.

Keystroke mapping consistent with Windows conventions is also an important aspect of usability. Given all

three tools being reviewed are Windows-based, users should expect certain functionality to be ubiquitous. For example, the F2 key is commonly used in Windows to rename a selected file or object. In PowerDesigner, hitting the F2 key allows the user to rename a selected entity (although none of the attributes), but in ER/ Studio, the F2 key does nothing. During testing, I intuitively tried the Insert key as an alternative, but instead of allowing me to edit a named object, it unexpectedly invoked a zoom out command. Unfortunately, neither F2 nor the Insert keys are explained in the ER/Studio help documentation. Ideally, keystroke command mapping should conform to Windows UI standards and allow the same functionality, where appropriate, to be contained within the application.

ER/Studio, similar to PowerDesigner, also suffers from a loose coupling between logical and physical models, such that changes made to a logical model are not automatically reflected in the physical model. I find it a little cumbersome having to remember that I must still push my logical changes to the physical model. To me, it is infinitely easier to have the tool automatically apply logical changes to the physical and deal with them there, rather than having to initiate a separate process to keep them in sync. Similarly, I would expect any submodels created on the logical side to be there in my physical. Having instantly synchronized versions of the logical and physical model helps users communicate their messages clearly and consistently to both the business and the development teams. While replicating a logical submodel to the physical side in ER/ Studio is not difficult, having the process take place automatically would be much more effective from a usability standpoint.

On a more positive note, the ER/Studio editor for Entities/Tables is nice and consistent. All of the items that pertain to entities are positioned at the top of the window while all the items for attributes are below. I like the fact that both components are within easy reach. That said, it makes the window rather busy, but given the advantage of being able to quickly get to everything about an entity users may find that an acceptable tradeoff.

The model diagrams produced in ER/Studio are clean, providing just what the typical user would expect. However, the application toolbars prove to be in need of updating. While they are not as crisp and clean as PowerDesigner, they are also not nearly as cryptic. An upgrade to the toolbars would add polish to the overall appearance of the application.

The Overview Window in ER/Studio is helpful. It makes navigating a large model much easier and it helps the user think a little less about the tool, which is always good. Being able to move the overview to a different display is also a nice usability benefit for those with two monitors.

During ER/Studio testing, I made some edits to both model versions and invoked a synchronization process. The overall process is not painful, but a bit tedious. For example, I also discovered that extra care must be taken when setting options for physical model creation, otherwise certain naming options cannot be changed unless the physical model is recreated from the logical.

Generating DDL in ER/Studio was a straightforward process. Users have the option of creating a single DDL script or have ER/Studio generate a DDL file for each object. Depending on how users are handling version control of the database, having the both DDL options is very useful. PowerDesigner also has this capability. After tweaking the DDL generation options a couple times I was able to generate DDL for SQL Server 2008 that ran without any issues.

I also tested ER/Studio's "Compare and Merge" feature, which facilitates the comparison of a physical model to the actual database (or another model, a DDL file, or the ER/Studio Repository). I opted to compare the model against the database I just generated. Users are presented with straightforward setup and connection options before selecting the items they want to compare. The selection list is organized but lengthy, and it took me two or three attempts to correctly choose the options needed to get the desired results. The results screen is intuitive and tricky situations like forced matches are resolved easily enough by reading the help documentation. Speaking of a forced match, it would be nice if that particular function were more clearly defined in the user interface since it is not unusual to encounter that situation in the real world.

The ER/Studio reporting capabilities were also examined during the test session. The reporting tool is adequate, allowing users to select a number of different content formatting and inclusion options. Output file formats are surprisingly limited to HTML and RTF. While the HTML output is presentable to any audience, RTF output is less useful. I also did not see output options for Excel or PDF, two of the most commonly used file formats.

In several hours of testing, ER/Studio proved to be a capable modeling tool. Aided by an intuitive interface, the average data modeler should be able to pick up this tool and be moderately productive with it in about a day. I suspect the tool also has a lot of versatility and power under the hood given its macro facility and repository features typically required in a medium to large data modeling shop.

Online ER/Studio forums seem to be helpful. I perused several threads where visitors seemed to be polite and knowledgeable. I would not categorize them as very active, but there was good dialog presented. The Embarcadero website also hosted a good selection of white papers authored by industry veterans. The content was what one would expect from a vendor site. The site included some videos and blogs which looked interesting.

ER/Studio Summary

ER/Studio is to be commended for its overall usability, the Overview Window, and editor capabilities, but it stumbles in a few areas. The help documents need work for readability. The UI is not very polished in appearance, and even the wizards themselves seem to need updating for appearance sake. Technical nuances with respect to keystroke and command mappings add to a tedious user experience. The loose coupling of the logical and physical models is problematic and the extra effort required to keep them in sync puts the tool a step backwards in general. **ER/Studio Overall grade: "B+".**

Figure 2:

ER/Studio Feature By Feature Summary:

Feature	Embarcadero Technologies ER/Studio Data Architect 9.0.1
Overall Usability	A
Model Formatting & Layout	B
Logical Model Creation	A
Physical Model Creation	A
Forward-Engineering/DDL Creation	A
Reporting	B-
Customization	B
Standards Creation & Reuse	B
Model & Database Comparison Tools	B+
Documentation	C
Online Community	A
Undo/Redo	B-
Metadata Interchange w/Other Tools	B

CA ERwin

Generally speaking, I like CA ERwin and the power that has built into the tool over the years. It is clear that a great deal of development focus was placed on usability in the r8 version, particularly around the UI.

As with other reviews, I began by exploring the help documents, which are highly informative and nicely presented. It is obvious that a lot of time has been spent on them in the new release. They are easy to read or skim and contain step-by-step instructions on how to perform a number of the tasks that are required in a data modelers day-to-day activities. There is also plenty of additional information and community support available at www.ERwin.com, which will be discussed later.

As I navigate around a model, I examined the keystroke command assignments. As in previous CA ERwin releases, I notice that I can still use the F2 key on either the entity name or attributes. Though the behavior seems to have changed slightly from previous versions, it is nice to know that I can make quick edits as I scan the model without having to open up an editor. I did notice in the help documents that I'm also able to customize hotkeys in CA ERwin, so that I can define function keys, keystroke patterns, etc. to match my own unique workflow. The 'out of the box' functionality is generally on-track and I'm able to fully customize it to meet my needs, if necessary.

That kind of convenience is demonstrated in many other areas of the tool, most notably in the reconciliation of model edits. For example, edits made on one side of the model automatically shows up on the other. If an attribute is added on the logical side it automatically appears on the physical side and vice versa, with no other steps required. CA ERwin also has the flexibility to create multiple types of physical models from a single logical model, meaning that users can create an instance for Oracle, another for SQL Server, etc. from the base logical model. That is a key strength of CA ERwin —giving users options and flexibility in their design approach.

CA ERwin also features a new Bulk Editor function that enables users to quickly and easily view and update with multiple object types, or multiple properties within a single object type. The Bulk Editor includes a well-designed wizard that guides users through their options. Users will note that the Bulk Editor groups items by object type. In other words, all the tables are grouped together, followed by columns and then check constraints, etc.

The overall CA ERwin UI is very crisp and clean. The toolbars are sharp and it is fairly easy to anticipate what each icon does, with tool tips available for each (similar to competing tools). Importantly, CA ERwin also allows users to customize their own toolbars, meaning the functions that users never or rarely invoke can be moved away while commonly used functions remain close at hand. In essence, the toolbar customization and related features in CA ERwin get the tool out of the user's way and enables them to focus clearly on the business at hand.

CA ERwin r8 also features new auto-layout buttons that are also very effective, helping to presenting the model in a variety of easy-to-analyze views. Five different layout options can be selected, and the user can select different layout options for subsets of model objects, depending on what makes the most sense for a given subject area of the model. This is a key differentiator for CA ERwin compared to tools like ER/Studio, which require that all diagram objects use the same layout.

Another feature new to CA ERwin r8 is gradient shading of the entities which makes the overall look of the model visually appealing. While PowerDesigner also has this feature, ER/Studio does not. But CA ERwin does not stop there, as users can now define themes for the models. By applying a theme, users can set font properties, color properties, and outline options for all the appropriate items in a given model. By color coding model components and giving them a common look and feel, presentations and reports can be made much more visually appealing and easy to follow, particularly for a non-technical audience.

Users will also be pleased to see that CA ERwin r8 adds an Overview Window function, which gives the user a "birds-eye" look at larger models, coupled with the ability to easily zoom in on areas of interest. ER/Studio has a similar feature, while PowerDesigner does not. Additionally CA ERwin allows you to take several of its windows and spread them between two monitors, or you can resize them and let them float. CA ERwin will also allow you to take those same windows and place them on the side of the UI where they can slide in/out as your mouse hovers over them. This really allows you to configure the environment in a way that works best for the individual. Neither PowerDesigner nor ER/Studio provide this much flexibility in the UI.

While I tested the creation of entities and attributes in CA ERwin, I noticed the tool provides users with some default domains to work with in a new model, something that ER/Studio does not do. And unlike either of the other two tools, CA ERwin lets users change the order of the attributes/columns in their entities/tables just by dragging them around with the mouse. Users can even copy attributes/columns from one entity/table to another by dragging them over with the control key pressed. This is a another very useful time-saving feature that makes working in CA ERwin easier and faster than either PowerDesigner or ER/Studio.

The DDL generation capabilities in CA ERwin are also advanced, proving quite flexible during testing. In this tool, DDL can be managed according to a set of Forward Engineering Templates, where users can completely customize their DDL and even create their own syntax. They can also customize a wide variety of other items, such as data types. It is impossible to design a tool that can anticipate every scenario it may be used for; therefore, flexibility is an extremely important factor in the overall usability of a tool.

> The level of flexibility & versatility demonstrated by CA ERwin is unmatched in either PowerDesigner or ER/Studio

After generating DDL, I validated the model against the actual database using the CA ERwin "Complete Compare" function. Users walking through the Complete Compare wizard will find a vast number of options to set. The list of available comparison options is more comprehensive than either PowerDesigner or ER/Studio, and some users may be overwhelmed at first, especially if they are not familiar with the DBMS with which they are working. My relative inexperience with SQL Server 2008 seemed to be a bit more exposed during CA ERwin testing, and comparison tasks took longer for me to complete than they did with PowerDesigner and ER/Studio. That said, at the end of the day it would seem better to have the options available rather than not at all. And consistent with the template-drive approach taken in the rest of the tool, CA ERwin does allow users to save their comparison settings in an XML file for use in a future or for sharing with other modelers.

After finishing a Complete Compare task, CA ERwin users can generate a variety of reports. I found the predefined reports to be quite effective, and the tool also includes some strong custom-built reporting capabilities given a built-in license for SAP Business Objects Crystal Reports – something that the other tools do not provide. CA ERwin reports can be exported to a number of different formats including PDF, Excel, Word, RTF, XML, and as a Crystal Report file.

There are two other noteworthy technical items that help put CA ERwin ahead of other tools. First, the CA ERwin undo feature (introduced in a previous release) took the tool to a level well beyond ER/Studio and PowerDesigner. With CA ERwin, an Action Log shows users all the things that took place within a particular session, and then enables users to undo or redo anything in that session. The log can also be saved off as a report for later review if needed. Seasoned modelers understand the importance of having this capability, for example during busy design sessions where the development team required a complete listing of all model changes being discussed. From a time saving perspective, the undo/redo functionality in ER/Studio and PowerDesigner do not reach the level of CA ERwin. In fact, testing revealed that there are some actions that ER/Studio simply cannot undo, and there were a few situations where I could not undo as far back as I wanted.

The metadata integration capabilities included free with CA ERwin is another notable superiority, and a significant reason why the tool is tremendously versatile. While certain exports and imports require more work than others, the number of tools with which CA ERwin can exchange data is impressive and saves users a substantial amount of time and effort. During my testing, PowerDesigner lagged way behind in this area, offering far fewer integration options. The integration options for ER/Studio are sold as chargeable add-ons, which adds several thousand dollars to the cost of the overall solution.

CA ERwin also stands out for the strong collection of online resources available at the dedicated www.ERwin.com website. While the activity on the PowerDesigner forum may be comparable to CA ERwin's, the strength of the CA ERwin community is obvious and undoubtedly aided by unique promotions such as their "Why Be Normal" contest, which offers incentives and a community approach to encourage participation. And unlike either ER/Studio or PowerDesigner, visitors to ERwin.com do not have to wade through material for unrelated products to get what they need. CA ERwin users should also find value in the blogs and comments that noted industry experts regularly post on the site. Like its competitors, CA ERwin is backed by a variety of helpful videos and white papers.

CA ERwin Summary

Overall, technical and non-technical users alike will find the newest version of CA ERwin a pleasure to work with. The highly intuitive UI is much easier on the eyes and does a terrific job of presenting material in an intuitive and helpful way. Clearly, a lot of effort went into not only the organization of the UI, but also into a highly refined fit and finish that further promotes ease of use. The ability of CA ERwin to edit entities and attributes on the fly in the diagram is noticeably lacking in the other two tools, while the reporting facility was cleaner and produced just as high-quality output in more formats. While some may find the Complete Compare interface a bit daunting, most users will appreciate the flexibility having a larger number comparison options provides. Ultimately, the usability of CA ERwin far outshines PowerDesigner, while its overall polish and painstaking attention to detail easily exceeds that of ER/Studio. CA ERwin earns my overall recommendation as the tool of choice for the average data modeler. **CA ERwin Overall grade: "A"**

Figure 3:

CA ERwin Feature By Feature Summary:

Feature	CA ERwin Data Modeler r8
Overall Usability	A
Model Formatting & Layout	A
Logical Model Creation	A
Physical Model Creation	A
Forward-Engineering/DDL Creation	A
Reporting	A
Customization	A+
Standards Creation & Reuse	A
Model & Database Comparison Tools	B+
Documentation	A
Online Community	A+
Undo/Redo	A+
Metadata Interchange with Other Tools	A

Overall Testing Summary

Summary Scorecard

Sybase PowerDesigner (v15.3.0)   C+
Embarcadero Technologies ER/Studio Data Architect (9.0.1)   B +
CA ERwin Data Modeler r8   A

Feature by Feature Scorecard Comparing All Three Tools

Feature	Sybase PowerDesigner v15.3.0	Embarcadero Technologies ER/Studio Data Architect 9.0.1	CA ERwin Data Modeler r8
Overall Usability	D	A	A
Model Formatting & Layout	B	B	A
Logical Model Creation	C	A	A
Physical Model Creation	C	A	A
Forward-Engineering/DDL Creation	B	A	A
Reporting	B	B-	A
Customization	C	B	A+
Standards Creation & Reuse	C	B	A
Model & Database Comparison Tools	C	B+	B+
Documentation	C-	C	A
Online Community	A-	A	A+
Undo/Redo	B	B-	A+
Metadata Interchange with Other Tools	C	B	A