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A Comparative Study of Database Design Tools

Embarcadero Technologies ER/Studio and Sybase PowerDesigner

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Executive Summary

Overview

Background of the Study

Embarcadero Technologies retained Usability Sciences Corporation to perform a comparative evaluation of ER/Studio® [1] and Sybase PowerDesigner®. Tests were conducted at Usability Sciences facilities in Irving, Texas. Twenty experienced data modelers/designers participated in the study. All participants possessed mid to expert experience levels in Computer Associates data modeling tool, ERwin®.

Objectives of the Study

The objectives for this research were as follows:

- Compare the usability and ease of use between ER/Studio and PowerDesigner.
- Gather comprehensive task timings and satisfaction levels of the basic data modeling functions in each tool.
- Determine participant's overall preferences regarding which tool they preferred in a number of different categories.

How the Study was Performed

Participants performed the tests individually and used between two and two-and-a-half hours to assess both tools. Each participant attempted the same twelve tasks related to creating and manipulating data models with ER/Studio and PowerDesigner. Tasks were selected based on their high frequency of use for typical data modeling functions. The order of tools were alternated for each session to prevent any bias to the results of the study. Usability analysts observed each participant as he/she performed the tasks from a separate control room. Task times, task completions, and satisfaction levels were recorded while the participant worked. After completing the individual tasks, the participant was asked to complete a series of post-test surveys and answer a series of interview questions regarding his/her experiences.

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[1] ER/Studio was in beta form for this study

Who participated in the study?

All twenty of the testing participants had mid to expert level experience with Computer Associates data modeling tool, ERwin. This decision was made to ensure that the participants were in the proper target market, and they were not biased toward either of the products being evaluated. In addition to using ERwin, several of the participants had experience with other data modeling tools from Microsoft, Oracle, and Sybase *(None of the participants had used Sybase PowerDesigner within the past six months)*. Another stipulation required that none of the participants could have past experience with Embarcadero Technologies ER/Studio.

All participants had job roles with one or more of the following titles: Data Design, Data Modeling, Application Architecture, and/or Business Data Architecture.

Highlights of the Study

What were the top-level findings regarding: **Post-Task Scores?**	At the completion of each *task*, participants were asked to rate the task on their perceived level of "Confidence of Completion"[2] and "Ease of Completion."

- 83% of the tasks were rated with a higher level of *confidence* of task completion in ER/Studio than in PowerDesigner.
- 83% of the tasks were rated with a higher level of *ease* in ER/Studio than in PowerDesigner.

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What were the top-level findings regarding: **Post-Test Satisfaction Scores?**	At the completion of all tasks for each product, participants were asked to rate their satisfaction in four different categories based on 20 different attributes. The categories evaluated were, "Design & Presentation," "Navigation," "Functionality," and "Productivity & Efficient Process."

- ER/Studio received a higher overall satisfaction average on *each* of the 20 surveyed attributes.
- The following graph highlights the average ratings received in each of the four main categories.

Note: Confidence Ratings: 7-Very Confident, 1-Very Unsure
The complete list of attributes and averages can be found in the
"Results of the Study" section of this report.

Figure 1 - Post-Test Survey Ratings

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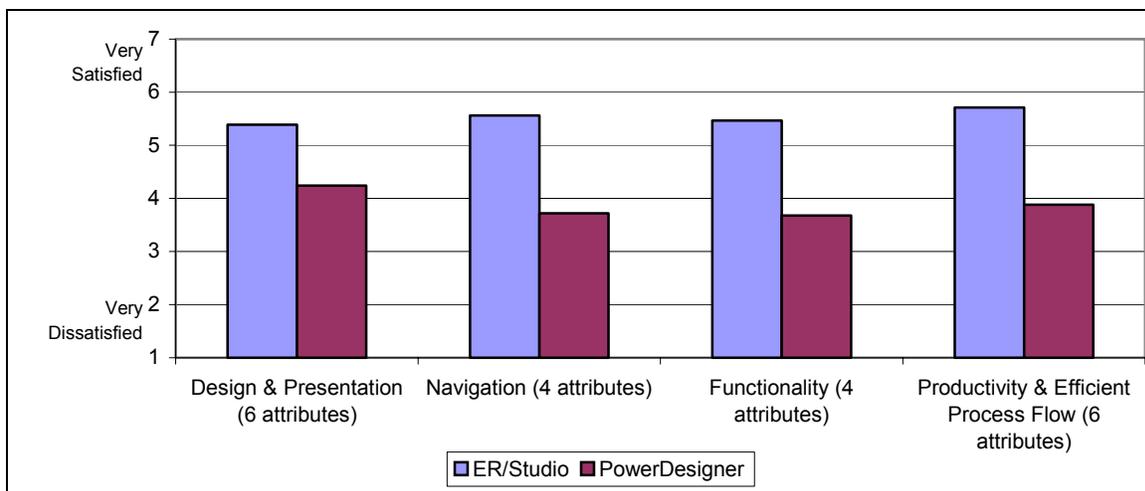
[2] Because the participants were never told whether they performed a task successfully or not, the *confidence* and *ease* ratings are subjective to how each participant *thinks* they accomplished the task.

What were the results of the Overall Comparative Survey?

After performing the same set of tasks in both products, participants were asked to complete a comparative survey of nine categories related to their experiences with the products. The following chart shows the comparison results of all 20 participants.

Figure 2 - Comparative Survey Ratings
(Rollup of all twenty participants preferences)
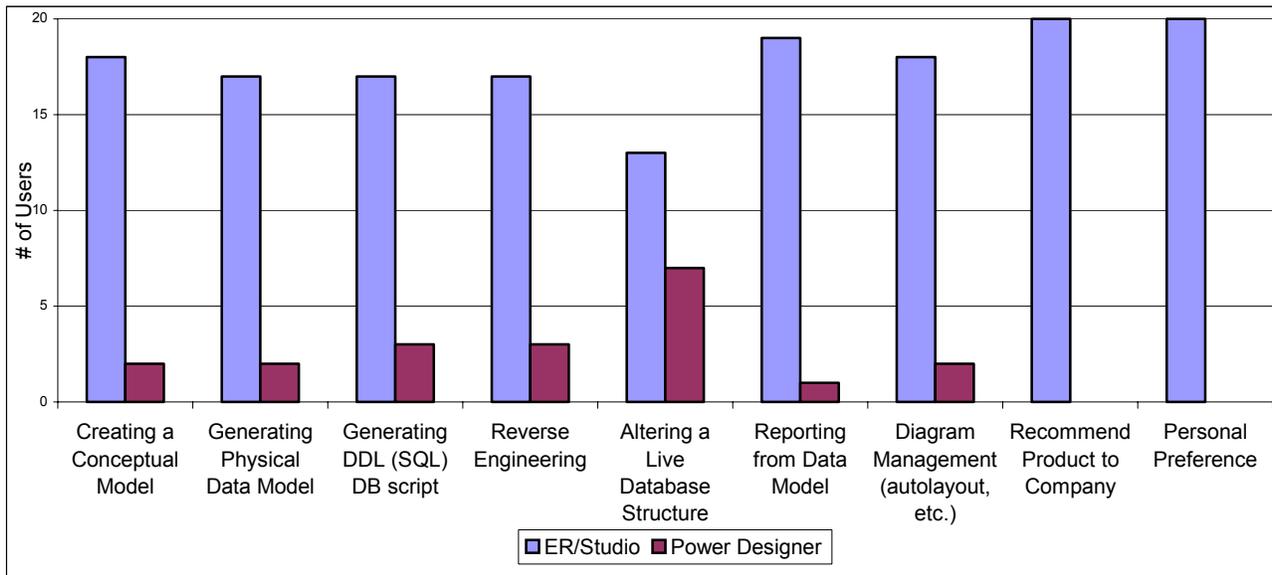
What were the top-level findings regarding: Task Completion?

- The average **failure rate**[3] across all participants on all tasks was approximately 40% for PowerDesigner, and 18% for ER/Studio.

- The average **successful** task completion[4] time across all participants on all tasks was approximately 16.7% faster in ER/Studio.

- 75% of the participants were *unable* to correctly define a relationship on PowerDesigner (20% were unable in ER/Studio).

- 70% of the participants were *unable* to generate an RTF model report on PowerDesigner (*all* of the participants were able to complete this task in ER/Studio).

- 65% of the participants were *unable* to generate an HTML model report on PowerDesigner (20% were unable in ER/Studio).

- 55% of the participants were *unable* to automatically layout their model on PowerDesigner (*all* of the participants were able to complete this task in ER/Studio).

- 35% of the participants were *unable* to reverse engineer a database in PowerDesigner (10% were unable in ER/Studio).

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[3] Failure rate is defined as an exceeded time limit or an incorrect stopping point for the task.
[4] Averages of time on task reflect only the *successful* task completion times, if a participant failed or ran out of time; their times were not included in the overall average.

Conclusions

Summary of this study

The quantitative and qualitative measurements from this research clearly highlight the ease of use of ER/Studio when compared to PowerDesigner. The data modelers tested were able to complete the tasks faster, and with a higher level of confidence in ER/Studio than in PowerDesigner. This success can clearly be attributed to the clarity and intuitiveness of the interface.

Post-test interview comments indicated high frustration levels with PowerDesigner which were attributed to difficulty with manipulating their models, understanding the terminology, and generating reports. All of the participants felt ER/Studio would require substantially less time to learn than PowerDesigner due to its clear interface and wizards that supported the majority of tasks.

As a result of ER/Studio's increased focus on the end user experience, it is our opinion that ER/Studio users will be able to create and modify their data models for the first time with little or no training on how to use the system. In terms of usability, the ER/Studio system possesses a tremendous advantage over PowerDesigner.

About Usability Sciences Corporation

Since 1988, Usability Sciences Corporation has continued to be the world-leading independent provider of usability testing services. Due to this extensive usability testing experience, Embarcadero Technologies retained Usability Sciences to perform this study.

Additional information about Usability Sciences is available at www.usabilitysciences.com.

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Results of the Study

Task Timing and Task Completion Results

What were the average timings and task completion percentages?

The following table displays the average timings for *successful* task completions and the average percent *failure*[5] rating for each task.

Note: ER/Studio averaged 16.7% faster across all of the tasks performed. PowerDesigner had a failure rating of 50% or higher in 5 of the 12 tasks.

Note: Tasks performed faster by at least 30% have been bolded. In addition, tasks with a failure rating of 50% or higher are also have been bolded.

Tasks Performed	Time		% Failure	
	ER/Studio	Power Designer	ER/Studio	Power Designer
Create entities, add attributes and identify Primary Keys.	3:13	3:36	5%	20%
Create a specific relationship between two entities with a Foreign Key	*1:26*	2:48	20%	*75%*
Generate a Physical Model for a specific environment	2:30	2:32	10%	10%
Generate a Database Script with specific parameters (must include Comments, etc.)	3:25	3:23	*50%*	40%
Reverse Engineer the sample database: Northwind	*2:07*	3:10	10%	35%
Add a field in a Physical Database	1:14	1:27	0%	5%
Generate a database script to modify the actual database structure	2:39	2:38	*65%*	45%
Generate an HTML report for the Northwind database	*2:16*	4:33	20%	*65%*
Use the Automatic layout features of both product	*0:49*	1:37	0%	*55%*
Modify the appearance of the data model (toggle datatypes on/off)	1:36	1:22	20%	*50%*
Create entities based on existing Domains	3:02	3:05	15%	15%
Generate an RTF report	2:31	2:46	0%	*70%*
Overall Average:			*18%*	*40%*

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[5] Failure rate is defined as an exceeded time limit or an incorrect stopping point for the task.

Confidence of Completion and Ease of Completion Results

What were the average *Confidence* and *Ease* percentages?
The following table displays the average level of confidence and ease given by the participants after completing each task. Since the participants were never told if they actually completed a task successfully, the confidence level indicates their own perception of whether they "think" they were successful with the task.

Note: The average confidence rating for ER/Studio was a 6 or higher in 9 of the 12 tasks provided. On average, ER/Studio was roughly a point and a half higher in satisfaction for both confidence and ease for all of the tasks.

Note: Confidence Ratings: 7-Very Confident, 1-Very Unsure
Ease Ratings: 7-Very Easy, 1-Very Hard
Averages with a 6.0 or higher are italicized in bold

Tasks Performed	Confidence		Ease	
	ER/Studio	Power Designer	ER/Studio	Power Designer
Create entities, add attributes and identify Primary Keys.	*6.8*	5.3	*6.1*	5.1
Create a specific relationship between two entities with a Foreign Key	*6.3*	2.6	5.9	2.9
Generate a Physical Model for a specific environment	5.8	5.2	*6.0*	5.0
Generate a Database Script with specific parameters (must include Comments, etc.)	5.0	5.5	4.9	5.0
Reverse Engineer the sample database, Northwind	*6.6*	5.7	*6.3*	5.3
Add a field in a Physical Database	*6.8*	*6.6*	*6.4*	5.8
Generate a database script to modify the actual database structure	4.6	5.4	4.8	5.2
Generate an HTML report for the Northwind database	*6.6*	3.0	6.4	2.5
Use the Automatic Layout Features of both product	*6.8*	4.3	*6.3*	3.4
Modify the appearance of the Data Model (toggle datatypes on/off)	*6.0*	4.3	5.0	3.7
Create entities based on existing Domains	*6.3*	5.5	5.7	5.3
Generate an RTF report	*6.6*	3.8	5.7	3.5
Overall Average:	*6.2*	*4.8*	*5.8*	*4.4*

Post-Test Survey Analysis

What were the results of the *Individual* prototype surveys given?

After completing tasks for a tool, participants were asked to complete a survey to rate their satisfaction. They were then instructed to complete the same tasks in the other tool, and again fill out a survey upon completion of all tasks. The starting tool was alternated between each participant to prevent any bias in the survey results.

Note: ER/Studio averaged more than one-and-a-half points higher across all of the attributes in this survey. PowerDesigner did not attain an average of five or higher in *any* of the questions, which shows a clear dislike for the overall tool.

Note: Survey Ratings: 7-Very Satisfied, 1-Very Dissatisfied

| OVERALL SURVEY QUESTIONS		
Design & Presentation	**ER/Studio**	**PowerDesigner**
Overall aesthetics	5.4	4.4
Visual metaphors to convey concepts	5.0	3.9
Interface of the module	5.5	4.2
Readability	5.6	4.6
Quality of content	5.5	4.6
Concise wording (headings, subheadings, etc.)	5.5	3.9
Average:	5.4	4.2
Navigation	**ER/Studio**	**PowerDesigner**
Ability to navigate	5.8	3.7
Consistency of the user interface	5.6	4.4
Organization of information	5.3	3.3
Current Location ("Knowing where you are at all times")	5.7	3.5
Average:	5.6	3.7
Functionality	**ER/Studio**	**PowerDesigner**
Consistency of functions & features	6.0	4.3
Ease of searching	5.0	3.3
Ease of browsing	5.4	3.5
Overall ease of use	5.5	3.6
Average:	5.5	3.7
Productivity & Efficient Process Flow	**ER/Studio**	**PowerDesigner**
Overall "Learn-ability" (minimal learning curve, quick mastery)	5.7	3.6
Overall efficiency	5.7	4.0
Overall "Linear Process" in this module (prompted for information in a logical path, clearly defined next steps, etc.)	5.9	3.5
Usefulness of on-screen guidance, instructions and descriptions (i.e. Wizards, labels, etc.)	5.5	3.0
Overall speed and responsiveness	5.9	5.0
Overall protection of participant's work (confirmations, error recovery, etc.)	5.6	4.5
Average:	5.7	3.9
Overall Average:	**5.5**	**3.9**

Comparative Survey Analysis

What were the results of the *Comparative* surveys given?

After completing tasks with *both* of the tools, participants were asked to complete a comparative survey ranking their preference of tools in several different categories.

It was difficult for the participants to give definitive answers regarding the functionality they experienced. Many of the data modelers, specifically the database administrators, felt they would have to spend a lot of time looking at the actual scripts, evaluating the models, and using each tool in their own work environment to truly gauge which product *functionally* performs the best. However, in regards to intuitiveness and ease of use, the participants did feel they could offer their perspective. Clearly, in regards to the usability of the products, ER/Studio was ranked higher than PowerDesigner in the categories listed below.

Note: For the question of "Generating a Physical Model," one participant did not select a product, therefore there were only 19 possible responses to this question.

Figure 3 - Comparative rollup of responses from the 20 participants
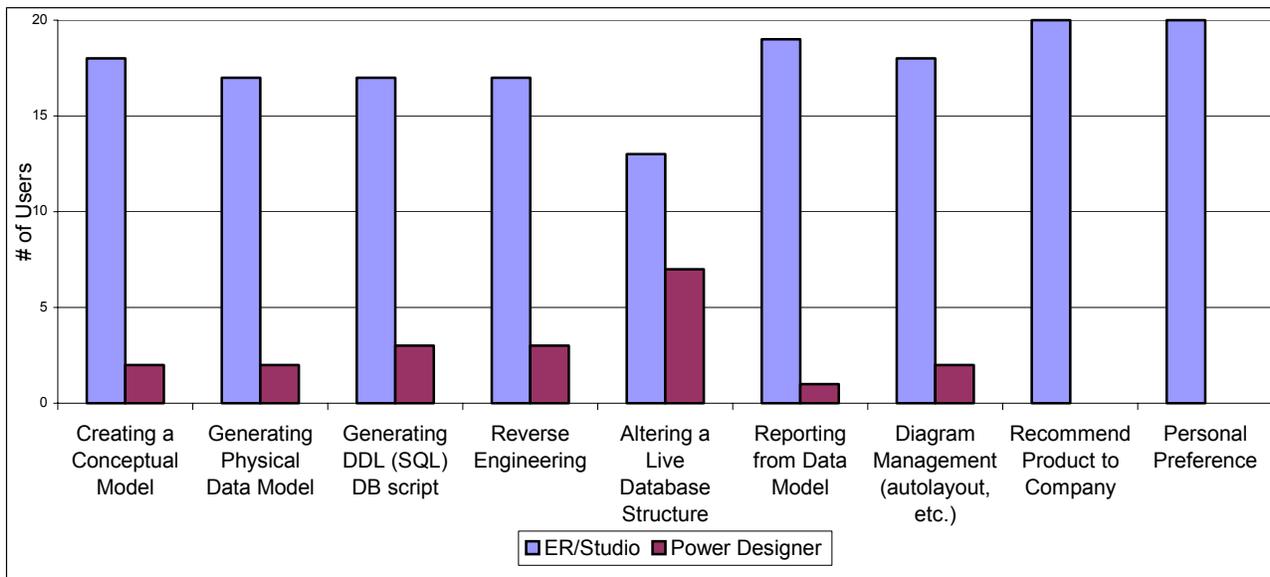
Comparative Survey Comments

What did the participants write on the Comparative Survey?	The following section highlights the comments written by participants when asked about their overall recommendations regarding both tools. These comments help convey the various thoughts and experiences participants had with each tool.

If experience was not an issue, which product would you recommend for your company and why?

ER/Studio	The following lists some of the comments written by the twenty data modelers that indicated ER/Studio as their answer:

- It was a more intuitive application.
- It was a much easier application to use and come up to speed on. Relatively easy to find all functions associated with my day-to-day work.
- Good tool to use and contains required features.
- The product was more intuitive.
- It was easier to use, although the combination of object modeling in PowerDesigner would cause me to seriously consider it.
- More powerful, easier to use, shorter learning curve.
- Data modeling only.
- Much easier to pick up and learn.
- Ease of use and more appealing.
- I was comfortable. It felt familiar, but with added features.
- Less chance for error.
- Smaller learning curve.
- More functional.
- Much easier to use, however, the UML piece of PowerDesigner would be important.
- Has better features and functionality.

Power Designer	*None of the twenty data modelers indicated they would recommend PowerDesigner to their company.*

If experience was not an issue, which product do you prefer overall and why?

ER/Studio   The following lists some of the comments written by the twenty data modelers that indicated ER/Studio as their answer:

- I found it to be a tool I could use on the job for meeting my daily needs.
- Easier learning curve, menu items were easier to navigate, and the icons were easier to use.
- Good tool to use and contains all the requirements needed.
- The product was easier to use.
- Easier to use and find functions.
- More consistent, intuitive, powerful, and easy to use.
- Data modeling only.
- Just easier overall. Less intimidating.
- Seems to be more intuitive.
- Besides comfort, it was much easier on the eyes.
- If column entry and manipulation could be done in one easy step, it would be even better.
- Smaller learning curve.
- Far superior.
- I prefer ER/Studio because it is easier to use, however, PowerDesigner has some important features like UML and repository.
- Has better features and functionality.

Power Designer   *None of the twenty data modelers indicated they preferred PowerDesigner overall.*

Appendix A. – Methodology

What tasks did the participants perform?

Usability Sciences and Embarcadero Technologies collaborated on the test script design used to evaluate the data modeling tools. The following is a list of some of the tasks included in this research:

- Create entities, add attributes and identify primary keys
- Create a specific relationship between two entities with a foreign key
- Generate a physical model for a specific environment
- Generate a database script with specific parameters (must include comments, etc.)
- Reverse engineer the sample database, Northwind
- Add a field to a physical database
- Generate a database script to *modify* the *actual* database structure
- Generate an HTML report for the Northwind database
- Use the automatic layout features of both products
- Modify the appearance of the data model (toggle datatypes on/off)
- Create entities based on existing domains
- Generate an RTF report

Tasks were designed to allow participants to complete basic data modeling scenarios and to cover a wide level of common data modeling functions.

Where was the study performed?

All of the testing was performed in the labs of Usability Sciences Corporation in Irving, Texas.

How was the study facilitated?	Each participant performed scripted tasks taking between two and two-and-a-half hours in order to compare ER/Studio and PowerDesigner. After initial introductions, participants were given three minutes to familiarize themselves with the first product being evaluated. At the end of the three minutes, they were given the same amount of time to familiarize themselves with the second product being evaluated. After this initial exploration period, participants were asked to complete the set of tasks in the first product and then the second product. Participants were given a satisfaction survey to measure response to and satisfaction with the tool. The order in which the modeling tools were presented was randomized for each participant. During each session the test facilitator was in the observation room to clarify the intent of any tasks, but did not answer any task-related questions. Participant comments and responses to questions were documented by electronic means and all sessions were videotaped.

Who participated in the study?	Participants had to meet the following criteria in order to qualify for the study:

- ERwin users with at least 6 months of experience
  - o *Note: This decision was made to ensure the participants were in the proper target market and that they were not biased towards either of the products being evaluated.*
- At least 6 months experience, as a job function, with one of the following:
  - o Data Design, Data Modeling, Application Architecture, or Business Data Architecture
- Must have used 3rd party tools for data modeling
- Had to fulfill the following software rankings (1-Top and 5-Worst):
  - o ERwin – Ranking of (1-5)
  - o ER/Studio – Ranking of (1-4, or were unaware of the product name)
  - o Power Designer, Microsoft Visio, Oracle Designer, System Architect – Ranking of (2-5, or were unaware of the product name)

How were the sessions recorded?	All testers were observed and videotaped as they worked. Usability Sciences' data logging software, TestLogr®, was used to record detailed electronic notes of all participant activities and comments. A camera and a scan converter captured the participant's facial image and the computer interface as he/she worked. The lab facility allowed the observation team to interact with and view the participant as well as the computer interface throughout each test session.

What computer system was the testing performed on?

The computer system used for this research:
- Dell Dimension 4100
    - o PIII – 933mhz
    - o 320 MB of memory
- Windows 2000 Server
- MS SQL Server 2000 Enterprise Edition
- ER/Studio
- PowerDesigner

Note: The hard drive of the testing computer was reset with an identical image before each testing session. This ensured identical testing environments for each participant.