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Autodesk Maya 2011:
Market Perspectives, Productivity
and Return on Investment

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Contents

Introduction

About this Report

This report presents the findings of a market specific benchmarking project conducted by Pfeiffer Consulting for Autodesk, combined with technology analysis of the latest release of Autodesk Maya.

Productivity measures, based on the *Pfeiffer Consulting Methodology for Productivity Benchmarking*, compared workflow productivity based on the Autodesk Maya 2011 with the 8.5 release of the software. Workflow benchmarks and efficiency measures analyzed the productivity impact of features introduced in Maya 2011, and previous releases on workflows using Maya 8.5. For details on the methodology used for the productivity benchmarks, please refer to the *Methodology* sidebar on the page 5, or to the complete benchmark report.

Structure of this Report

This report is structured in 3 sections:

Inventing the Future of 3D Production (page 4) analyzes recent trends in 3D software and the feature additions of Maya 2011.

Productivity in 3D Modeling and Animation (page 6) concentrates on the productivity impact of new features in Maya 2011.

The Cumulative Effect of Productivity Gains (page 8) analyzes the effect of productivity gains on return on investment.

About Pfeiffer Consulting

Pfeiffer Consulting's mission is to provide unique high-level, international market intelligence and strategic consulting for both content and technology providers.

Pfeiffer Consulting is the publisher of the *Pfeiffer Report on Emerging Trends and Technologies*, an online resource on trends in the technology and content industry, as well as numerous specialized studies and reports.

For more information, please visit: www.pfeifferconsulting.com.

Major Findings

▷ Maya 2011 is a landmark release of the software that introduces several significant new features that **expand creative possibilities** as well as **operating efficiency**.

▷ Productivity research conducted for this project show that **Maya 2011 offers significantly enhanced productivity over older releases** in a variety of product areas.

▷ Return on investment projections show that **Maya 2011 can yield return on investment of close to $20,000** per workstation per year.

About Pfeiffer Consulting

▷ Pfeiffer Consulting is an **independent technology research institute and consulting operation** focused on the needs of digital content professionals.

▷ Download the complete **Autodesk Maya 2011 Benchmark Report** at www.pfeifferreport.com.

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Inventing the Future Of 3D Production

Major Points

▷ **The trend towards virtual movie-making is driving the convergence of CGI technology and traditional movie production techniques,** moving towards an increasingly integrated environment of 3D and traditional production environments.

▷ Maya 2011 introduces the Camera Sequencer, which has **the potential to redefine pre-production workflows and virtual storyboarding.**

▷ Maya 2011 offers **a new, more efficient user interface** that can be easily customized and offers many productivity enhancements.
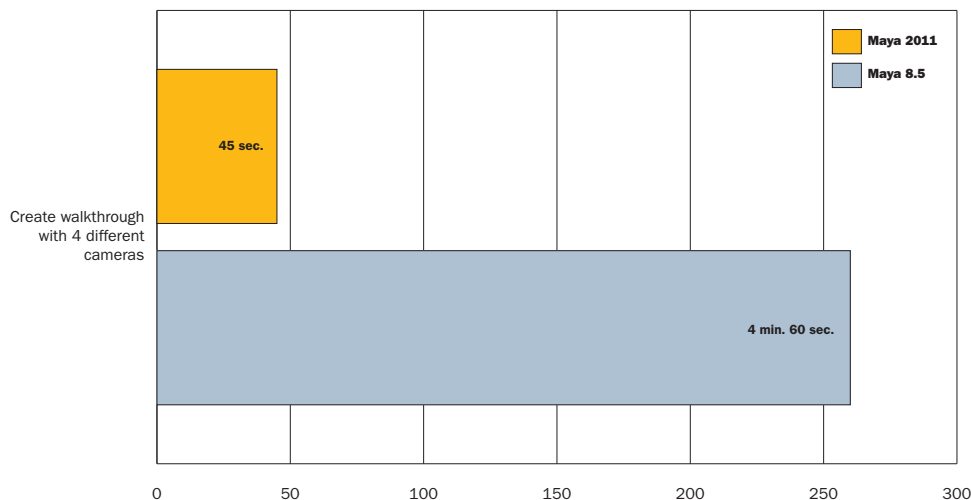
3D Production, Movie-Making and Beyond

3D production and traditional film making have had a long-standing relationship, and from the looks of it, the involvement of the two domains is about to become even more intense — and the boundaries ever more blurry. Integration of CGI into film is now a well-known process, that seems to be producing ever more spectacular results — spectacular in the sense that for the average movie audience it has become virtually impossible to draw the line where traditionally shot footage ends and where computer generated imagery starts.

But while the technology itself evolves constantly, the integration of CGI is old news, of course. What has only become clear fairly recently, however, is to which extent the 3D toolset is beginning to shape the process of movie-making itself. Suddenly, the 3D production environment is no longer only an imitation of the real world that supplants the camera when traditional techniques can't get the job done: thanks to advances in software such as Maya 2011, the 3D system is increasingly becoming the brain and the nervous system of the movie-making process itself.

The Camera Sequencer: Approaching Virtual Movie Making

Camera Sequencer
Time scale in seconds. Shorter is better.

Maya 2011
Maya 8.5

Create walkthrough with 4 different cameras

45 sec.

4 min. 60 sec.

0   50   100   150   200   250   300

The Camera Sequencer, one of the more original features introduced in Maya 2011, allows the sequential use of different cameras much like one would in a real cinema or television studio. This makes pre-production of animated films much easier.

In our benchmark, we tried to emulate working with different camera positions using the tools of Maya 8.5, inserting position changes and key-frames for a single camera. The process is cumbersome and unpredictable, and takes significantly longer, as the benchmark results show.

This report is based on technology analysis and market-specific productivity benchmarks conducted by Pfeiffer Consulting for Autodesk. It also includes elements from independent research and technology analysis projects conducted by Pfeiffer Consulting.

Productivity measures

Pfeiffer Consulting conducted market-specific performance, productivity and efficiency benchmarks of common 3D workflow situations, comparing features and productivity enhancements introduced with recent releases of Autodesk Maya, as compared with the the Maya 8.5 release of the software.

Nature of productivity benchmarks

Experienced professionals performed segment-specific workflow tasks and assignments, defined in clearly repeatable steps and executed in a closely monitored way.

To ensure real-world results, no scripting was used for any benchmarks.

System specifications

Benchmarks compared features introduced in Maya 2011 as well as previous releases with Maya 8.5. Benchmarks were conducted on two identical Dell™ Precision™ T7400 workstations equipped with 2.83GHz quad-core Intel® Xeon® processors and with 4 to 32 GB of RAM, factory-configured respectively for 32-bit and 64-bit Windows® operating systems.

For in-depth discussion of the benchmark methodology, system configurations, and comprehensive benchmark description and results, please download the complete "Autodesk Maya 2011 Benchmark Report" at www.pfeifferreport.com.
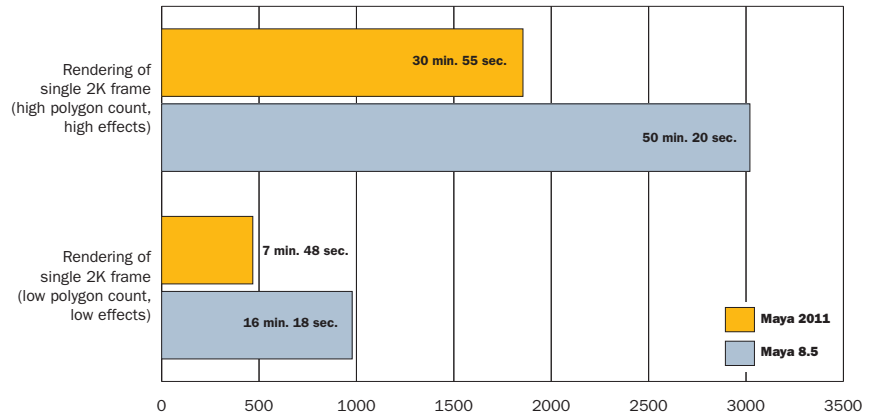
The Impact of 64-bit Support: Rendering Performance
Time-scale in seconds. Shorter is better.

64–bit support not only gives Maya users access to more available memory, it can provide a significant performance boost: Rendering a complex 2K image took almost 20 minutes less on a 64–bit workstation.

Maya 2011: Extending the Boundaries of 3D Production

One of the most interesting new features included in Maya 2011 is a tool called **Camera Sequencer**. It provides a fast and easy way of stringing together views from several cameras to create complete sequences using different cameras, angles and viewpoints: an integrated editing environment, that will significantly speed up the pre-production process, from planning camera angles to managing the approval process with the producer or client.

But the potential of Camera Sequencer goes well beyond simple storyboarding; it paves the way for virtual movie-making. Maya 2011 now supports multiple audio tracks; and thanks to integration with EDL data from Final Cut Pro, Maya can now be used to match and plan integration of camera footage with the CGI environment in a more pervasive way.

User Interface, Tools and Productivity

One visible change in Maya 2011 is the **new user interface**, however, that not only radically changes the look of the software, but allows for greater overall efficiency and easier customization of the work environment. (Maya 2011, which runs on Windows, Linux and Mac OS X, now also provides 64-bit support for the Mac platform.)

As can be expected from a major new software release, there is a long list of additional feature enhancements and new tools that speed up the production process, ranging from simple modeling features: **object-level soft selection**, a new **Pinch tool** for interactive modeling, or a new **Spin Edge tool** that accelerates work with polygon meshes. Another major improvements is the **Auto Resize option for fluid containers**, that can result in significant productivity gains.

The present report particularly focuses on the effect Maya 2011 can have on productivity: On the following pages, we will analyze the impact of key efficiency enhancements introduced with recent releases of the software in greater detail.

Productivity in 3D Modeling and Animation

Major Points

▷ Maya 2011 offers a **wide variety of productivity and efficiency enhancements** over older releases of the software, as well as **innovative features like the Camera Sequencer**.

▷ Maya 2011 offers an **Auto Resize option** that makes **working with fluid containers much more efficient** than in the past.

▷ New modeling functionality in Maya 2011 makes **working with polygonal models significantly more efficient**.

Sophistication vs. Efficiency

How do you balance the need for seemingly unlimited sophistication with the efficiency required by heavily deadline-driven production schedules? It is not an easy problem. Maya is a deep software program; many areas require the expertise of a trained specialist, yet their work is punctuated by highly repetitive (not to say mind-numbing) tasks that can take hours to complete, yet in most cases cannot be automated.
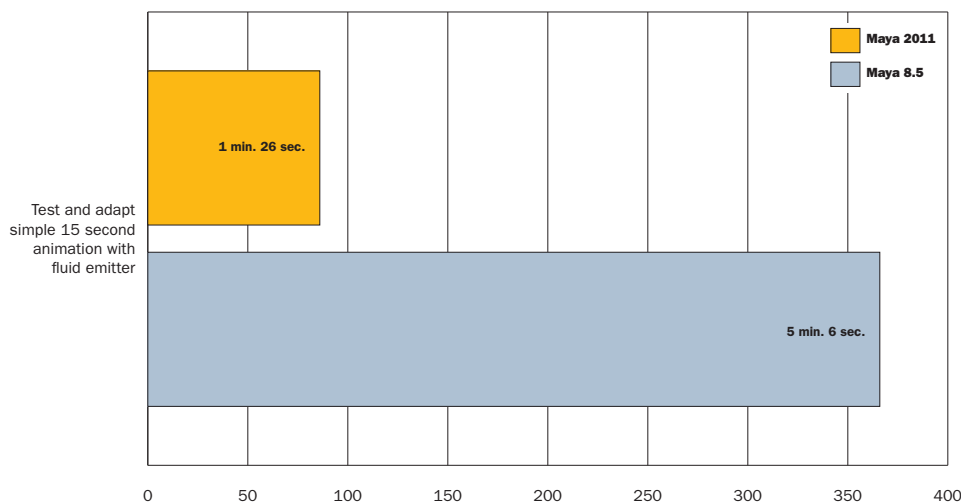
Increasing productivity, therefore, means eliminating unnecessary steps. In terms of efficiency, every second counts, every click adds up. There is nothing more annoying than having to repeat an unnecessary trip to the menu bar or to a dialogue box over and over again.

Maya 2011: Key Productivity Features

One of the most impressive new features in Maya 2011 is the **Camera Sequencer,** that allows users to string together any combination of camera views on a special time-line, switching back and forth between

Auto Resize Fluid Containers: Boosting Efficiency of Working With Fluids

Auto Resize Fluid Container
Time scale in seconds. Shorter is better.

Maya 2011
Maya 8.5

Test and adapt simple 15 second animation with fluid emitter

1 min. 26 sec.

5 min. 6 sec.

0   50   100   150   200   250   300   350   400

As experienced Maya users know, working with fluid containers can be cumbersome and time-consuming, since it is hard to predict how big the fluid container needs to be to accommodate the movements and development of the fluid emitter. This results in a time-consuming trial-and-error process that can take hours to get right.

The Auto Resize option introduced in Maya 2011 eliminates this need, and results in significant productivity gains, as the benchmark results (from a very simple example) show.

Soft Selection
Time-scale in seconds. Shorter is better.

Simple scaling of components	Maya 2011: 20 sec.
	Maya 8.5: 1 min. 12 sec.
Controlled scaling of two regions	Maya 2011: 28 sec.
	Maya 8.5: 1 min. 36 sec.

Legend: Maya 2011, Maya 8.5
(Axis: 0, 20, 40, 60, 80, 100)

Object-Level Soft Selection
Time-scale in seconds. Shorter is better.

Arrange 5 objects	Maya 2011: 5 sec.
	Maya 8.5: 9 sec.
Arrange group of 15 objects	Maya 2011: 6 sec.
	Maya 8.5: 26 sec.

Legend: Maya 2011, Maya 8.5
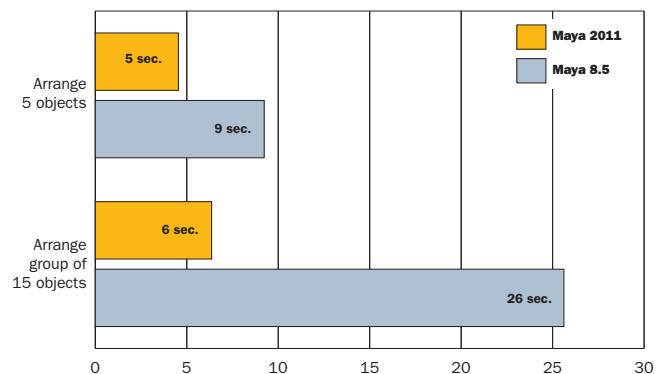(Axis: 0, 5, 10, 15, 20, 25, 30)
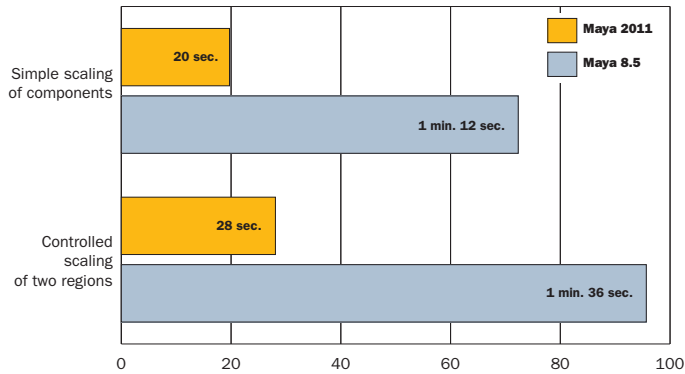
Soft Selection has been significantly enhanced in recent releases of Maya, and result in significant productivity gains when reworking polygon meshes. (Chart on the left.) Object–level Soft Selection, *introduced in Maya 2011, makes it much faster to dynamically re–arrange multiple objects in a scene, and provides not only higher productivity but also increased creative control. (Chart on the right.)*

different camera views as one would in a movie studio. While it is technically possible to move between different camera positions in an earlier release of Maya by animating a single camera, the process is so cumbersome that it becomes impractical. (See chart on page 4.)

Sometimes very simple additions to time-consuming features can provide a spectacular productivity boost. Working with fluid simulations was very slow and complex in earlier releases of Maya since it required a lengthy trial and error process to scale and animate the container boxes for fluid emitters. Maya 2011 introduces an **Auto Resize option for fluid containers**, that reduces a process that could take hours to a few minutes. (See chart on previous page.)

Other productivity gains can be linked to intelligent application of existing functionality to extend its reach. A good example is the revised **Soft Selection** option. Not only has this feature been significantly enhanced over previous releases of the program, but Maya 2011 now also offers **object-level soft selection.** This makes it possible to re-arrange groups of objects dynamically in very subtle ways, that would take much longer if executed on a one-by-one basis. (See chart on this page.)

Tweaking the Polygons

The last group of productivity enhancements concerns existing modeling tools, and allows frequently repeated tasks to be completed in fewer steps. While these improvements may not seem very spectacular for the layman, experts immediately recognize their utility — and the efficiency gains they can provide. Maya 2011 offers a slew of new features along those lines, including **intelligent selection tools**, or the new **Spin Edge tool** that can change the direction of multiple selected edges with a single keystroke. (See charts on page 8 and table on page 10.) Another example that speeds up modeling is the new Multi Mode selection, which allows users to switch from edges to faces to vertices on the fly, saving precious time.

64-bit Support in Maya 2011

Maya has offered 64-bit support for some time, but not on all platforms. This is now a thing of the past — Maya 2011 offers full 64-bit support on all platforms, including Mac OS X.

Support for 64-bit architectures is essential for memory intensive workflow situations, such as complex scenes or high resolution rendering: in our benchmarks, conducted both on 32-bit and 64-bit versions of Windows, the 32-bit version could not work with our largest test document, that contained 4.5 million polygons. Likewise, Maya running under the memory constraints of a 32-bit operating system, was unable to complete the 4K test rendering we had set up.

Access to more memory is not the only benefit of 64-bit support: Maya 2011 completed some our performance benchmarks almost twice as fast on a 64-bit workstation than on the same computer model running 32-bit software and operating system.
(See chart on page 5.)

The Cumulative Effect of Productivity Gains

ROI Can Be a Subjective Notion

While in some sectors of activity, the exact meaning of ROI can be very clearly understood and easily defined, this is far from being the case in creative industries in general, and in particular when the investment in enabling technologies is concerned.
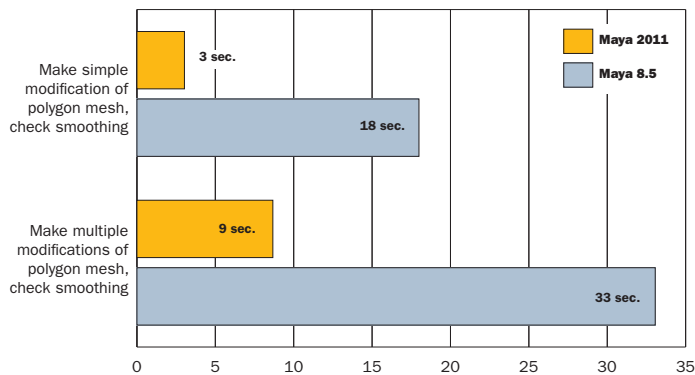
ROI is essentially a matter of approach: what exactly is considered a valid return on investment? While a decision maker in a bottling plant may have a clear idea of the return of a specific technology investment may bring, the situation is much less clear-cut in a game house, advertising agency, or video production company — essentially, any company where the goods sold depend on creativity and not just production capacity.

Perceived ROI also varies considerably depending on the size of an operation: Smaller studios and creative agencies frequently value the creative edge a new tool provides more than they do calculated cost savings, and thus base their equipment decisions on available funds

Modeling Efficiency: The New Tools of Maya

Smooth Mesh Preview
Time-scale in seconds. Shorter is better.

Legend: Maya 2011, Maya 8.5

Make simple modification of polygon mesh, check smoothing: 3 sec. (Maya 2011), 18 sec. (Maya 8.5)

Make multiple modifications of polygon mesh, check smoothing: 9 sec. (Maya 2011), 33 sec. (Maya 8.5)

Modeling Efficiency
Time-scale in seconds. Shorter is better.

Legend: Maya 2011, Maya 8.5

Select 2 edge loops: 3 sec. (Maya 2011), 8 sec. (Maya 8.5)

Merge 10 vertices: 15 sec. (Maya 2011), 33 sec. (Maya 8.5)

Maya 2011 offers a host of features designed to accelerate common modeling tasks. Smooth Mesh Preview allows to work directly on smoothed subdivision surfaces. (Chart on the left.)
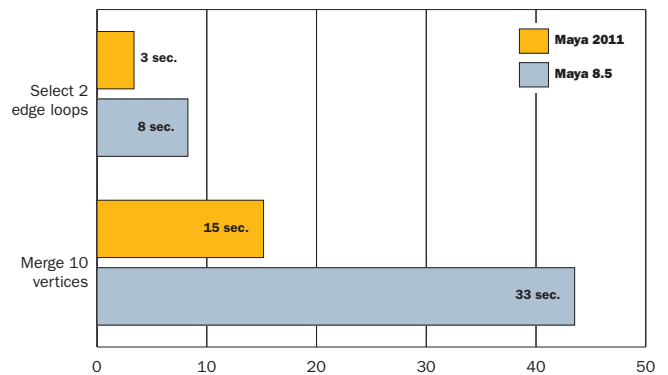
New modeling features: the intelligent selection tools or the Merge Vertex tool accelerate the time consuming process of optimizing polygon objects. (Chart on the right.)

The ROI projections at the end of this document have been calculated using a simple methodology. The top half of the table presents the features taken in account, and calculates **the number of seconds saved by one individual operation** over a previous release. In addition, these time savings are mapped to the hourly cost of a creative professional.

The lower half of the table uses the same features and time savings, **applies a reasonable weekly frequency of use for each feature, and calculates the cost savings based on hourly rates.**

Finally, the bottom of the table presents **the cumulated cost savings of all features included in the table over a month and a year** (based on 20 workdays per month and 220 workdays per year).

and immediate usefulness; in larger operations such as studios, cost of deployment and training will factor heavily in any decision to purchase or upgrade creative technologies.

The Invisible Gains

There is one factor, however, that is almost universally underestimated when analyzing return on investment: **the considerable cumulative effect of small productivity gains in everyday operations** that a new software release can bring.

Let's take a simple example: each time one uses the Intelligent selection tools instead of the previous, multi-step method for selecting specific parts of a model, one saves between two and 10 seconds. But these options can be used dozens of times during the course of a work day. **Repeated just twenty times a day, this single functionality can save a designer close to an hour per month.** And we are only considering a single, isolated (and seemingly minor) feature. Once one starts adding up the individual productivity gains provided by a variety of efficiency enhancements and features introduced in recent releases of Maya, it is clear that the returns on investment can be very significant.

Every Click Counts

It is a widely accepted fact in productivity research and ergonomics that **every click counts, and every trip to the menu bar slows the user down**. If one works in an office environment without particular time pressure, these gains may seem insignificant, but in highly competitive, deadline-driven businesses such as game and development and 3D film production, even seemingly minor productivity gains are immediately useful.

The Bottom Line

Pfeiffer Consulting has analyzed the data from the productivity benchmarks to establish the impact of productivity gains on return on investment. **Autodesk Maya 2011 increases the productivity of average users by providing efficiency gains in many everyday operations.** The ROI can very easily reach thousands of dollars per workstation per year: Based on the workflow projections documented on the following page, which calculate the impact of repetitive use of the benchmarked productivity features, **the ROI impact of Maya 2011 can easily reach $20,000 per year and per workstation.**

Autodesk Maya 2011: Return on Investment Scenarios (Per Workstation)

	Prod. measures in Maya 8.5 workflow (Time in seconds)	Prod. measures in Maya 2011 workflow (Time in seconds)	Individual time savings (seconds)	Productivity gain (%)	ROI generated (1 hour @ $100)
Incremental productivity gains (Return on Investment generated by individual operation)					
Modeling Tools					
▷ **Spin Edge Tool:** Rearrange group of 10 edges	57.94	15.10	42.84	73.94%	$1.19
▷ **Smooth Mesh Preview:** Make simple modification	17.99	3.03	14.96	83.18%	$0.42
▷ **Smooth Mesh Preview:** Make multiple modifications	33.06	8.67	24.39	73.78%	$0.68
▷ **Merge Vertex Tool:** Merge 10 vertices	43.52	15.17	28.35	65.14%	$0.79
Intelligent Selection					
▷ **Intelligent Selection:** Select 2 edge loops	8.28	3.37	4.91	59.34%	$0.14
▷ **Intelligent Selection:** Select face loop	10.56	2.52	8.04	76.10%	$0.22
▷ **Intelligent Selection:** Select vertex ring	14.86	4.64	10.22	68.79%	$0.28
▷ **Multi Mode Selection:** Modify one object	13.19	5.45	7.74	58.67%	$0.22
▷ **Multi Mode Selection:** Reshape three objects	36.01	17.82	18.19	50.51%	$0.51
Soft Selection/Object-Level Soft Selection					
▷ **Soft Selection:** Simple scaling of components	72.33	19.71	52.62	72.75%	$1.46
▷ **Soft Selection:** Scaling of two regions	95.67	28.08	67.59	70.65%	$1.88
▷ **Object-Level Soft Selection:** Arrange 5 objects	9.23	4.54	4.70	50.87%	$0.13
▷ **Object-Level Soft Selection:** Arrange group of 15 objects	25.62	6.36	19.26	75.18%	$0.54
Workflow Enhancements					
▷ **Camera Sequencer:** Create scene with 4 cameras	260.00	45.00	215.00	82.69%	$5.97
▷ **Auto-resize Fluid Container:** Test and adapt animation	366.00	86.00	280.00	76.50%	$7.78

	Time saved (seconds)	Number of occurrences (Per week)		ROI (1 hour @ $100)
ROI projections (based on incremental productivity gains)				
Modeling Tools				
▷ **Spin Edge Tool:** Rearrange group of 10 edges	42.84	50		$59.50
▷ **Smooth Mesh Preview:** Make simple modification	14.96	50		$20.78
▷ **Smooth Mesh Preview:** Make multiple modifications	24.39	25		$16.94
▷ **Merge Vertex Tool:** Merge 10 vertices	28.35	50		$39.37
Intelligent Selection				
▷ **Intelligent Selection:** Select 2 edge loops	4.91	20		$2.73
▷ **Intelligent Selection:** Select face loop	8.04	20		$4.46
▷ **Intelligent Selection:** Select vertex ring	10.22	20		$5.68
▷ **Multi Mode Selection:** Modify one object	7.74	50		$10.75
▷ **Multi Mode Selection:** Reshape three objects	18.19	50		$25.26
Soft Selection/Object-Level Soft Selection				
▷ **Soft Selection:** Simple scaling of components	52.62	50		$73.08
▷ **Soft Selection:** Scaling of two regions	67.59	25		$46.94
▷ **Object-Level Soft Selection:** Arrange 5 objects	4.70	25		$3.26
▷ **Object-Level Soft Selection:** Arrange group of 15 objects	19.26	10		$5.35
Workflow Enhancements				
▷ **Camera Sequencer:** Create scene with 4 cameras	215.00	10		$59.72
▷ **Auto-resize Fluid Container:** Test and adapt animation	280.00	10		$77.78
	Total ROI generated/week			$451.61
	Total ROI generated/month			**$1,806.45**
	Total ROI generated/year			**$19,870.99**