
**ERP End-User Business Productivity:
A Field Study of SAP & Microsoft**

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Executive Summary

Study Overview

In this white paper, we measure how end users of Enterprise Resource Planning (ERP) applications describe the impact of Microsoft and SAP applications on their business productivity. This research found that Microsoft Dynamics end users on average rated their experience with Microsoft applications more favorably than SAP users rated their experience with SAP. These findings are based on a business productivity measurement framework developed by Keystone Strategy, working under the direction of Dr. Marco Iansiti, the David Sarnoff Professor of Business Administration at the Harvard Business School, and sponsored by Microsoft.

Background

Keystone's research fits within the context of several recent studies exploring the impact of software applications on business productivity, beyond traditional measures such as the level of information technology (IT) investment or feature/function comparisons.

A study from AMR Research¹ finds that only 15% of employees are licensed to use their company's ERP system and furthermore that 46% of licensed ERP seats go unused. Logical follow-on questions to these findings include: How can an application have a deep impact on productivity at a company when such a limited set of employees has access to the system? Why would an investment in a tool as powerful as an ERP system and with such potential to boost business performance be limited to such a small set of employees? Of the already limited number of licenses purchased, why do nearly half go unused?

In a separate study, Forrester concludes that "poorly designed user interfaces can profoundly affect the bottom line. The expenses associated with a bad UI, over the course of the application's lifetime, may end up being many times the cost of the application itself." The report continues on to explain the costly implications of a bad UI, including increased new user training times, a decrease in productivity, and poor user adoption.²

Against the background provided by AMR and Forrester, Keystone Strategy has initiated a broader research program to analyze the interrelationships between IT and business productivity. Previously, Keystone has found that firms with the highest deployed IT capabilities in their peer groups have been best able to profitably grow their revenues. This finding has been true of both enterprise³ and midsized⁴ businesses.

In this white paper, we extend our previous research to investigate how enterprise applications, such as ERP systems, affect business performance - in particular end-user productivity. We believe this approach yields particular insight. If IT leads to more profitable sales growth as we have found, which factors drive the productivity of individual users? Which applications are most satisfying to users? And, which applications hold the potential to be more utilized, benefiting the firm's scalability? In short, what is behind the end user's experience with the applications they use, and how do those interactions positively or negatively impact business productivity?

To answer these and other related questions, we evaluate the extent to which end users of ERP applications in production environments feel software makes them productive in ways relevant to them in their day-to-day responsibilities. Does the software help users with the tasks they do every day in a way that is intuitive to them? Does, for example, a warehouse manager feel like this ERP application was designed by a warehouse manager, for a warehouse manager? Is critical business information readily and broadly available to all employees who will benefit from it? Through this research, we argue that end-user productivity is based on multiple dimensions, all of which

¹ *The Enterprise Planning Spending Report 2005-2006*, AMR Research 2005

² *Put Business Applications To The Usability Test*, Forrester Research 2006

³ *Enterprise IT Capabilities and Business Performance*, Keystone Strategy 2006

⁴ *Why IT Matters to Midsized Firms*, Keystone Strategy 2005

are fundamental to maximizing the potential of the investment in IT systems.

Business Productivity Framework

Measuring the impact of applications on ERP end-user productivity is a complex undertaking because of the wide range of business functions, vertical industry requirements, and user types who interact with such systems. In this study, we developed a business productivity framework to measure how ERP end users feel Microsoft and SAP applications impact their personal productivity.

The framework was developed by leveraging a combination of industry standard usability tests and exhaustive research into the roles and responsibilities of end users across Sales & Marketing, Finance and Operations department areas. Usability tests such as the Software Usability Measurement Inventory (SUMI) were evaluated to identify typical factors impacting application usability and end-user business productivity. SUMI is a widely regarded, industry standard usability methodology developed and refined over the past 15 years by software usability experts at the Human Factors Research Group at University College Cork, Ireland. It is designed to evaluate satisfaction and user productivity with software applications and is tool commonly employed in the software development community.

Complementing the use of SUMI, this study also utilized extensive research into end user roles and experiences with ERP systems. This research identified common needs and frustrations across the three department areas. This evaluation of end user roles was used to extend SUMI to encompass additional factors specific to ERP systems that have a strong bearing on end-user productivity.

This analysis of typical user responsibilities and industry standard usability tests such as SUMI has illustrated that business productivity is a function of six factors. Our business productivity framework is comprised of Usability, Familiarity, Transactional Efficiency, Flexibility, Business Insight, and Collaboration (Figure 1).

The study probes each business productivity category with specific questions, then aggregates the results into category-specific and overall scores.

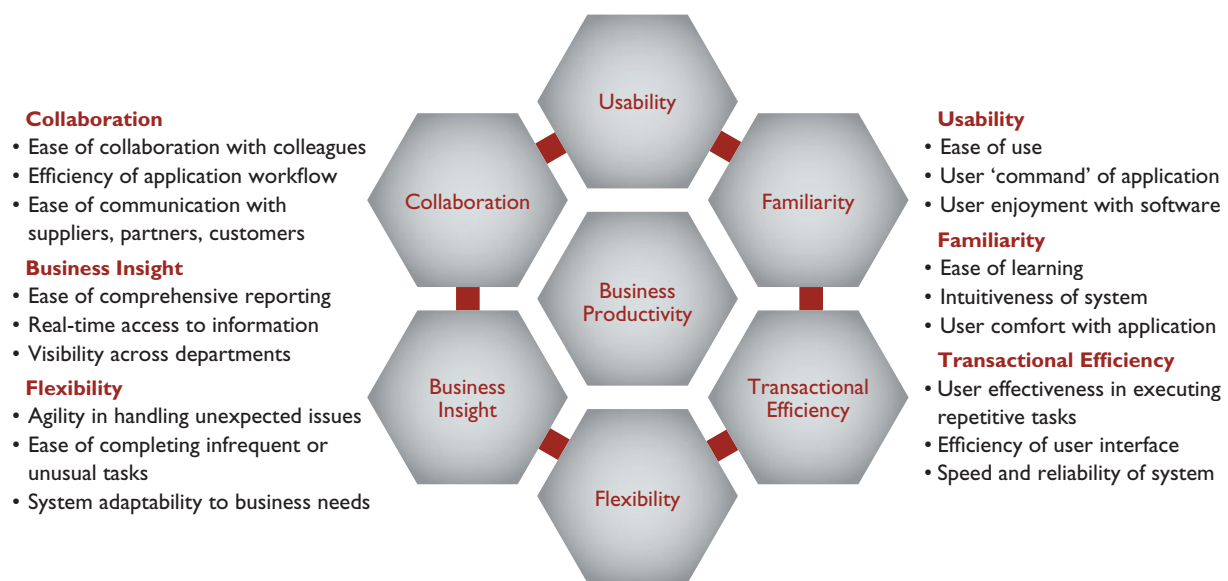


Figure 1. Business Productivity Measurement Framework

Summary of Findings

Users of Microsoft Dynamics NAV, Microsoft Dynamics GP, SAP All-in-One, and SAP R/3 at approximately 100 companies (randomly selected) were asked about their experiences with Microsoft and SAP applications across the six categories of business productivity. Participants responded to statements about each of the categories using a standard, seven point Likert scale. The final score measures how end users across Sales & Marketing, Finance, and Operations departments describe the impact of ERP applications on their business productivity. A higher score indicates a higher business productivity impact (Figure 2).

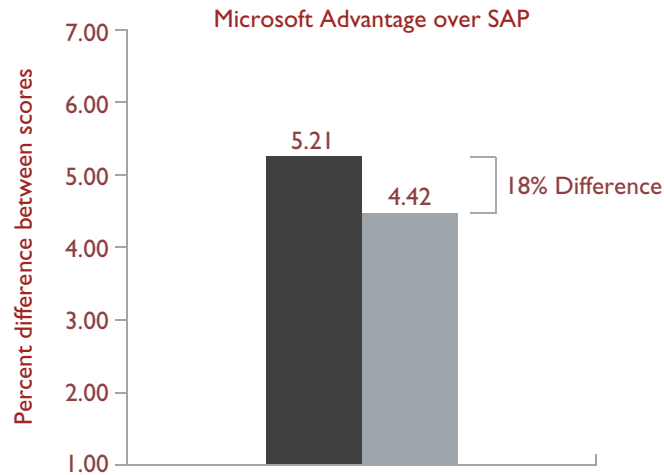


Figure 2. Average Business Productivity Score

Microsoft Dynamics users on average scored Microsoft 18% higher than SAP users scored SAP applications. In all six dimensions of business productivity measured, Microsoft scored higher than SAP, as much as 27% higher in some categories (Figure 3). This study has found with a high degree of confidence that the average scores of Microsoft and SAP are different and that Microsoft scores are uniformly higher across all categories.

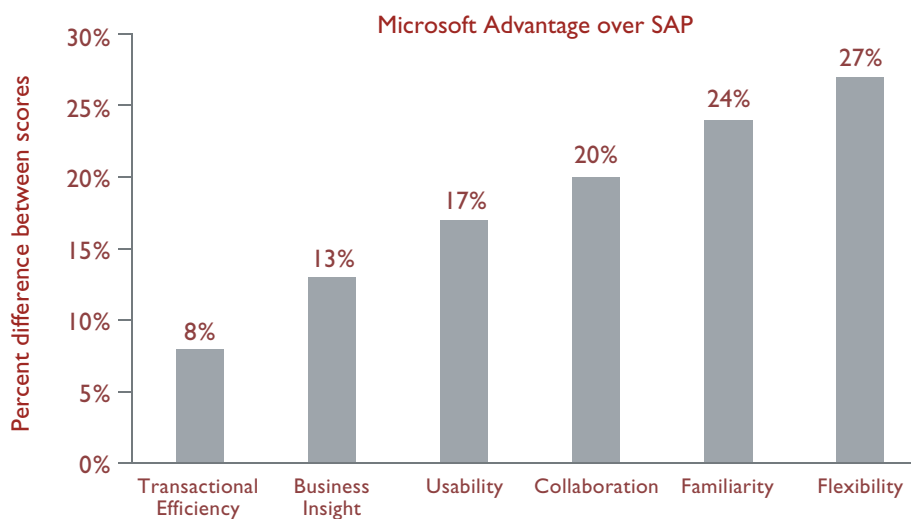


Figure 3. Percent Difference in Business Productivity Scores by Category

Methodology

Survey Administration and Scoring

The survey consists of eighty-five statements on software business productivity, grouped into the six categories of Usability, Familiarity, Transactional Efficiency, Flexibility, Business Insight, and Collaboration. The survey was administered via telephone to end users of Microsoft Dynamics NAV and Microsoft Dynamics GP (66 respondents), and SAP All-in-One and SAP R/3 (33 respondents) in Sales & Marketing, Finance, and Operations departments. Surveys were administered to capture a cross-section of functional roles for each application suite. The survey was double-blind: the sponsor of the survey was not revealed to respondents and the individuals administering the survey did not know who the sponsor was. The totals by function and applications are shown below in Table 1.

	Sales & Marketing	Finance	Operations	Total
Microsoft	11	43	12	66
SAP	9	11	13	33

Table 1: Departmental Breakdown of Survey Respondents by Application

For each statement, respondents were asked to respond on a scale of 1 to 7, with a 1 meaning that they “strongly disagreed” with the statement, a 7 meaning that they “strongly agreed” with the statement, and a 4 meaning that they “neither agreed nor disagreed” with the statement. Respondents were also given the option to respond that they “didn’t know” or that the statement “was not applicable to their situation.”

The score for each business productivity category is the average score across all the statement responses. The overall score is a weighted average, which is derived by averaging the scores of each category. Some statements are worded negatively, which is to say that a high response on the Likert scale indicates a low or negative impact on user productivity. Before calculating the overall scores for each category, the scores for those negatively worded statements were normalized to a standard scale to enable overall averaging of results. For example, a response of a “2” (“disagree”) to the statement “It takes too long to learn how to work with this software” would actually be averaged as a “6” to reflect a relatively high level of positive impact on user productivity.

Survey Instrument and Measurement Framework Development

The survey instrument and business productivity measurement framework are based on two major inputs: standard usability test methodologies and extensive ERP user research.

The SUMI methodology informed our survey design and we leveraged SUMI questions where appropriate in our business productivity measurement framework. SUMI, the “Software Usability Measurement Inventory,” is a proven industry-standard methodology used to measure software quality from the end user’s point of view. The SUMI methodology was most relevant and comprehensive in our categories of Usability and Familiarity.

We also exhaustively researched the roles and responsibilities of business application users and the work environments in which they operate to generate comprehensive business application use scenarios at a functional level. From these functional-specific profiles we abstracted a common set of application use scenarios relevant to users of business applications in different departments. These scenarios naturally fell into the six categories of business productivity measured in this study. From these scenarios we generated a set of statements to measure an end user’s perception of the impact of the applications on their business productivity.

Together, these two inputs provide the basis for the comprehensive evaluation framework used in the study.

Sample Questions

In this study, Microsoft scored higher than SAP in eighty of the eight-five total questions. Below are several examples of questions from the survey instrument, and the average scores for Microsoft Dynamics and SAP users, respectively. The questions below are drawn from across all six business productivity categories. Certain questions included statements describing challenges⁵ users face with the software. On such questions, Microsoft respondents frequently scored more favorably than SAP users. For the example questions in the table that follows, respondents reacted to the statements on a seven point scale (7=strongly agree, 4=neither agree/disagree; 1=strongly disagree):

Challenges with the Software ⁶	Average MSFT Score	Average SAP Score	Score Difference
It takes too long to learn how to work with this software	2.4	4.4	45%
This software is very awkward to use	2.2	3.8	42%
I sometimes don't know what to do next with this software	2.9	4.0	28%
There is too much to read before you can use the software	2.1	3.9	46%
This software is awkward when I want to do something which is not standard	3.4	5.1	33%
There are too many steps required to get something to work	3.0	4.4	32%

Table 2. Responses to Statements on Challenges with the Software

Likewise, Microsoft Dynamics respondents rated Microsoft more favorably on questions from the survey inquiring as to the strengths of the software. In the table that follows, respondents reacted to the following statements on the same seven point scale (7=strongly agree, 4=neither agree/disagree; 1=strongly disagree):

Strengths of the Software	Average MSFT Score	Average SAP Score	Score Difference
It is easy to share my comments and provide feedback on the work of others in <SAP> <Microsoft> software.	5.0	3.5	43%
My company is able to change how we use the software as our business changes	5.3	4.1	29%
<SAP> <Microsoft> software enables me to create comprehensive forecasts for my department	5.1	4.0	28%
It is easy for me to submit work to my supervisor for review or approval	5.4	4.3	26%
<Microsoft> <SAP> software makes it easy to manage problems and exceptions that arise in my day to day work	5.3	4.4	20%
I can easily gain visibility into sales, operational, and financial data across divisions and locations in <Microsoft> <SAP> software	5.6	4.9	14%

⁵Note: the scores in the 'Challenges with the Software' table are actual responses; these scores were normalized to a standard scale to summarize the survey results.

⁶'Challenges with the Software' statements based on the Software Usability Measurement Inventory (SUMI), © Human Factors Research Group, Ireland.

Strengths of the Software	Average MSFT Score	Average SAP Score	Score Difference
The instructions and prompts are helpful	5.2	4.0	30%
Doing what you want to do with this software is straightforward	5.3	4.1	29%
I am able to find solutions to new problems using <Microsoft> <SAP> software	5.1	3.9	31%
<Microsoft> <SAP> software helps me collaborate with other companies I work with, such as suppliers, customers, partners, or service providers	5.0	3.7	35%

Table 3. Responses to Statements on Strengths of the Software

Detailed Findings and Implications

Usability

Usability measures the user’s perception of how easy the applications are to use, how “in command” of the application a user feels, how easy it is to navigate in the software, and how much the user enjoys using the software. Many of the questions in this category are based on the SUMI methodology.

Microsoft Dynamics users scored Microsoft 17% higher than SAP users scored SAP in this category (Figure 4).

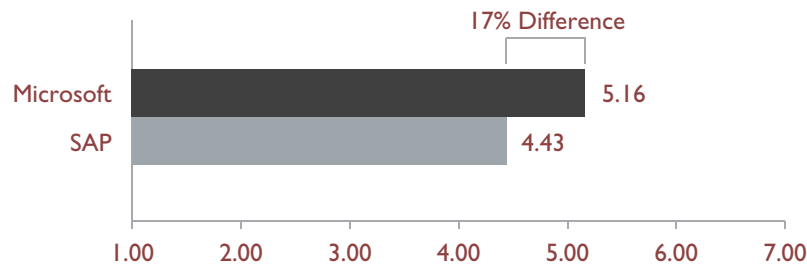


Figure 4. "Usability" Category Score

High usability scores drive user adoption and reflect users’ tendency to actually use an application, meaning significant investments are actually put to work, rather than sitting on the shelf.⁷ An application’s value to an organization and its impact on business performance can be maximized through greater application ease of use. This has practical implications for ERP installations in which, as AMR Research has stated, only 15% of employees on average have access to the system.⁸ A high usability score can translate into greater usage, and it is reflective of a user’s tendency to “explore” an application, to discover and utilize features and functionality with which the user is not yet proficient. Highly usable applications, therefore, inherently encourage users to extract more value from the application through more frequent and broader use.

⁷ This parallels the findings of the Forrester report referenced in the introduction, which states “Increasing usability increases user adoption for the applications, and the faster users begin relying on the system to perform their jobs, the earlier project ROI should be realized.” *Put Business Applications To The Usability Test*, Forrester Research 2006

⁸ *The Enterprise Planning Spending Report 2005-2006*, AMR Research 2005

Familiarity

Familiarity measures the user’s perception of how intuitive the application feels, how easy it is to learn, how quickly they can become proficient with the application, and how comfortable they feel using it.

Microsoft Dynamics users scored Microsoft 24% higher than SAP users scored SAP in this category (Figure 5).

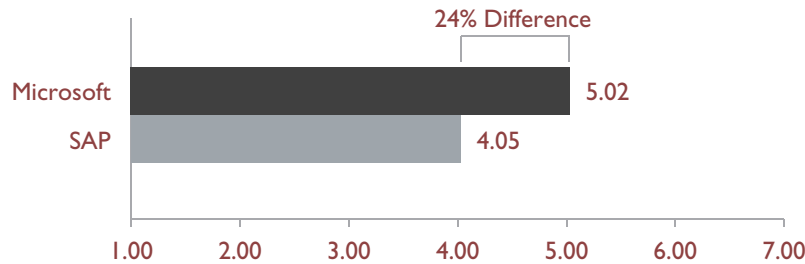


Figure 5. “Familiarity” Category Score

Adoption is accelerated and training time is minimized by applications that feel familiar to users, that are similar to other applications they use, and that offer intuitive interfaces, features, and functions. Users learn “familiar” applications without extensive formal training and quickly attain a high level of proficiency in performing their jobs. They are rapidly productive at an individual level, which contributes to productivity at departmental and business levels. Low barriers to learning also contribute to higher adoption rates among users. “Familiar” applications encourage users to explore the software and enable them to find and utilize “new” functions and capabilities, further enhancing business productivity.

One individual who had never used a computer before learning her company’s ERP system commented on the importance of an intuitive user interface, reporting that: *“It took me about a month to become comfortable doing payroll”* (Microsoft Dynamics Payroll User).

Transactional Efficiency

Transactional Efficiency measures the user’s perception of how easy it is to execute common and repetitive tasks, the efficiency of the interface as it pertains to those common tasks, and the speed and reliability of the software.

Transactional efficiency is the category with the smallest difference between Microsoft and SAP user perceptions. Microsoft Dynamics users scored Microsoft 8% higher than SAP users scored SAP in this category (Figure 6).

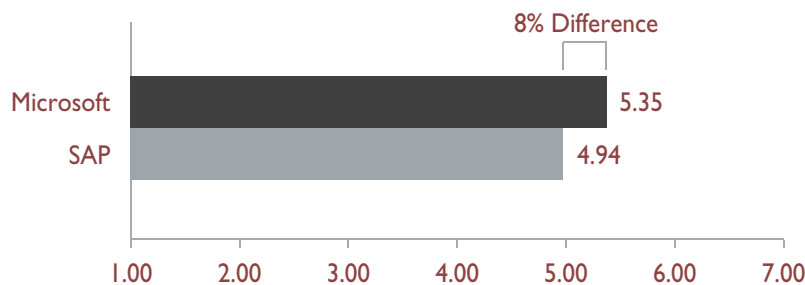


Figure 6. “Transactional Efficiency” Category Score

Transactional efficiency perhaps best represents the “classical” approach to ERP applications, with a substantial focus on repetitive, volume-oriented operations. It is also an area emphasized in feature comparison evaluation methods. While this is a traditional area of focus for companies trying to differentiate their applications, the low level of differentiation found between Microsoft and SAP in this study suggests that both vendors’ applications are well evolved in this respect. While transactional efficiency is critical, this study asserts that end user productivity is about considerably more than individual performance on isolated tasks.

Flexibility

Flexibility measures the user’s perception of how easy it is to execute infrequent or unusual tasks in the application, how easily the software can be adapted to meet specific new business needs and processes, and how agile the software is in handling problems that arise unexpectedly.

Microsoft Dynamics users scored Microsoft 27% higher than SAP users scored SAP in this category (Figure 7).

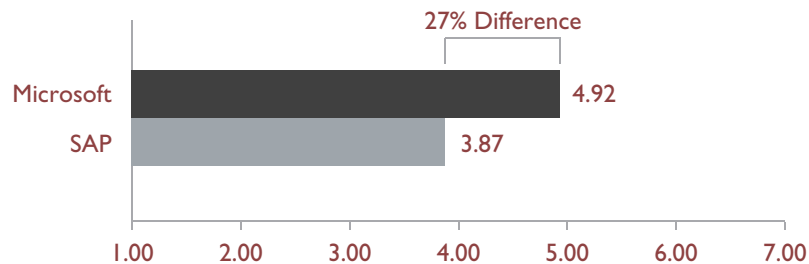


Figure 7. “Flexibility” Category Score

Departing from “transactional” tasks to solve unusual problems or complete ad-hoc tasks translates into decision-making agility, responsiveness to changing business needs, and addressing critical challenges quickly and flexibly. Flexibility also measures the extent to which software can be easily and cost-effectively tailored not only to a specific industry’s needs, but further to an individual company’s needs. The software’s ability to support such tasks is critical to business productivity.

Business Insight

Business Insight measures the user’s perception of how well the software enables easy and comprehensive reporting, access to real-time information, visibility into cross-departmental information, and the ability to gauge the impact of business decisions.

Microsoft Dynamics users scored Microsoft 13% higher than SAP users scored SAP in this category (Figure 8).

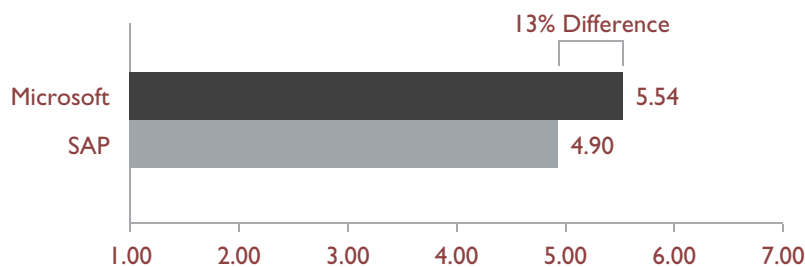


Figure 8. “Business Insight” Category Score

Applications that drive Business Insight deliver more accurate, relevant, and timely data to end users. As users take advantage of this information, they extend their usage of the software beyond basic, repetitive tasks to making well-informed business decisions. The more applications deliver information in the context of the processes for which a user is responsible, the more likely that users can make accurate decisions faster.

One survey respondent said of the importance of business insight: “[Before we implemented our ERP system], the worst part was reporting. We were responding months if not years after data input. Now, I can get information to the executives: ‘here’s what you are going to do next year based on deposits we have now. It allows us to be more proactive in terms of decisions we make in marketing, employment levels, cost, operations... we are now looking at today and tomorrow because we have real-time data, not data that is a year old. Everything is coming together” (Microsoft Dynamics Executive User).

Collaboration

Collaboration measures the user’s perception of how the software helps them work and communicate with their colleagues; share and review work; and communicate with suppliers, partners, and customers.

Microsoft Dynamics users scored Microsoft 20% higher than SAP users scored SAP in this category (Figure 9).

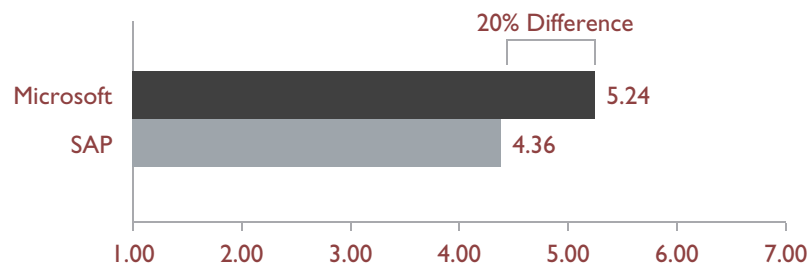


Figure 9. “Collaboration” Category Score

Businesses rely not only on tight communication and collaboration within a given department (for instance, between a manager and his or her direct reports or on a project team), but also across functions within their organization, or across organizational boundaries (for example between suppliers, partners, and customers). Applications that help end users collaborate – up, down, and across their department, company, and industry ecosystem – increase their productivity and the health of their companies and business ecosystems.

Conclusion

Our intent is that this whitepaper serve to focus attention on the interplay between application ease of use and business performance and to highlight the impact applications can have on end user productivity. The business productivity measurement framework used in this study provides a useful mechanism to gauge the perceptions of actual end users and to benchmark the applications according to the six productivity dimensions we have advanced. Three major points emerge from this study:

- The importance of user productivity should be significantly elevated in software purchase decisions. User attitudes are of prime importance, equal to feature/function comparisons. Indeed, users must feel comfortable using advanced application functionality if it is to benefit the organization. This study, therefore, has broad implications for companies who are in the process of developing selection criteria for use as a basis for evaluating ERP systems.⁹
- High user productivity is driven by more than an appealing user interface and must be evaluated on multiple dimensions. This study provides a framework to assess how well applications meet user needs along six major dimensions: Usability, Familiarity, Transactional Efficiency, Flexibility, Business Insight, and Collaboration.
- Applications differ in their ability to make features available, usable, intuitive, and valuable to end users and high marks in these areas positively impact user productivity. Respondents in this survey scored Microsoft applications higher across the board than they did SAP applications.

We hope that this framework proves valuable for those considering application purchases, and that it encourages the industry as a whole to dedicate itself to furthering end-user productivity in all its dimensions.

About Keystone Strategy

Keystone Strategy is a market research firm with offices in Boston, Massachusetts; San Francisco, California; and Salt Lake City, Utah. The firm is focused on business strategy, technology, operations management, and expert witness testimony. More information about Keystone can be found at www.keystonestrategy.com.

About Dr. Marco Iansiti

Dr. Marco Iansiti is the David Sarnoff Professor of Business Administration at the Harvard Business School. He is an expert on technology and operations strategy and the management of innovation. His research has focused on technological innovation, product development, entrepreneurship, and operations—specifically the drivers of productivity, flexibility, and adaptation in organizations. Professor Iansiti has advised a variety of Fortune 500 firms and is a member of the board of directors of Keystone Strategy, a consulting firm he co-founded, and of Eurizon Financial Group, a European Asset Financial Services Firm with more than \$300 billion in assets under management.

⁹ This finding is echoed by Forrester, which concluded that "...before buying or building a new software application — or when making the decision to overhaul an existing implementation — firms should evaluate application usability as a critical component, right along with technology, architecture, and functional breadth and depth." *Put Business Applications To The Usability Test*, Forrester Research 2006.