Report on Standards for
Software Identification and Entitlement

Survey: SAM Pros See High Demand for
ISO 19770 Standards

Distribution of this report in print is made possible with support from:

altiris.com/products/AssetCMDB.aspx

**adobe.com/elicensing/
licensemanagement/sam/**

microsoft.com/sam

symantec.com

Contents

Acknowledgments

The International Business Software Managers Association's (IBSMA) entry into the world of ISO standards development is an adventure that began in September 2005 when Juan Fernando Rivera (Director, Worldwide Software Asset Management, Microsoft), encouraged me to explore the topic. Exploration led to many meetings and phone conversations with ISO Working Group 21 members David Bicket, David Dery and others, as well as introductions to the British Standards Institute, Investors in Software and others in the United Kingdom's SAM community. The U.K. leads the way in software asset management practice and commitment to standards development. We look forward to building solid relationships and to bringing knowledge and expertise to North America.

I want to thank the IBSMA SAM Standards Committee members and other contributors for their efforts to compile the data in this report. I also want to acknowledge the valuable input of everyone who attended our meetings last summer. The following companies participated in the committee's work:

Adobe Systems	IBM	Oracle USA
BDNA Corp.	KPMG	Questra Advisors
CA	Macrovision	Sassafras Software
Centennial Software	ManageSoft Corp.	Symantec
Express Metrix	Microsoft	

And special thanks to these individuals for extra effort:

Juan-Carlos Colosso, Adobe Systems	Steven Klos, ManageSoft Corp.
Rohit Thukral, BDNA Corporation	Butch Sakashita and Ryan Tanaka, Questra Advisors
Kris Barker, Express Metrix	John Tomeny, Sassafras Software

I look forward to continuing our work on standards for software asset management and to the next phase of this adventure.

Steven Russman
Publisher, ECP Media
Founder, IBSMA

Introduction

Software publishers use so-called software tags to carry important identification information about their products. In principle, these digital identification files should make software asset management an easier task, because auto-discovery tools or operating systems can read them to identify the product for inventory and determine what usage rights an end user has, among other things. However, in practice a lack of standards or naming conventions limits software tags' utility. Instead of making SAM easier, inconsistent tagging complicates the job of software asset management.

Software publishers, their customers, IT service providers and tool vendors all have a stake in adoption of standards for uniform software tagging. Software companies can offer products with industry-standard identification mechanisms. Consistent labelling will improve inventory management and identification and ease compliance auditing. End users benefit for the same reasons, and in the process, shift some of the work of reconciling software inventory to the publishers, where many end users think it belongs. This report looks at efforts underway to create an effective standard for software identification tags.

The Background

In May of this year the International Organization for Standardization released ISO 19770-1, the first international standard for software asset management. Covering 27 process areas, it was developed to enable an organization to prove that its SAM program complies with corporate governance requirements. Part one closely aligns with ISO/IEC 20000, the standard for IT service management processes that was published by the ISO (www.ISO.org) as a joint standard with the International Electrotechnical Commission (IEC, www.iec.ch) on December 15, 2005. The new standard replaced BS 15000, developed by the British Standards Institute. However, neither ISO 20000 nor part one of 19770 addresses software tagging.

Early this year, a group of experts from the private sector began work on a proposed second part of the ISO 19770 standard to specifically cover software tagging. In July this group, the ISO/IEC/JTC1/SC7* Working Group 21 on software asset management standards, appointed the International Business Software Managers Association to direct the project definition phase.

During this phase, completed in September, the IBSMA conducted a series of public information sessions in Chicago, Dallas, London, New York, Santa Clara, Calif., Seattle, Toronto and Washington, D.C. More than 120 IBSMA members and ECPweb subscribers attended, representing major end-user corporations, consultancies, business-software publishers and software asset management tool providers. The IBSMA conducted an online survey to gauge public awareness and opinions on ISO 19770 standards for software asset management, and its adoption. Eighty-eight individuals representing organizations worldwide responded, and survey results are reported here. The IBSMA formed a SAM Standards Committee that met weekly to discuss and define the proposed ISO 19770-2 standard and consider input from the public sessions and survey.

This report summarizes the committee's feedback, which was overwhelmingly positive, and offers recommendations. We also look at targets for development, tag details, scope, stakeholders and business benefits. The second part of this report is an analysis of survey results of perspectives on ISO SAM standards.

---

*JTC1 is the joint technical committee of the ISO and IEC. SC7 is a technical subcommittee of JTC1 responsible for software and system engineering.

The Mechanics of Standards for SAM

Standards and certification

Standards are norms and guidelines established by authority, custom or general consent, with input from individuals and groups across a wide array of industries and professions. They can address the quality or integrity of a product or process, or a person's knowledge in a subject area. In the ISO certification process, independent auditors conduct evaluations and inspections to verify that the standard's criteria are met. Organizations, individuals, services or products may be certified as conforming to (or complying with) a standard.

Accreditation bodies, such as ANSI (the American National Standards Institute) and UKAS (the United Kingdom Accreditation Service), which vary by standard, country or profession, are the most common means of comparing conformity assessments, typically ensuring the quality of the assessment process, overseeing training and education of assessors. The membership of the ISO, the premier international standards body, includes national bodies such as ANSI, the sole U.S. representative.

Respondents to the ECP survey reported that organizations were unlikely to undertake standards-compliance programs unless compelled by law or business factors, citing reasons that included cost and uncertain benefits. Organizations often take steps to comply with standards but do not proceed though a formal certification process; however, in some cases the drive to certification can be compelling. For example, organizations rushed to get certified in ISO 9000, which addresses quality management and quality assurance, because it was seen as a prerequisite for doing business in some markets. The ITIL® (Information Technology Infrastructure Library) process framework for IT service management is, in fact, not a standard, but adoption is often perceived as a differentiator by customers, financial analysts, suppliers, government agencies and auditors, particularly in certain industries, such as insurance and banking. Regardless of motivation, efforts to comply with standards are likely to improve the overall state of practice, and awareness of a particular technical issue or area.

ISO 19770-1: The standard for SAM processes

The ISO 19770-1 standard marks a shift toward outcome-based IT standards, encouraging multiple approaches to SAM implementation, depending on an organization's context. The standard is organized around 27 process areas, which include three ITIL processes (change, incident and problem management), as well as control, planning and implementation, inventory, verification and compliance, and operations management and interfaces. Despite the flexibility on approaches, the standard takes an all-or-nothing position on compliance. Only organizations demonstrating proficiency in all 27 processes can claim full conformance. This is likely to limit the pool of qualified candidates, and we explore this in more detail in the section on survey results.

Certification in ISO 19770-1 offers no guarantee of compliance with any law, nor does it guarantee compliance with contractual obligations, including software licenses. It does, however, indicate a strong likelihood the organization will have processes and personnel in place to inventory

its IT infrastructure and reconcile software-use entitlements. Software publishers and compliance officials looking for prospects to audit are unlikely to find disorderly records and major areas of noncompliance in an organization where senior management has devoted time and money to ISO 19770-1 certification.

In the United Kingdom and Europe where process-focused IT initiatives are more firmly rooted, there is demand for ISO 19770-1 certification, although there is still a lot of work to be done to spread the word about the standard. In the U.K., the Federation Against Software Theft (FAST) and Investor in Software, a U.K.-based advocacy group, have put forth separate certification schemes with the UKAS. An early-adopter program is in the works, and we expect to see accredited certifications in 18 to 24 months. However, in the United States, no organization has announced intent to advance accreditation or certification in ISO 19770 through ANSI. Demand for certification is also limited in Canada.

The case for manufacturer-specific certifications is not yet clear, given the prerequisite of ISO 19770-1 certification, the long lead time to develop accredited certification programs and the absence of well-defined business benefits (i.e., incentives from software companies). Limited-scope manufacturer certification programs not relying on ISO 19770-1 certification are more likely to gain acceptance in the short term.

27 SAM Process Areas Described in ISO 19770-1

Organizational management processes

Control environment
- Corporate-governance processes
- Roles and responsibilities
- Policies, processes and procedures
- Competence

Planning and implementation
- Planning
- Implementation
- Monitoring and review
- Continuous improvement

Core SAM processes

Inventory
- Software asset identification
- Software inventory management
- Software asset control

Verification and compliance
- Software asset record verification
- Software license compliance
- Software asset security compliance
- Conformance verification

Operations management and interfaces
- Relationship and contract management
- Financial management
- Service-level management
- Security management

Primary process interfaces for SAM

Life-cycle process interfaces
- Change management
- Acquisition
- Software development
- Software release management
- Software deployment
- Incident management
- Problem management
- Retirement

ISO 19770-2: What's Driving Demand for a Software-tag Standard?

Businesses need software-identity information to be available for all software installed or running on any computer or operating system. Many tools can identify software installations running on Microsoft Windows, with varying results from tool to tool. A careful shopper, with time and plenty of money, can purchase a tool that will correctly identify a high percentage of titles*. However, software running on other operating systems (i.e., UNIX and LINUX) is not as easily identified (assigned a title) by end users and auto-discovery tools. A standard method that works across multiple computing platforms and operating systems will make the work of the SAM administrator and tool provider easier by bringing order and consistency to what's installed on a computing device.

Opportunities exist for consultants and outsourcers to assist end users in developing and implementing SAM processes and programs. Companies that make tools for managing software, including auto-discovery tools, contract repositories, configuration management databases and software libraries or content services, stand to gain much if ISO 19770-2 is adopted. The process of identifying software will become easier, potentially freeing up resources for tool vendors to enhance usage monitoring, reconciling and reporting functions.

Although software-use entitlement (a right to benefits specified by law or contract) is outside the scope of the software tag, improvements in inventory accuracy can only improve the process of reconciling entitlements and installation (or software use).

Businesses need a means to show software titles installed on a computer system and the relationship among titles licensed as a group. Identifying software should provide details on which product group, or component of the group, has been installed on a computing device. The means to show the relationship could be indicated by an identifier (i.e., a licensing key) entered during the installation process. In this context, "licensing key" means a code or unique string provided by the software publisher and usually programmed to activate the base product, features and options licensed by the end-user entity. Another means to show the relationship could be provided by "Component of" and "Complex of" identity elements. In this context, "Complex of" identifies the parent or top level of a group. The components that make up the group identify themselves as components of the parent complex.

*Rates of identification accuracy of auto-discovery tools can vary between organizations and when using different tools in a single organization. Factors such as network access, agent or agent-less scanners and software identification techniques account for much of the variance.

Component of and Complex of: This example applies to product groups or suites. An end user installed Productivity Office Professional (Complex of) using an installation CD and licensing key. The add/remove programs menu indicates that Productivity Office Professional (the product title) is installed, but not the titles of the components contained in the suite. The suite consists of the following product titles: Words, Charts, E-mail and Website. The auto-discovery tool reports the individual product titles (Component of). Using the relationship identity elements of the software tag, the auto-discovery tool or operating system could be programmed to identify the suite as well as the individual titles installed.

Depends on parent and Parent: This example applies to product titles that depend on another (Depends on parent) and for product titles that determine use or activation of dependent titles (the Parent). An end user installed Mathlabs Professional (the Parent) and Mathlabs Statistics (Depends on parent). The end user uninstalled Professional, disabling Statistics. The reason for this is that Statistics depends on Professional for its use or activation. Relationship identity elements (Depends on parent/Parent) allow the end-user and tool provider to determine that the two product titles are linked.

Upgrade from version: This example applies to product upgrades that depend on lower-level versions. Document Reader Standard 8.0 Upgrade (Upgrade for) can be used to upgrade a range of product versions. In this example, v. 5.X (Upgrade from version – lower range) to v. 7.X (Upgrade from version – upper range) may be upgraded using v. 8.0 Upgrade. If this upgrade is installed, the administrator will be able to determine which product was upgraded (Upgrade for) and if the product version was within the lower or upper range.

(Product titles are fictitious. Refer to Appendix 2 for complete definitions of these terms.)

Defining the Scope of 19770-2

In meetings of software manufacturers, tool vendors and end users, and among members of the IBSMA's SAM Standards Committee, it was agreed that the standard's scope be limited to identity elements, primarily for inventory management. Our discussion of standards for software-use entitlement is included here because it is tightly linked with inventory, both practically and in the work of most software managers. However, entitlements are a separate matter because of the variety of means a software publisher has to define them. Product activation and launch controls (preventing or authorizing use based on publisher-defined parameters) were also not considered essential to identifying software or for inventory management. The committee did propose a set of data elements for entitlement, and IBSMA intends to pursue work on this subject, possibly exploring a separate standard for entitlements. ECP's survey results show strong support for such a standard.

The discussion of inventory and licensing resulted in two broad categories: identity and entitlement elements. Identity elements, either mandatory or optional, represent distinguishing characteristics of the software and signify the common attributes of most software titles and operating systems. Identity tags, created by the software manufacturer, may be changed or altered by end users who are packaging software for distribution, or by programmers when customizing open-source (or other) software. Identity elements are defined in Appendix 2. Entitlements (classified as extended subcategory elements) are discussed in the following section and in Appendix 3.

Some software experts point to the rise in popularity of virtualized applications and software-as-a-service as evidence that a standard for software tagging will be obsolete by the time it is published. Limitations of electronic inventory methods in these contexts may make software tags unusable and the technology may make inventorying unnecessary. For these reasons, virtualized applications running in the Web browser or other categories of software use that cannot be detected or electronically inventoried on the computing device accessing the application, are likely beyond the scope of the proposed standard for software tagging.

Tagging proponents counter that the market for business software is too large and complex to shift quickly. It seems unlikely that networks of terminal servers and streamed applications will replace computers, existing licensing agreements and infrastructure under the careful control of the IT department. Many factors, including the technology used in the above contexts, business requirements of software publishers and their customers, computing infrastructure, and tools for inventorying, monitoring and managing software, will affect growth of software-as-a-service. For the foreseeable future, software tags will continue to be relevant.

Software tag elements can be grouped in three general categories: control, relationship and descriptor. Control elements are for cross-referencing with other data (i.e., entitlement data elements, purchase orders or vendor/supplier invoices). Relationship elements describe the association or linking of the software with something else. Examples include upgrades, product groups or suites and features whose use depends on another's presence. Descriptors are elements describing the manufacturer or product-unique values, such as part number, title, version and language.

Classifying Data Elements

Extended subcategory: These fields, specific to the tag owner, are not predefined in the specification. They are allowed to ensure the tag user can provide specialized or context information (i.e., additional details for a software asset) required for asset administrators or for asset management tools.

Mandatory subcategory: These fields are required for an identity tag to be considered valid or complete.

Optional subcategory: These fields may or may not be provided in the identity tag. Optional tags are provided to allow tag creators to provide more information to ease the burden of the asset administrator or asset management tool.

(Refer to Appendix 1 for complete definitions of these terms.)

SOFTWARE-TAG IDENTITY ELEMENTS	
Groups	Tag element
Control	Control
	Licensed
	Packaged by
	Serial number
Relationship	Complex of
	Component of
	Depends on parent
	Parent
	Upgrade for
	Upgrade from version — lower range
	Upgrade from version — upper range
	Usage identifiers
Descriptor	Abstract
	Category
	Language
	Manufacturer name
	Manufacturer part number or stock-keeping unit (SKU)
	Product license version
	Product title
	Product version

Optional Software-release Tags

This set of optional tags provides details that a software manager may want to know about software received, or they could be applied to software packaged for distribution or installation. Software-release tags are aligned with IT service management change- and release-management processes. Definitions are included in Appendix 2.

OPTIONAL SOFTWARE-RELEASE ELEMENTS
Release-package by
Release-package signoff
Release-package signoff date
Release-tested by
Release-tested signoff
Release-tested signoff date
Release-production signoff
Release-production signoff date

Software-use Entitlement

Entitlement elements describe usage rights specified in the software license agreement (i.e., license term, fees, installation, location, etc.). Entitlement data is provided by the software publisher or other authorized party (i.e., the reseller or distributor). It may come in a separate file, perhaps at the point of purchase, and will share a common attribute or field for cross-referencing with the identity tag. The purpose of this data is to reconcile software inventory (i.e., identity elements) with software-use entitlement to ensure compliance with the contract. It may also be imported into the end-users' asset or contract management repository, providing proof of purchase details to support audit and compliance reviews. Entitlement elements are defined in Appendix 3.

Software-use entitlement elements employ the same three general categories as tag elements: control, relationship or descriptor. Control elements may be cross-referenced with other data (i.e., installations detected on computers) or serve as inputs to software deployment, policy management or license management tools. Relationship elements describe the association or linking of the software with the end-user entity or organization, or purchase order reference. Descriptors are the elements describing the manufacturer or product-unique values, such as part number, license type or supplier name. Additional elements may be added by the provider (e.g., manufacturer), and we hope to develop standard terms for describing and presenting the data. Manufacturer-unique elements may not conform to a standard.

ENTITLEMENT ELEMENTS	
Groups	Tag element
Control	Contract number
	Deactivation date
	Enrollment number
	Exclusions
	Licensing key
	Number authorized
	Overdraft
	Serial number
Descriptor	License type
	Manufacturer name
	Manufacturer part number or SKU
	Supplier part number or SKU
	Supplier name
Relationship	Organizational unit
	Purchase order

Conclusions and Recommendations

Correctly identifying software is the foundation of inventory management, contributing to compliance with a host of legal, financial and contractual obligations. The IBSMA committee concluded that businesses need software-identity information for all software installed or running on any computer or operating system. It concluded that a standard for software tagging must consider installed software as well as new, but stopped short of describing the methods for implementing the standard. Methods for implementing standard software tags are likely to differ for new and installed or legacy software, and may employ existing technologies and those not yet commercially available. The committee will address these details during the next project phase, the actual writing of the standard.

End users are demanding software-identification standards that make the job of inventorying and managing software and entitlement easier. Software manufacturers, auto-discovery and systems-management tool vendors and IT services companies also stand to gain from more accurate inventory functions. Easier-to-manage products, better quality data for reports, and optimal tools will generate sales for software companies. Finally, consistent standards for software-use entitlement will pave the way for uniform management of software licensing, usage-based pricing and easier-to-automate license management.

Our report continues in the next section with an analysis of survey results of perspectives on ISO SAM standards.

Survey: SAM Pros See High Demand for ISO 19770 Standards

Our recent survey of IT managers on the question of ISO software asset management (SAM) standards reveals a strong consensus on the need to establish standards for SAM processes, inventory identification and software-use entitlement. The adoption of such standards now or in the future will largely depend on the perceptions of the businesses and governmental organizations that these standards will affect. Many IT managers will design processes and procedures, hire consultants and implement tools in an ongoing effort to improve their SAM capabilities and comply with the standard—all good intentions, but quite a different matter than the rigors of a compliance-certification program. Lacking a legal requirement or compelling business reason to comply with the standard, many organizations will take the slower approach to adoption of ISO 19770-1. Many North American managers are keeping a close eye on the United Kingdom, where accreditation and certification programs are currently progressing through the approval process.

The second part of the standard covers software tagging. The adoption of this standard will depend on the voluntary compliance of software manufacturers—but for most, old habits die hard. Industry leaders will continue to pave the way, as long as they have strong business reasons to produce software that conforms to the standard. (Just imagine the effect if federal governments, industry giants and the military joined forces to mandate that software bought for their use comply with industry-standard tagging methods!)

Support for the adoption of a software tagging standard seems unanimous among software manufacturers, tool providers, end users, consultants and IT service providers. The widespread demand for a standard method of labelling software-identity elements is being driven by its promise to increase the accuracy of software inventory management, and to reduce the time and cost involved in reconciling software-use entitlement.

This report contains a review and analysis of responses to the ECP survey entitled *Perspectives on ISO 19770-1 and 2.* The survey asked questions that ranged from managers' general awareness and acceptance of the ISO standards, to questions about purchasing tools and software that align with ISO 19770. We also asked about the likelihood of organizations and practitioners to undertake certification efforts, the value of embedded license controls, and the specific content of the standards.

Methodology

In July and August of this year, some 88 IT managers from a wide range of organizations around the world answered an online survey of questions covering perspectives on ISO 19770-1 and 2. Respondents were asked to rank their agreement or disagreement on a scale from 0 to 10 (10 being strong agreement). Many entered comments at the conclusion of the survey, and some are reported here.

The pool of respondents included IT professionals primarily involved with software asset management, qualified by their membership in the IBSMA (the International Business Software Managers Association) or by their interest in the topic. A selection of the respondents' titles is included on p. 13. Many respondents work in software asset management, compliance, change and configuration management or purchasing, and/or manage or supervise these functions. Close to half of the respondents had not previously completed an ECP survey. Fourteen percent of the respondents identified themselves as software publishers; 8.1 percent as SAM tool providers; 11.6 percent as consultants; 14 percent as IT service providers; 36 percent as end users and 16.3 percent as "other."

Because the audience was a self-selected one, the respondents are likely to be more familiar with ISO 19770 than a more broadly based group would be. Since our purpose was to gauge the relative likelihood of adoption of the standard, the perspectives of respondents already familiar with the topic were especially valuable. Early adopters are likely to be those already familiar with ISO 19770, and this group will help bring about acceptance of standards for software asset management.

| SELECTED TITLES OF RESPONDENTS |
| --- |
| Asset Management Analyst |
| Business Unit Manager |
| Change and Configuration Manager |
| Compliance Manager |
| Contracts Manager |
| Director, Software Compliance |
| Director, Software Asset Management |
| Facility Manager |
| Global License Compliance Manager |
| Global Technical Manager |
| Infrastructure Analyst |
| Inventory Specialist |
| IT Asset Manager |
| IT Licensing Administrator |
| IT Manager, Procurement and Asset Management |
| Manager of IT Asset Tracking |
| Manager of Technology and Compliance |
| Manager, IT Procurement and ITAM |
| PC Licensing and Asset Administrator |
| Process Owner, Configuration & Asset Management |
| Project Lead |
| SAM Consultant |
| SAM Practice Manager |
| Senior Business Analyst |
| Senior Program Manager |
| Software Administration Team Lead |
| Software Asset and License Manager |
| Software Compliance Specialist |
| Software Licensing Manager |
| Senior Software Engineer |
| Strategic Purchasing Supervisor |

| RESPONSES BY COUNTRY OF RESIDENCE	
Australia	2
Belgium	2
Canada	4
Germany	4
Mexico	1
Netherlands	1
New Zealand	1
Norway	1
South Africa	1
South Korea	1
Sweden	1
Switzerland	1
United Kingdom	10
United States	58
Total	88

Results

Awareness of ISO 19770 Standards (Questions 1, 2 and 3)

The survey asked respondents to evaluate their awareness of industry efforts to define software asset management standards, as well as their familiarity with part one of the standard (covering SAM processes) and part two (covering software tags). The survey indicates a general awareness of industry efforts, but lower awareness of 19770-1 and especially 19770-2 indicate there is much work to be done to educate both those interested in the topic and the broader audience of IT professionals.
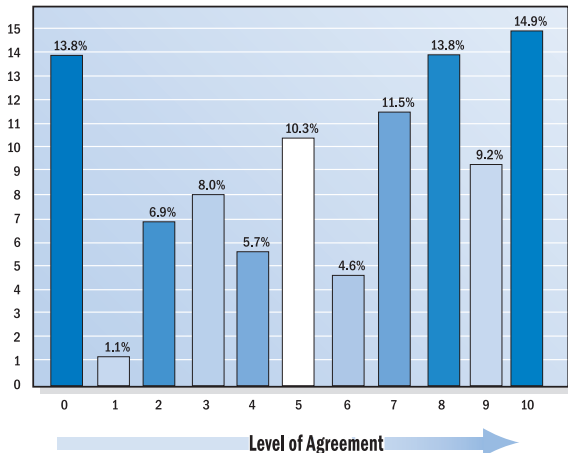
Question 1. Are you aware of industry efforts to define software asset management (SAM) standards under ISO?

Level of Agreement
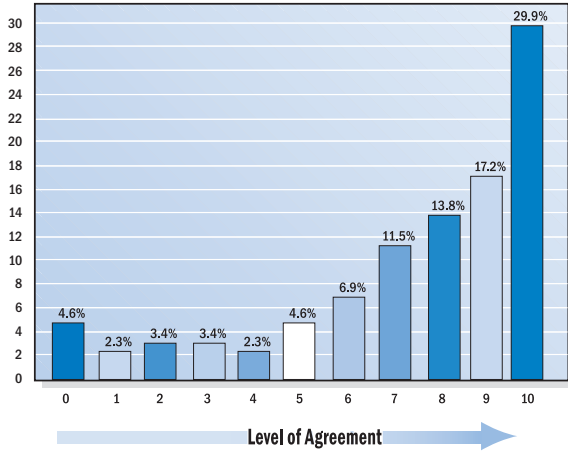
Question 2. Are you aware of ISO 19770-1, published in May 2006, covering 27 SAM life-cycle processes?


Level of Agreement
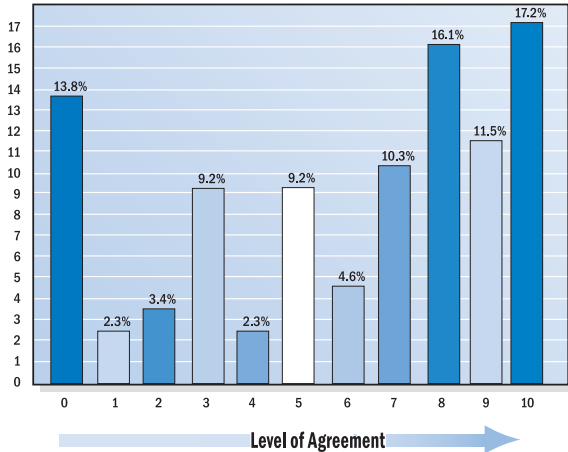
Question 3. Are you aware of ISO 19770-2 and industry efforts to create a standard for software tagging?


Level of Agreement

Support for the ISO Effort (Questions 4 and 5)

Support for the establishment of processes and software tags is very strong, with more than 90 percent of respondents rating the benefits at 7 or higher. Another question asked to what degree respondents' organizations would support, promote or undertake efforts to comply with ISO 19770-1. Seventy-six percent responded with a rating of 7 or higher, indicating a reasonably strong conviction that their organizations will support adoption of and compliance with the standard. However, answers to a subsequent question about the actual intentions of organizations indicate that efforts to comply do not necessarily translate into plans for organizational certification.

Question 4. Do you think organizations benefit from standards for SAM processes and software tagging in the form of an internationally-recognized ISO standard?

Level of Agreement
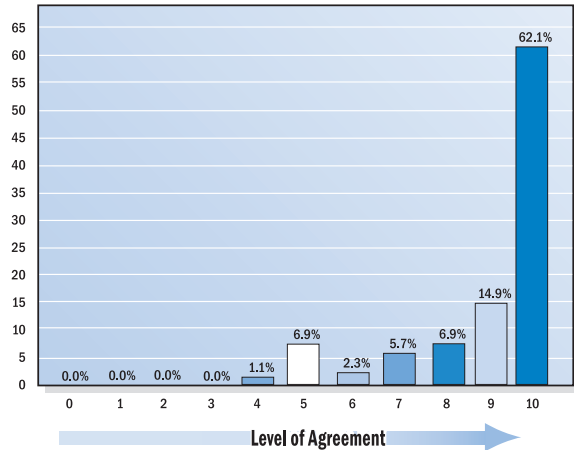
Question 5. To what degree would your organization support, promote or undertake efforts to comply with ISO 19770-1?

Level of Agreement
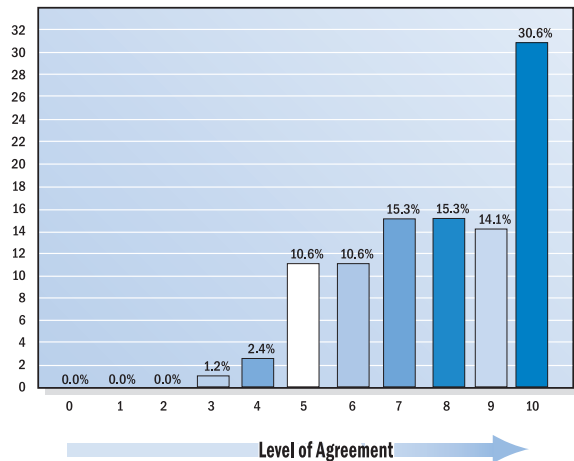
## Purchasing Tools and Software that Complement ISO 19770 (Questions 6 and 7)

Perhaps an even more reliable measure of support for ISO 19770 is how users feel about purchasing SAM tools that comply with the standard. We asked whether they would be more likely to buy a SAM tool if it complies with ISO 19770-1 or -2, whether they would exclude a tool that did not comply, and if they would be willing to pay a premium for the additional functionality. Our intent was to test whether the preference for IT service management tools that align with the ITIL framework would apply here. The results indicate a strong perceived value on the part of buyers for tools that align with ISO 19770.

Software asset repository, license management and auto-discovery tools can, in theory, align with or conform to some or all of the 27 process areas outlined in ISO 19770-1, for instance, programmable workflow and audit and history tracking. For 19770-2, the proposed standard for software tags, conformance by auto-discovery and repository tools could mean built-in filters and data-normalizing programs that would present tag data from "compliant" and "noncompliant" software in a consistent manner. Essentially this is what many tools currently do, although presentation varies from tool to tool. Perhaps "compliant" tools will stick to the format described by the tag standard.

It is too soon to tell if any of this will come to pass, or how. One thing, however, is certain; customers for SAM tools will continue to place a higher value on "compliant" products. Some 82 percent of our respondents indicated by a score of 6 or more they would be more likely to buy such tools, and a number of these (26 percent of all respondents) gave it an enthusiastic 10. Although more likely to buy these products, 66 percent of all respondents, by giving a rating 6 or more, indicated that they would be likely to exclude a tool that does not comply, indicating that compliance alone is not an absolute requirement. Tool providers may find themselves spending money re-engineering their products to meet new market demands, even though a majority of users (62 percent) are not likely to pay a premium for so-called compliant tools.

As we see in Question 7, end users appear just as likely as not to buy application software that complies with the software tagging standard. But since much of the software in this category cannot be easily replaced with a substitute, we believe the lukewarm rating on this question reflects customers' propensity to choose specific business-application software for reasons of singular functionality.

Question 6. Would you be more likely to buy a SAM tool (e.g., auto-discovery tool, asset management repository, CMDB, etc.) if it complies with the ISO 19770-1 or 2 standard?

Level of Agreement
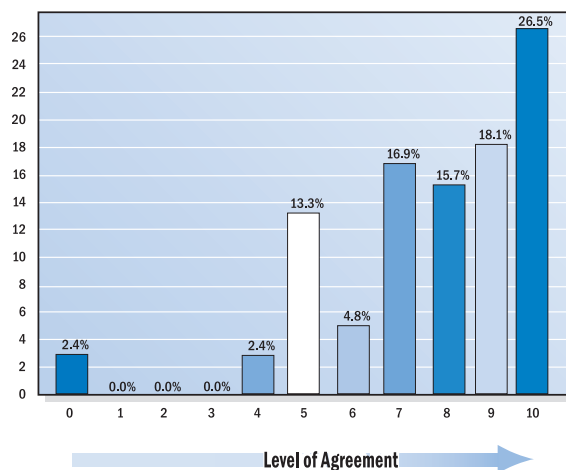
Question 7. Would you be more likely to buy a software product (business application software, such as Microsoft Office, Oracle database, mainframe accounting program, etc.) if it complies with ISO 19770-1 or the proposed -2 standard?

Level of Agreement
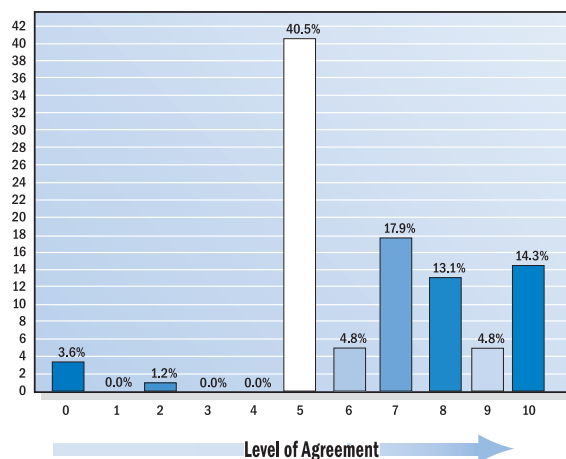
Checking for Agreement on Key Issues

Effectiveness of SAM (Questions 8 and 9)

The charts to the right present key findings from this research effort. Respondents were asked to rate their agreement on a scale from 0 to 10, from strong disagreement (0) to strong agreement (10). Because the questions in this section were very specific, the responses yielded invaluable information, including rich insights into the varied perspectives of different segments within the respondent groups.

Question 8 shows responses to a basic question about the effectiveness of SAM. Considering the group of knowledgeable SAM professionals, one would expect a high degree of agreement, and indeed, the majority of respondents (70 out of 88) answered 9 or 10, indicating the strongest agreement. Clearly, our group believes SAM is good for business.
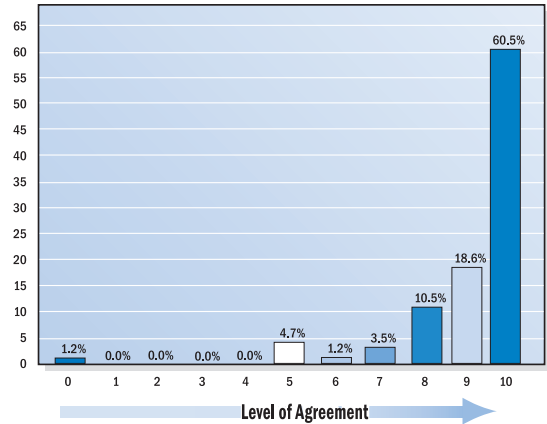
We asked if organizations that follow ISO 19770-1 SAM guidelines can improve SAM competence. Question 9 tells us that 84 percent rated this 7 or higher, signaling strong agreement with the statement. Interestingly, software publishers and SAM tool providers, representing 18 percent of the responses, rated this question lower than did end-user organizations, IT service providers and consultancies. Our inclination is to give more weight to the overall responses of the second group, because of their first-hand knowledge of internal operations and prospects for improvement.

Industry Support (Question 10)

Rated slightly lower, though still showing strong agreement, were responses to the statement that software publishers that support SAM ISO 19770-1 certification are viewed as proactive and audit-friendly. Ratings among all groups of respondents on this question were consistent; 27 percent responded with a 10 and the balance of ratings fell in the 5 to 9 range.

In our earlier surveys of end user attitudes about software publisher enforcement programs, respondents stated they wanted publishers to do more to help their customers manage software-use entitlement. We believe publishers that provide tools and services and promote certification, perhaps through education and training programs, could see improvement in their public image and perhaps a reduction in negative sentiment around enforcement activities. There is no one-size-fits-all approach, and programs will need to be tailored to fit different market segments.

Question 8. Software asset management
is good business, saving money, improving IT service and
a company's negotiation position.

Level of Agreement

Question 9. Organizations that follow ISO 19770-1
SAM guidelines can improve their SAM competence.


Level of Agreement
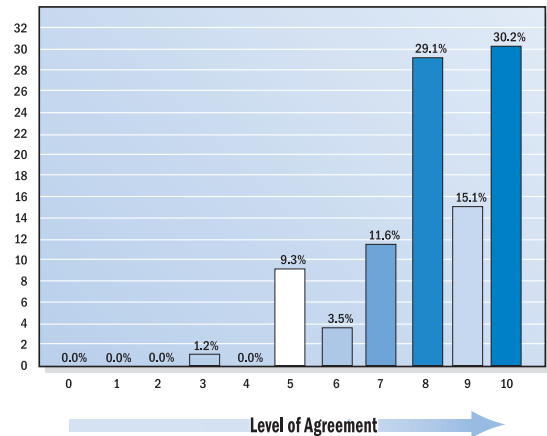
Question 10. Software publishers that support
SAM ISO 19770-1 organizational and practitioner certification
are viewed as proactive and audit-friendly.

Level of Agreement
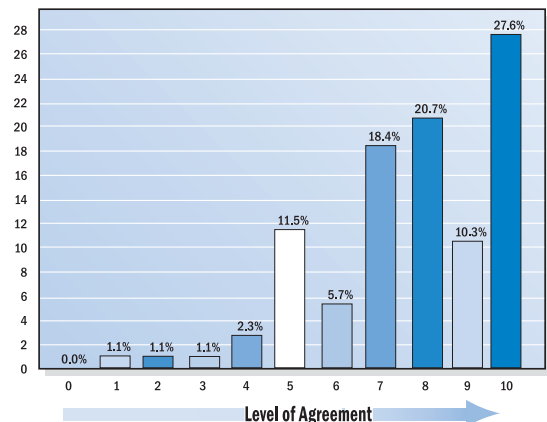
Software Publishers' Audits (Question 11)

The next question asked if publishers have a reduced need to audit customers who are in compliance with or certified on ISO 19770-1. Not surprisingly, end users reported the strongest agreement, followed by IT service providers and consultancies. SAM tool providers' responses were more neutral, and those of software publishers ran the gamut from positive to negative. As a group, software manufacturers are generally a skeptical bunch, resorting to enforcement programs to ensure compliance with their contract terms and to protect their intellectual property. Manufacturers we spoke to, including some of the most well-known, look to ISO 19770-1 certification as a possible means to exclude customers from audit or review. Like everyone else, they are waiting to see how the market for certification will develop. From the end-user perspective, a combination of factors seem to be at work: the newness of the standard and its prospects for certification, general distrust of the audit process and of publishers' motivations, and the absence of actual documented benefits of ISO 19770 organizational certification (i.e., discounts from publishers, auditors' requirements, documented evidence of cost savings).

Question 11. Software publishers have a reduced need to audit customers who comply with ISO 19770-1 SAM processes.
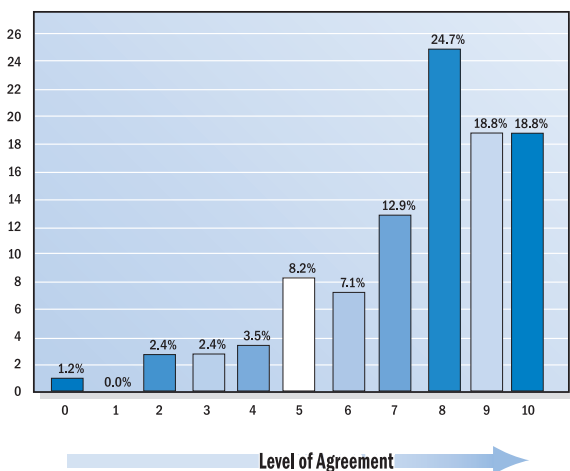
SAM Tools (Questions 12 and 13)

Responses to our question about the likelihood of buying SAM tools that align with ISO 19770-1 showed strong correlation with other research on this topic and with responses to an earlier question in the survey. Given a choice, IT managers prefer tools that demonstrate "compliance" or alignment with standards for performance and functionality, and when selecting tools, tend to rely equally on industry reviews and analysis, and on personal

opinion. End user organizations, IT service providers and consultancies showed the highest level of agreement on this question. SAM tool providers' and software publishers' ratings were lower, possibly indicating skepticism on the matter of alignment, and agreement on a means for comparing tools.

Question 12. I am more likely to buy SAM tools that comply with the ISO SAM standards.
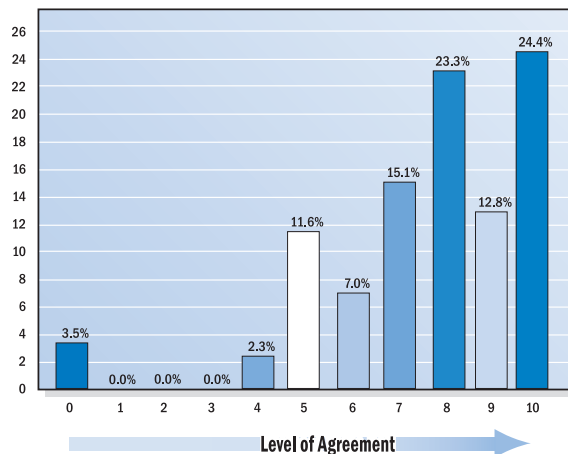
Question 13 reveals stronger agreement (72 percent rated 8 or higher) for the statement that respondents would be more likely to buy a SAM tool that supported their efforts towards ISO compliance. Viewed together with responses in Question 6, this agreement is an early indication that it would be good business for tool developers to build and market products that support SAM processes and align with ISO 19770-1 and the proposed standard for software tags.

Question 13. I am more likely to purchase SAM tools that offer features and functions that support my efforts to comply with the ISO SAM process standards.

17

This coded version is distributed by ECPweb. Unauthorized distribution prohibited.
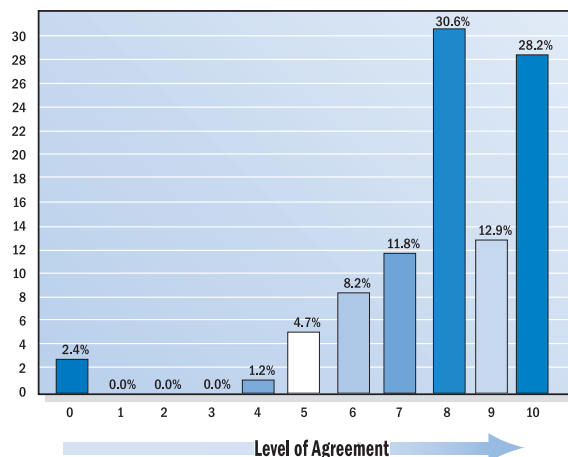
Effectiveness of a Standard for Software Tags (Questions 14 and 15)

The next two questions rated expectations on the effectiveness of a standard for software tags. Both questions showed strong agreement (91 percent gave a 7 or higher rating). In-person reviews and input from ISO education sessions revealed universal approval for software tagging standards. Question 14 addresses the question of software manufacturers conforming to a standard for software tags and Question 15 addresses the value of a standard for software tags. Question 14 reflects a commonly articulated belief expressed by end users that publishers will conform to the standard.

Question 14. Software publishers conforming to ISO 19770-2 will offer their products with consistent labeling that will improve inventory management, identification and auditing.
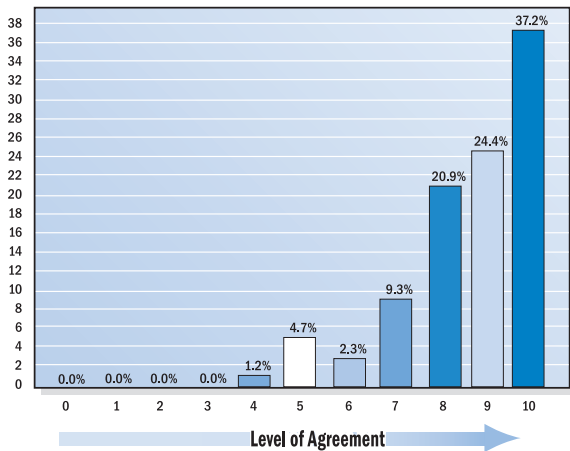

Question 15. Consistent labeling based on ISO 19770-2 simplifies inventory, identification, license management and control.
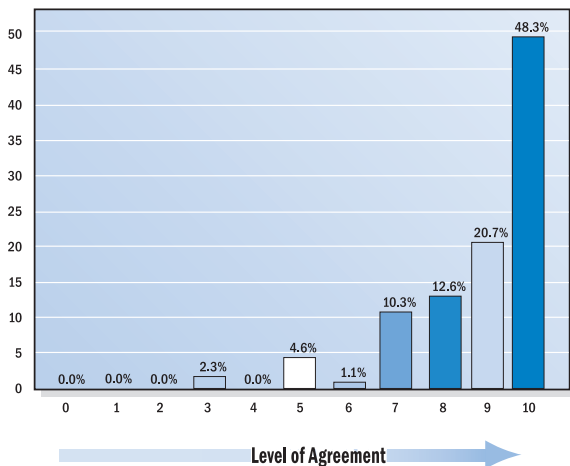
Embedded License Controls (Question 16)

We included one question on embedded licensing controls because of the close association many participants in the public ISO discussion sessions and committee meetings made with software tags. Although outside of the scope of the proposed standard, the topic came up often in meetings and was intensely debated. We wanted to see if our survey respondents also associated embedded license controls with compliance enforcement and software tags, and they did. (Questions in the next section on the scope of the standard also confirm the prevalence of the association.) There was less agreement on the question of embedded license controls than on many other questions, and the wide range of answers indicates very mixed reactions to such controls. End user organizations and IT service providers gave the questions a rating of 7 or more at least 50 percent of the time. Consultancies, SAM tool providers and software publishers showed more mixed ratings with numbers fluctuating from "disagree" (a rating of 2) to "strongly agree" (a rating of 10). Software publishers, the group with the most to gain from licensing controls, showed the greatest variation in responses, indicating that they too have mixed reactions.

Question 16. Embedded license controls are a good method to enforce compliance and entitlement tracking.
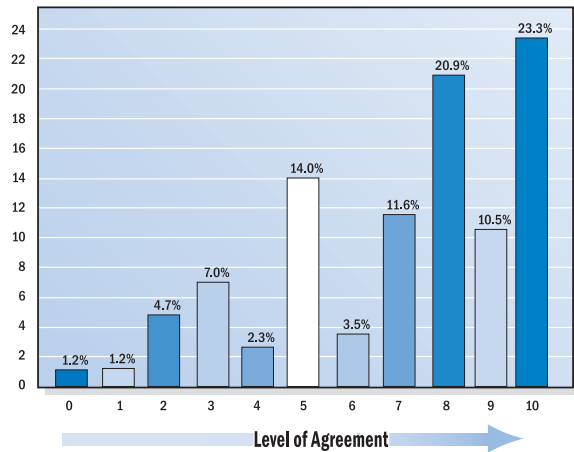
## Scope of ISO 19770-2 (Questions 17, 18 and 19)

We asked three questions about the scope of 19770-2, offering respondents various options for what should be included in the standard. All respondents expected 19770-2 to include standards for field labels (names of fields) and for content of fields (data in the field). The strongest response (Question 17) was for tags with software-use entitlement built in. Although beyond the scope of 19770-2, the desire for standards as well as an automated means to delivering, managing and reconciling software-use entitlements with inventory is clear from the responses. The responses are ranked below, from strongest to moderately strong levels of agreement:

Strongest agreement: 19770-2 should include field labels, content of fields and software use entitlements. Question 17 indicates that 66 percent rated 6 or higher.

Strong agreement: 19770-2 should be limited to include field labels and content of fields. Question 18 indicates 65 percent rated 6 or higher. The midpoint, 5, showed the highest number of responses.

Moderately strong agreement: 19770-2 should include field labels, content of fields, software-use entitlements, and access and execution rights. Question 19 indicates 57 percent rated a 6 or higher. Of the three questions, this had the highest percentage of disagreement (20 percent rated between 0 and 4).

Question 17. 19770-2 should include field labels, content of fields and license entitlements.
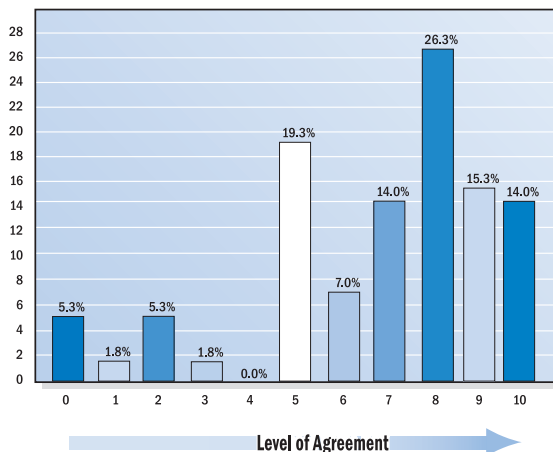
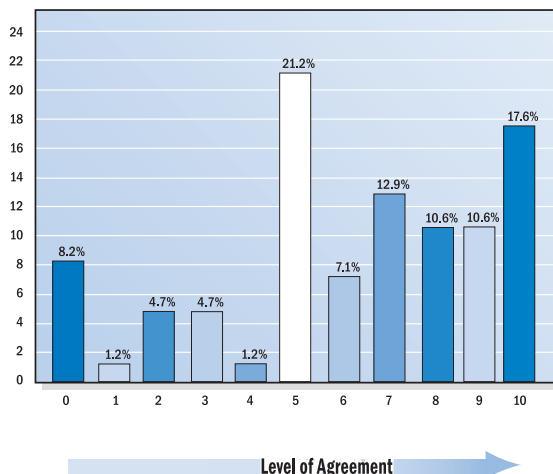Question 18. 19770-2 should be limited to include field labels and content of fields.
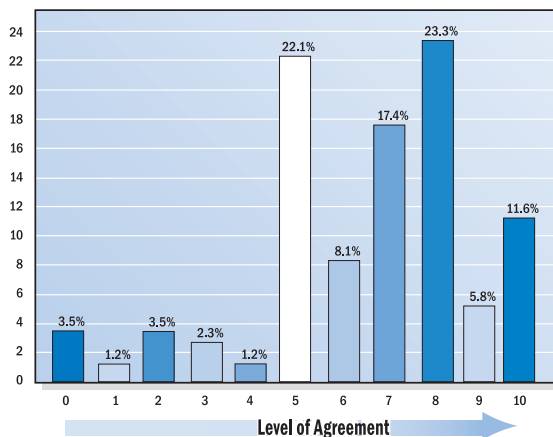
Question 19. 19770-2 should include field labels, content of fields, license entitlements, tracking and access and execution rights.

Training and Certification (Questions 20 and 21)

We gained valuable insight from respondents' opinions about the relative value of training and certification for 19770-1. The results show that many are likely to pursue practitioner training (some 60 percent rated 7 or higher), though ratings do not indicate a commitment to organizational certification. On the question of the likelihood of pursuing organizational certification, relatively few, some 30 percent, rated 7 or higher. Forty-one percent rated at the midpoint (between 4 and 6) and the largest group, 46 percent, rated 5 or less. The midpoint, 5, was chosen by 23.5 percent of the respondents. The survey respondents indicated a higher likelihood of pursuing certification than did participants in direct interviews. On the whole, most practitioner organizations appear to be unlikely to pursue certification in the near term. However, most don't want to be left out, and ratings on the likelihood of pursuing SAM training are higher for courses and training that are aligned with 19770-1 process areas.

Question 20. Are you likely to pursue SAM practitioner certification?

Level of Agreement
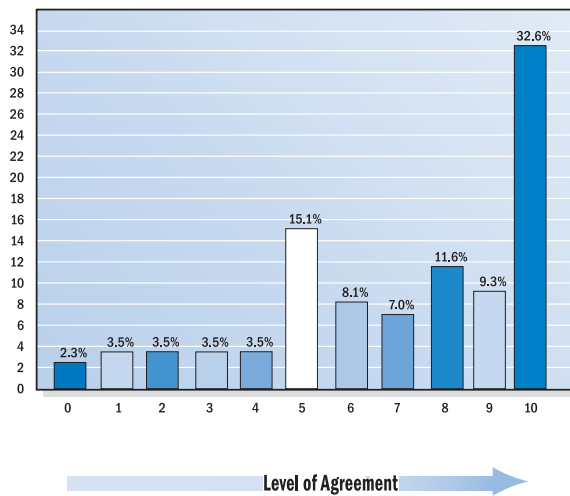
Question 21. Is your organization or company likely to pursue ISO 19770-1 organizational certification for SAM life-cycle processes?

Level of Agreement
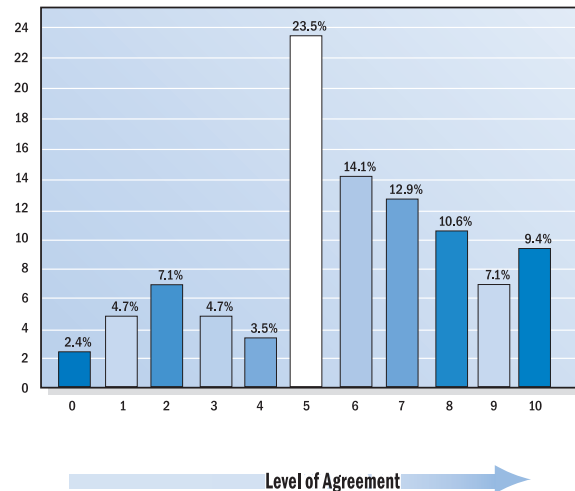
Time and Money

Survey results relating to the amount of time and money an organization would likely invest in ISO 19770-1 certification indicate unrealistic expectations, lack of information on the certification process, or both. For all but the most advanced and mature organizations (or very small companies), preparation for organizational certification is likely to require more than 6 months and costs exceeding $50,000. Getting ready for certification will surely require, at a minimum, training personnel, assigning staff to manage the program and conducting a pre-audit assessment of SAM processes. No organization is likely to implement processes included in the standard without first evaluating the processes in place at their own workplace and revising those processes where necessary. The standard states that in order for an organization to be certified on ISO 19770-1 it must pass a review of all 27 process areas.

It's hard to know what factors are at work in these responses: unrealistic expectations, lack of information on the process, lack of a clear definition of the business benefits of ISO certification, or other factors. IT managers in organizations with mature SAM and IT service man-

agement programs are the only group to show interest in making the required investments at this point. Their responses indicate an interest in ISO 19770-1 organizational certification, and they typically express a desire for an estimate of costs, time for implementation of the standard, and, most important, a clear definition of the business benefits that will derive from implementation.

Question 22. How much time would you be willing to invest in the ISO 19770-1 organizational certification process?

46.3%
Less than 6 months

32.9%
6 months to 1 year

20.7%
More than 1 year
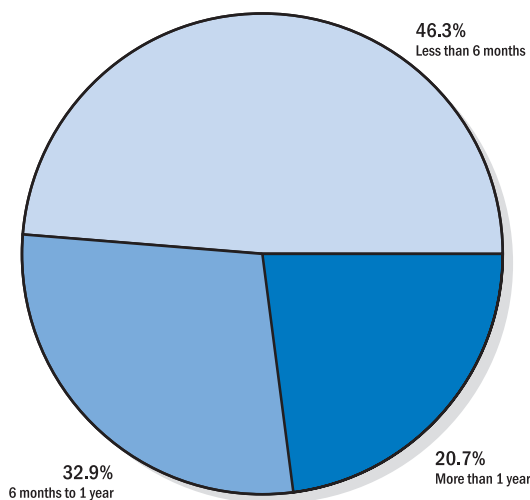
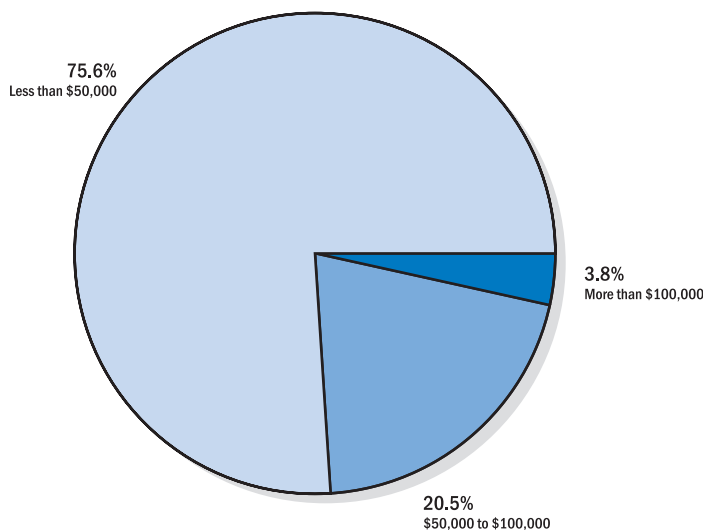**Question 23. How much money would you be willing to invest in the 19770-1 certification effort?**

75.6%
Less than $50,000

3.8%
More than $100,000

20.5%
$50,000 to $100,000

Conclusions

Our survey results reveal strong interest in tools that will complement SAM standards and in the development of programs by software publishers that will make managing software easier. Although a majority of end users are unsure if they will undertake an organizational certification program, they view efforts to comply with the standard as important measures for preparing for the inevitable publisher audits and other compliance reviews. Support for a standard method to label software for electronic identification is nearly unanimous, as is support for a standard method of conveying software-use entitlement information. No one expects software publishers to agree on standards for software licensing or to relinquish the competitive advantage that licensing offers. End users expect—and indications are that they will soon demand—that software publishers offer clear, unambiguous and detailed software-use entitlement information. We expect to see increased movement to create a standard electronic form that customers may use to reconcile software inventory and industry-standard identity tag data.

In summary, this survey offers an international perspective on attitudes and perceptions on ISO standards for software asset management. The majority of responses came from the United States and the United Kingdom, and the balance from twelve countries including Australia, Belgium, Canada, Germany, Mexico, the Netherlands, New Zealand, Norway, South Africa, South of Korea, Sweden and Switzerland. This group wholeheartedly supports SAM, and to a significant degree standards, and strongly agrees that SAM is good for business. Awareness of the particulars of ISO 19770-1 and the proposed standard for software tags is low and much work needs to be done to educate and inform IT professionals around the world. Education and awareness-building programs will increase the likelihood of adoption and help improve the overall state of SAM practices.

Survey Respondents Speak Out about SAM Standards

"ISO 19770-2 sounds great, but I believe there will be an extreme amount of push-back, especially from the publishers who provide SAM tools that 'discover' software using 'special magic.' "

"I would purchase a tool that is in compliance, [but] those who control the money are more likely to go with something cheaper and shoehorn it into place."

"We need to swing the pendulum back to the middle. The software providers don't have to provide any information, and we have to dig around on websites and search CDs for EULAs [end user license agreements]."

"ISO 19770-2 needs to be able to have a standardized method that allows end users (using third party or in-house built tools) to discover exactly which applications are installed in their environment. . . The standard should provide a consistent method for software publishers to specify the entitlements that are licensed to an end user in a way that the entitlements and inventory can be reconciled."

"By the time the part 2 of the standard is completed, it is questionable [how much] value it will actually deliver. . . We continue to be focused on the idea that software must be discovered in the first place. However, such process mandates that software files are permanently installed on the computer. That may or may not be valid depending on the licensing model that a given customer purchases from an ISV [independent software vendor], so even with perfect discovery, license compliance cannot be ensured."

"Pushing [for a wider] scope for part 2 will increase resistance for support and adoption by software publishers. The most prudent path probably involves a phased approach, in which completeness and standardization of reporting are addressed first, especially since they involve the [lowest] implementation cost for publishers, followed by license entitlements, tracking, access and execution rights."

"As always, the definition of license entitlements defines the question. Technology seems to be one step ahead of licensing models (witness the turmoil over multicore processors and the demise of PowerUnit pricing by Oracle). Adding informational headers to software that address licensing rights would be a good first step. The enforcement of license entitlements becomes very tricky when companies run the same software purchased at multiple times under different licensing models. Perhaps [part 2 of] the initiative must first be a forward-looking model and then later address retrofitting and compatibility with legacy software as a related initiative."

Appendix 1. Definitions

End user: Organization, group or individual acquiring license to use software from publisher, software manufacturer or vendor. The final user of a product. In the context of these documents, "end-user entity" refers to an organization, group or entity.

Extended subcategory: These fields, specific to the tag owner, are not predefined in the specification. They are allowed to ensure that the tag user can provide specialized or context information (i.e., additional details for a software asset) required for asset administrators or asset management tools. Extended tags identify the tag's creator, name and value. Identity tags may also have extended tags from multiple sources, such as publisher, reseller and end user, with each extended tag indicating its source. This allows an identity tag to specify the software's route from the publisher to installation on the end user's computer.

Identity: Identity tag elements describe common attributes of most software titles. Operating systems or auto-discovery tools can use these attributes to identify a software title. Tags may be altered by end users who package software for distribution, programmers (i.e., open-source software) and others.

Identity elements proposed in 19770-2 are not exhaustive. Other elements (i.e., virtualized use, streaming, Web applications or other types of use that cannot be measured, detected or inventoried on the computing device accessing the application) are beyond the scope of the standard and left for future revisions.

Mandatory subcategory: These fields are required for an identity tag to be considered valid or complete. Incomplete identity tags most likely will be flagged by asset management tools as invalid, so the end user will be aware that they are not in use.

Optional subcategory: These fields may or may not be provided in the identity tag. Optional tags allow tag creators to provide more information to ease the burden on the asset administrator or asset management tool. Optional tags will have field names predefined in the specification to ensure consistency between tags.

Publisher: Organization owning rights to distribute software, also known as the manufacturer. The owner may or may not have developed the software but typically controls copyright or intellectual property rights and the right to sell or license the product.

Software-use entitlement: Rights or benefits authorized or specified by the software license agreement or contract, such as uses, installation, location, etc. Part of the overall requirements of a complete SAM solution, these data could be provided by the software publisher, for example, in a separate file at point of purchase. Entitlement data share common attributes or fields for cross-referencing with identity tag elements, to ease reconciliation of software inventory with authorized or contractual entitlements to ensure license compliance. *Entitlement* and *software-use entitlement* are used interchangeably in this document.

Appendix 2. Identity Elements

CATEGORY	SUBCATEGORY*	DESCRIPTION OR DEFINITION
Identity	Language (2.1)	Language that the program interface presents to the user.
	Licensed (2.2)	Subject to license or not licensed, or incorporated in a parent license agreement. Product titles subject to license may depend on parent items or are independent items.
	Manufacturer name (2.3)	Manufacturer company name.
	Manufacturer part number or SKU (2.4)	Part number or other unique identifier provided by the manufacturer.
	Product license version (2.5)	Version number shortened to indicate major version and release.
	Product title (2.6)	Name of product as assigned by manufacturer.
	Product version (2.7)	Full version number normalized to numbers, letters and periods.
	Abstract (2.8)	A summary that concentrates the essential functions of a product title or group.
	Category (2.9)	Using a standardized list of groups or categories, software titles are categorized by high-level function. UNSPSC (United Nations Standard Products and Services Code) v9.0501 COMMODITY listing number 43230000 covers major categories for software (www.unspsc.org).
	Complex of (2.10)	Unique name to identify complex product or composition of products (or parent or top-level of group).
	Component of (2.11)	Unique key to identify component of or dependency on a complex product.
	Control (2.12)	Indicates the data is controlled or signed by the author or originator of the data. Typically used to validate security and reliability of contents.
	Dependent on parent (2.13)	Use or activation dependent on another.
	Parent (2.14)	Determines use or activation of dependent titles.
	Packaged by (2.15)	The party (e.g., end user, manufacturer, systems integrator) packaging product for distribution or installation.
	Release-package signoff (2.16)	Describes the end user, administrator or technician who approved the package for testing and release into the production environment. Release-package signoff provides a checks-and-balances system for the process manager, ensuring packages follow the defined process and contain properly licensed software.
	Release-package signoff date (2.17)	Indicates when the package was approved and made ready for testing.

*Number in parenthesis, e.g., (2.1), is for reference.

Example	Mandatory/ OPTIONAL
Languages include English, French, German, Japanese, and others. Refer to ISO 639-2 for a list of standard language codes.	Mandatory
Yes or no	Mandatory
Refers to master list of company names. Manufacturer shall register a standard name for use in its products.	Mandatory
1234-XYZ or any combination as defined by the manufacturer.	Mandatory
Version 7.2.1 or 7.2	Mandatory
Master Product Suite A Product Name A Name	Mandatory
Version 7.2.1.XYZABC.1234567-0000000123456	Mandatory
Viewmaster is a presentation-design tool with spell check, color graphics, design function and animation.	Optional
Segment title: Information Technology and Telecommunications Family: 43230000 Family title: Software Class: 43231600 Class title: Planning ERP software Commodity: 43231602 Commodity title: Enterprise resource planning ERP software Unique ID: 117533	Optional
Master Product Suite A (m) NAME m (m = master)	Optional
Master Product Suite A (c) NAME c (c = component)	Optional
Data subject to control may be evaluated as to whether it has been changed or modified outside of the control of the data's originator or author. Data controlled by the software manufacturer may be used for verification of a status, such as serial number. Controlled data that has been changed is no longer reliable. A mechanism to alter the tag(s) is also needed for other scenarios. The standard therefore should provide for tamper-proof modifications (i.e., only by vendor who has private key, etc.).	Optional
Use of program X depends on the presence of file Y	Optional
File Y must be present for use of program X	Optional
As defined by packager.	Optional
Example not provided.	Optional
Example not provided.	Optional

Appendix 2. Identity Elements (continued)

CATEGORY	SUBCATEGORY*	DESCRIPTION OR DEFINITION
Identity	Release-packaged by (2.18)	Describes who packaged or repackaged the application. Multiple end users may participate in packaging, but one will be identified as responsible. If questions arise about why or how a package was created (e.g., installation of components not properly licensed), the responsible party could be referred to for help.
	Release-production signoff (2.19)	Describes the responsible party who approved rollout of the package to the production environment.
	Release-production signoff date (2.20)	Indicates date the package was approved for rollout to the production environment.
	Release-tested by (2.21)	Describes the responsible party who conducted the testing.
	Release-tested signoff (2.22)	Describes the responsible party who approved the testing process.
	Release-tested signoff date (2.23)	Indicates the date the package was approved (after testing) and made ready to enter testing in the production environment.
	Serial number (2.24)	Unique identifying number or signature. May be a combination of characters (numbers, letters or symbols).
	Upgrade for (2.25)	A product title that is an upgrade for an earlier, down-level version. If an upgrade, provides specific details of what it upgrades. Typically, *Upgrade for* is described by a manufacturer part number or SKU.
	Upgrade from version — lower range (2.26)	The lowest version supported by the upgrade data. For an upgrade, we need to know the range of previous versions that support *Upgrade from*. This field will provide the lower number of the range.
	Upgrade from version — upper range (2.27)	The highest version supported by the upgrade data. For an upgrade, we need to know the range of previous versions that support *Upgrade from*. This field will provide the upper number of the range.
	Usage identifiers (2.28)	Optionally provide a list of executables, or other types of process identification that, when monitored, indicate activity or usage of a software title.

*Number in parenthesis, e.g., (2.1), is for reference.

EXAMPLE	MANDATORY/ OPTIONAL
Example not provided.	Optional
Example not provided.	Optional
Example not provided.	Optional
Example not provided.	Optional
Example not provided.	Optional
Example not provided.	Optional
1234-5678-ABCD-1234	Optional
Product title X is an upgrade for product title Y. The field data contains the product title, manufacturer part number or SKU. Example: Productivity Suite 7 or part number 4567-8910 or SKU 10-23456-78	Optional
Version 7.2.1 as described by product license version. Example: If Upgrade for = Productivity Suite 7 or part number 4567-8910 or SKU 10-23456-78, then Upgrade from — lower range = version 5	Optional
Version 8.0 as described by product license version. Example: If Upgrade for = Productivity Suite 7 or part number 4567-8910 or SKU 10-23456-78, then Upgrade from — upper range = version 6	Optional
File name of executable: Filename.exe Program file: Program.dll Process: System process	Optional

Appendix 3. Entitlement Elements

Our discussion of standards for software-use entitlement is included here because it is tightly linked with inventory. The topic warrants further exploration and possibly a standard of its own. The IBSMA intends to pursue work on this topic.

CATEGORY	SUBCATEGORY*	DESCRIPTION OR DEFINITION	SOURCE OF CONTENT	EXAMPLE
Entitlement	Contract no. (3.1)	Number of contract under which license was retrieved.	Supplier or publisher	Example not provided.
	Deactivation date (3.2)	Last date for use. Field should be updateable in order to allow for period extensions, which can happen in enterprise agreements, etc.	Publisher	Date in defined format, i.e., month/date/year or date/month/year.
	Enrollment no. (3.3)	Number of enrollment (or order or contract number) under which the license was retrieved.	Publisher	Enrollment number 100.
	Exclusions (3.4)	Product titles (or tag elements of specific criteria) described in contract as excluded from counts of active entitlement.	Publisher	Exclusions are listed uses, types or categories such as disaster recovery, testing, application development or other uses as defined by the publisher (or listed in the contract).
	Serial no. (3.5)	Unique identifying number or signature. May be a combination of characters (numbers, letters or symbols).	Publisher	1234-5678-ABCD-1234
	License type (3.6)	Examples include named user, concurrent, node lock, virtual, processor count, cores count, floating license, trial license, or other.	Publisher	As defined by publisher.
	Licensing key (3.7)	Key code or unique string provided by software publisher to enable product activation. May be encrypted for control. Usually programmed by manufacturer to represent and activate the base product, features, content, options, etc., that are licensed by the end-user entity.	Publisher	As defined by publisher.
	Mfr. name (3.8)	Manufacturer company name.	Publisher	Refer to master list of company names. Manufacturer shall register a standard name for use in its products.
	Mfr. part no. or SKU (3.9)	Manufacturer part number or other unique identifier.	Publisher	1234-XYZ or any combination as defined by manufacturer.
	Number authorized (3.10)	Number of licenses and license types authorized.	Publisher	As defined by publisher.
	Purchase order (3.11)	Purchase order or other order number provided by end-user entity when placing order.	End user	As defined by end-user entity.
	Supplier name (3.12)	Vendor or supplier company name.	Publisher	As defined by supplier or vendor.
	Supplier part or SKU (3.13)	Vendor part number, part number or other unique identifier.	Supplier	As defined by supplier or vendor.
	Organizational unit (3.14)	Unit or organization entitled to use licenses.	Supplier or publisher	Location = U.S.A. Division = manufacturing
	Overdraft (3.15)	Quantity authorized for temporary use above number authorized.	Supplier or publisher	As defined by publisher.

*Number in parenthesis, e.g., (3.1), is for reference.