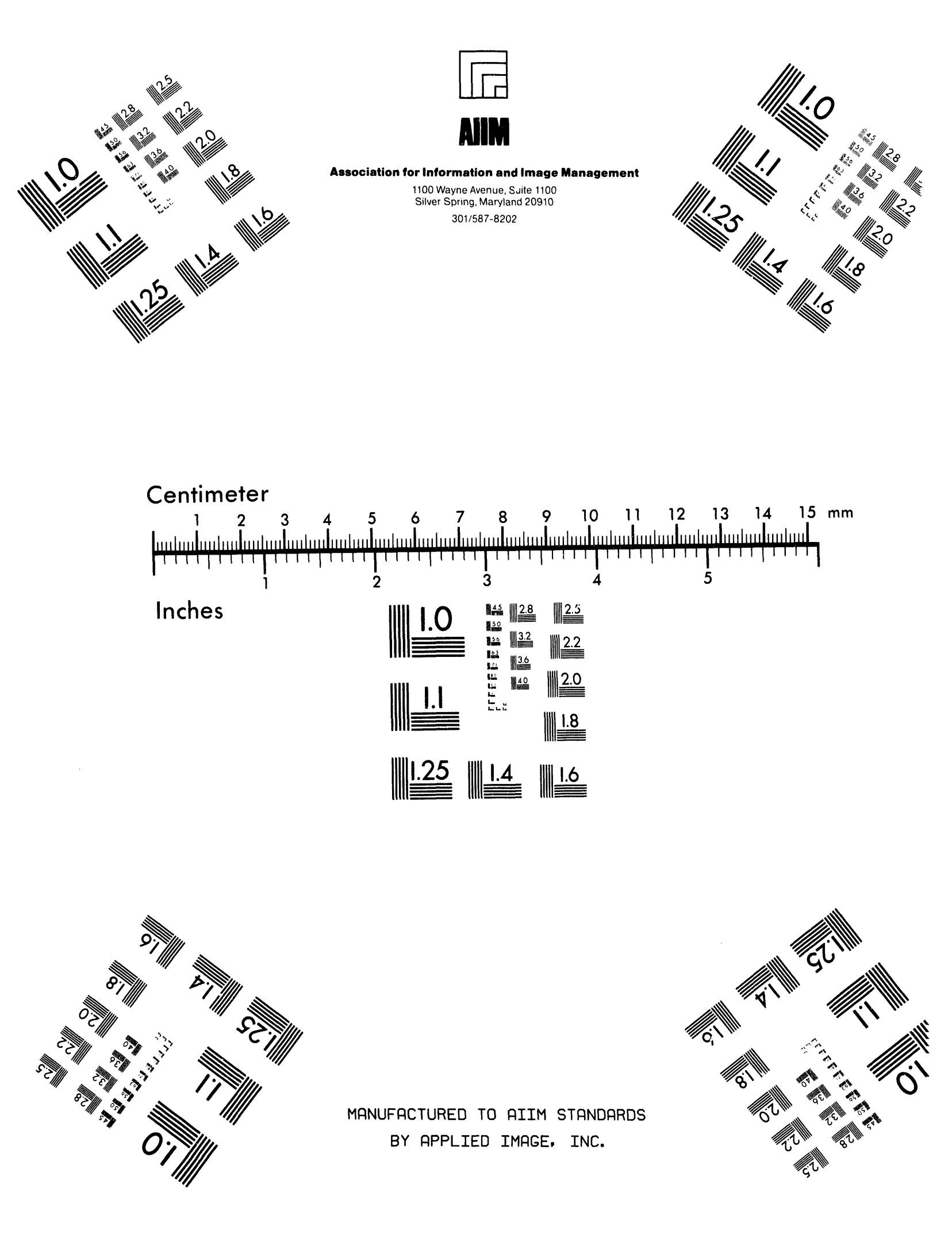
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Title: TECHNOLOGY GUIDANCE FOR SAFEGUARDS INFORMATION MANAGEMENT

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Technology Guidance for Safeguards Information Management*

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Abstract

The Safeguards Information Management Systems project, SIMS, seeks to provide information access tools to the IAEA to assist in implementation of enhanced safeguards. The Technology and Systems Group advises the SIMS project in the selection of hardware and software, the integration of system components, and the evaluation of realistic information management approaches. The group's guidance has led to reevaluation of the system hardware choices, visual data storage methods, and geographical data sources. Consultation with the Agency has resulted in a major realignment of our effort towards providing information access on Networked Microsoft Windows desktop computers rather than separate SUN workstations. The manner in which imagery is stored and presented is another developing area. Initial systems delivered to the Agency relied on analogue videodisc recorders and VCRs. Future systems will store and manipulate digital images. The initial source of map data for the workstation was analogue videodiscs from the U.S. Defense Mapping Agency. Many of these maps are restricted in their distribution, therefore additional map data sources were developed. The Technology and Systems Group's efforts to steer a clear course through this ever changing mine-field is described.

Introduction

The Technology and Systems Group is one of four committees formed to provide guidance to the SIMS initiative. Its task is to keep SIMS projects on track with technology and computer systems developments and advise in the appropriate use of technology and computer system developments and assure appropriate use of functional technologies. In part we are to function as the reality checker and conscious for the project team members and reign in extravagant expectations of underdeveloped research advancements. As such we act to protect the interests of the IAEA in that we attempt to assure that deliveries to the Agency not only meet high standards, but also are supportable and compatible with the existing IAEA infrastructure

Initiatives

The project is providing support to the Agency in several areas which are covered in other papers at this conference. These areas are advanced analysis tools and techniques[1], field computing for special inspections[2], map reference[3] and GIS (Geographical Information System) support tools, and open source evaluation[4].

Critical Decisions

The group made several decisions in the last year to further our efforts to support the Agency in a reasonable manner with cutting edge technology which is both cost-effective and supportable. Initial SIMS deliveries to the Agency were based on SUN Sparc®

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workstations with advanced analogue videodisc handling abilities supported by custom applications written in C. In an effort to increase the supportablity of the Safeguards information management systems we decided to concentrate on the use of "commodity" components for both hardware and software. With the use of these "commodity" commercial products we can concentrate on providing innovative approaches to enhanced safeguards analysis, data collection and data management, and minimize our expenditures in the support of unique, aging hardware and custom software systems.

A very important realization which was reached only painfully in the middle of our efforts, is that powerful Unix® workstations, although they are the "weapon" of choice within the DOE National Laboratories are not feasibly deployable as desktop systems at the IAEA. The IAEA has a considerable investment and infrastructure in Intel® microprocessor desktop computers. Thus if we are to provide solutions that the Agency can use it is necessary that the majority of users be able to access them through their existing (or upgraded) Intel desktop systems.

Desktop systems

In order to have an impact on the implementation of information management for enhanced safeguards in the future it is necessary to provide accessible solutions. These solutions when deployed must fit within the budget, training and support constraints for the existing IAEA systems (We assume that the IAEA will not see a huge increase in budget in the next several years). This points to a requirement that systems for enhanced safeguards be accessible to users on Microsoft Windows desktop systems connected by the current or upgraded Agency and Safeguards department LANs. Therefore DOE individuals providing information management support will either have to switch to and develop on Windows systems or continue to develop in their existing Unix systems making sure that the applications are deployable to Windows desktops. Several strategies exist for the later possibility. Applications can be developed on Unix workstations and ported to personal computers for deployment, applications can be run on Unix computers but accessed from desktop systems (the mainframe model), or application components can be split between servers and PC desktops with the high performance RISC workstations providing storage, compute, and coordination services and the desktop systems running the user interface code providing quick response to user actions and immediate feedback for data entry validation. With either of the last two approaches effective network connectivity is necessary.

Client/Server Applications

Since it is necessary to maintain data integrity and security, the systems which are actually storing and distributing safeguards data need to support operating system and hardware features to implement these protective measures. Our existing experience with windows desktop systems and Unix workstations leads us to the selection of RISC Unix platforms for the data and application "Server" role. The multiprocessing operating system, discretionary access controls, error correction features and flexible and expandable I/O subsystems of these systems provide the necessary features to act as data and application servers.

A straightforward partitioning of application client/server roles is possible with the X11 Window System which is the basic building block of almost all windowing systems for workstation class and higher computers. In this partitioning the desktop system would manage the display, keyboard and mouse interactions of the user with the server system providing all the data and procedural support for the application. The necessary desktop system software for this arrangement is available from many vendors for very reasonable costs.

Alternative partitioning of client and server responsibilities is possible. With the use of commercial application development products such as "Smart Elements*", user interface modules can be built that are able to run more of the actual data manipulation operation on the desktop system with the server then primarily providing database support.

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* from Neuron Data Inc., no endorsement implied, this is just one example of many.

The choice of partitioning the application responsibilities is up to the application developer. In our case we want to avoid writing custom communications code to partition our applications so we have chosen to select approaches that are supportable by systems such as the X11 Window System or client/server development tools such as "Smart Elements". Both of these approaches allow desktop access to applications with security and data integrity maintained by flexible and powerful Unix server systems.

The Mine Field

SIMS presents certain difficulties for coordination it involves individuals from DOE and four laboratories spread across the USA's four time zones. In addition to the diverse DOE participation user requirements, constraints, priorities and system features must be communicated to multiple users from various cultures up to nine time zones away in Vienna, Austria. A considerable amount of effort has gone into trying to clarify our communications to avoid and clear-up misunderstandings.

In addition the goal of the project "provide support to ongoing and future IAEA information management needs, as identified by the DOE*" makes it clear that there are in fact two customers, both the IAEA in the role of end-user, and the DOE as "director" and funding source. Each of these customers expects to be informed regularly as to project milestones and status. Difficulties occur when there are differences of opinion between the many individuals or organizations involved in SIMS development and deployment.

Conclusion

Projects coordinated by DOE National Laboratories can overestimate the capabilities of technology and attain that revered phrase "leading edge". To keep SIMS on track we have tried to make a sane evaluation of needs along with a survey of existing technological solutions and thereby remain slightly back from the "bleeding edge".

The SIMS Technology and Systems Group tries to provide a relatively honest evaluation of applicable hardware and software systems in an attempt to deliver usable solutions to some of the IAEA's immediate information management needs. In pursuit of this goal we have become more attuned to the needs of the IAEA end users and made choices that conflict with some of our developed biases. These seemingly technical decisions were not driven as much by the technical capabilities of data processing systems, but rather a considered evaluation of the application and expected deployment environment.

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* SIMS mission statement: "Provide coordinated support within a standardized architecture on a prioritized basis to the ongoing and future IAEA information management needs, as identified by the DOE. Our purpose is to support enhanced safeguards by providing systems to increase the effectiveness of IAEA analysis, inspection, and training."

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