



26 August 2015



The Hon Ian Blayney MLA
Chairman
Economics and Industry Standing Committee
Parliament House,
Perth,
Western Australia 6000

Dear Sir,

Inquiry into technological service innovation in Western Australia

Thank you for your request for my submission for use in your Committee's inquiry.

I am a Chartered Accountant and have been involved over the past twenty years in the adaption of 900 years of accounting and commercial law practice, developed in response to the commercial needs of the physical analogue world, to the needs of the current non-physical digital world of ecommerce.

The best contribution I can make to your inquiry is to make available to your Committee some published articles on the subject that I have authored and have supplied copies herewith.

I have applied the information and beliefs I have written about in the Companies I have founded to generate value based on the innovations resulting.

In the longer term I am hopeful of making a global value contribution by utilising the unique geographical position of Western Australia to service the digital management needs of the developing economies to our north where 55% of the world's population lives one hour either side of our time line.

My recommendations to your Committee are to think big, think digital and focus efforts on the private sector rather than the public sector.

Yours Faithfully,

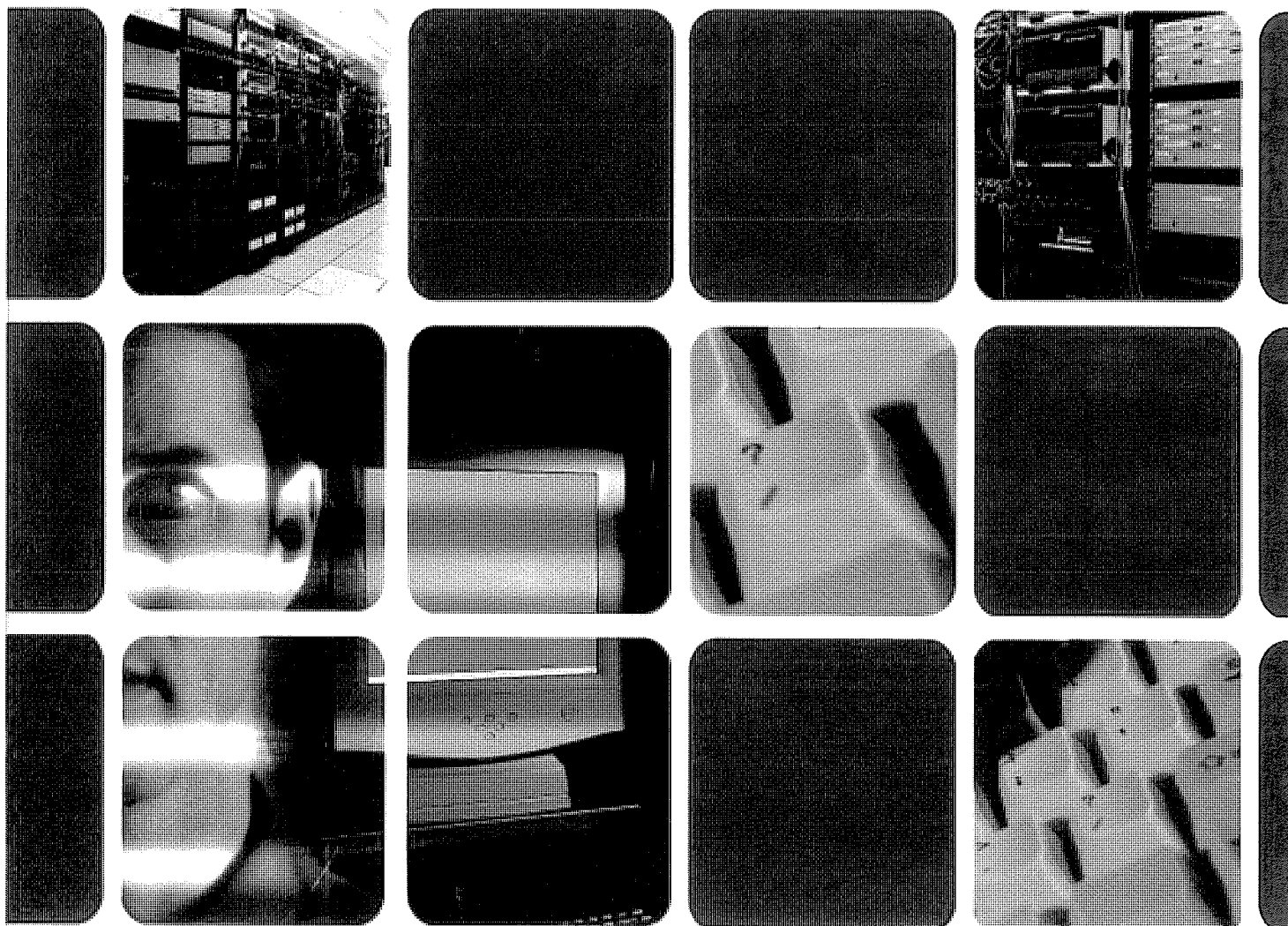

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Editorial (extract)

Leo J. Mullins extends DAM to rights management, e-commerce, management best practice and, alas, taxation and other financial implications. In particular, Leo links DAM and digital rights management to the creation and management of intellectual property, what he calls digital management.

Michael Moon
Managing Editor

Managing intellectual property in the digital product market

Leo J. Mullins

is the founder and managing director of the digital asset management company, Optimiser Pty Ltd. Mullins was awarded successive bursaries by the University of South Africa for academic excellence. He now holds DAM patents and has been living and working in Australia since 1985. His previous roles include professional and corporate accounting. He is a management consultant specialising in the fields of accounting, e-commerce and Management Information Systems (MIS).

Keywords: *measurement, metadata, appropriate to access, unique identity, rules, evidence*

Abstract This paper explores the general nature of, and issues relating to, intellectual property stored and distributed in digital form, as well as some of the main implications for business managers and the information communication technology industry. It covers a number of topics, broadly:

- The fundamentals of digital management (DM)
- DM's relationship to digital asset management (DAM) and digital rights management (DRM)
- The impact of e-commerce on the law of contract and DM
- The inefficiencies inherent in traditional practices
- The need for management to improve administration of digital intellectual property
- The increasing commercial importance of DM
- General taxation, accounting and administration issues and their relevance to, and impact on, the evolution of digital intellectual property management are also introduced.

The intention of the paper is to:

- provide a better practical understanding of DM
- demonstrate DM's impact on future best management practice
- highlight the importance of DM's predicted contributions to the processes and commercial value of e-commerce markets

THE NEED FOR DIGITAL MANAGEMENT

The fundamental reason for management, its *raison d'être*, is the protection and administration of assets. Its principal weapon is measurement. Without measurement, value cannot be ascertained, wastage cannot be eliminated and wealth cannot be maintained. Assets are commodities. They are, by definition, valuable in themselves, as well as being the tools used by a business to create more value. Conversely, anything that incurs a cost to a consumer is an asset and, hence, expense is viewed as the consumption of assets.

Business processes for managing tangible assets are accepted worldwide, having developed over

the last 600 years, and are designed to measure revenue against the cost of assets consumed. The bases of these processes are:

- identification
- custody
- measurement
- settlement.

General ledger accounting and Enterprise Resource Planning (ERP) systems have traditionally managed tangible assets using the double entry system, recording ownership and transactions through various functional modules that comply to Generally Accepted Accounting Practices (GAAPs).

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Intangible assets, however, have never been satisfactorily accounted for in the same way because of their incorporeal nature and the associated problems of measuring them. However, though sometimes contentious, serious investment has been made in the attempt to manage and value them. For example, brands valued on the strength of marketing spend and sales potential, carried on a company's balance sheet as goodwill. Why is this not the same with digital assets and products?

True, the internet space and online marketplace are relatively new, but the underlying economics and commercial imperatives are as they ever were. In addition, capitalism has already fostered sophisticated accounting and legal systems that are mature enough to be able to contribute immediately and directly to progressing the digital world.

Now, 21st Century ratios of intangible to tangible asset values are three to ten times higher than just a decade ago. Then, intangible assets comprised approximately 10–50 per cent of the tangible asset value of an enterprise. Today it is likely that an enterprise's intangible assets are worth far more than its tangible assets.

Intangible asset values are growing faster and becoming more important than tangible assets. This trend can only continue as service economies become the norm with more and more associated activities provided via the internet.

This is solid evidence of the increasing importance of intangible assets, not just to corporate performance and wealth creation, but also as another layer of capital bedrock. Yet, no adequate system for managing and accounting for them has yet been developed.

According to the World Intellectual Property Organization's Report (WIPO) of November 2003:

Today DRM remains a fledgling industry . . . Several initiatives . . . promise to create a networked environment that is trusted, based on the secure identification of users, devices and software modules, ensuring that content can only be exploited in line with rules set by the owners of the material. . . . However, this technology is still some way off (and, according to some, will never succeed) and for the moment, it is necessary to concentrate on specific technologies solely

designed for the protection of intellectual property rights.¹

The evidence and consequent effects of this situation are apparent in virtually every organization, given society's reliance on information technology.

Software, an example of a vendor's intellectual property, still has to be purchased outright. The costs are either written-off or amortized according to inadequate depreciation policies that assume the consumption rate of each asset to be the same.

When organizations create digital assets, there is usually no accounting for them at all when used internally. Consider any software company where its employees use its own product. Current accounting practice considers that the use of such assets cannot be correlated with revenue performance over time, and is without cost. Clearly this treatment is deficient.

Additionally, when digital assets are deployed externally, the intellectual property owner loses control. Consider an architect sending out plans for a tender, or the lawyer with client confidential communications, over email. Anything can happen to that email and its attachments once it has left the corporate network boundary.

The result is plain to see: no meaningful management or accounting for a digital asset's value, either created or consumed. Furthermore, what should be of concern to every business manager: no information for commercial decision making.

DIGITAL MANAGEMENT AND THE LAW

The basis for laws governing DM is essentially the same as that for traditional trading activities. Laws have evolved out of the need to exchange value between buyers and sellers, and technology has not changed these needs. What has changed is the ability of buyers and sellers to extend their geographic reach; increase their potential transaction volumes, and speed up their turnover rate.

This does not change any of the fundamental needs of trading for fairness, honesty, transparency, and reasonable terms for delivery and payment. However, the new capacity to trade digital intangibles requires that traditional

trading law also be extended, to maintain its relevance and effectiveness in the electronic marketplace. The responsibility of the legal profession is to develop practical "cyber laws" to apply the accepted norms of commercial, contract and trading law to e-commerce.

THE DIFFERENCE BETWEEN DIGITAL RIGHTS AND DIGITAL ASSETS (DRM V DAM)

The term "rights" is generally considered only from a legal perspective and the concept of ownership, with scant linkage to assets, revenues and costs.

Consequently, the traditional business of rights management is a legal one, aimed at excluding access to intellectual property by any party which does not have the legal capacity, or permission, to use or consume a specific asset. For example, the numerous litigations over trademark infringements — online or otherwise.

The prevailing attitude of businesses towards so-called DRM seems to rely exclusively on the technical fraternity being able to protect digital content with technological wizardry. The hope seems to be on preventing unauthorized use before the event, as a complement to traditional rights managers — the lawyers who pursue remedy after the event.

Unfortunately, this myopic perception has been the template used by the information technology industry in its DRM efforts to date. Restricted largely to software licensing, DRM technology has failed because of its inability to deal with the intrinsic nature of digital product. Easy duplication of a digital asset provides consumers with almost infinite and cost-free access, without depriving original purchasers of their rights or utility.

Rights are seen solely as an enforcement issue, primarily through an over-emphasis on encryption as the keystone to security. However, this offers no management capability beyond a "give access or deny" event when the asset is initially deployed, but even that has not been enforceable.

Conventional thinking, therefore, construes DRM as fundamentally concerned only with technology and processes, and has omitted commerce and management — or, in other words, value creation and preservation.

Digital asset management is generally considered to be the management of intangible digital assets. It is therefore focused on measuring and identifying, perhaps incorporating facets of DRM but essentially focusing on the "inclusive" aspect of managing digital intellectual property; in other words the measurement and recording of access and consumption of assets.

For the sake of completeness, however, it is also possible for a right to exist without creating value and thus not be considered an asset in immediate commercial or financial terms. This can happen where ownership of an entity can be clearly shown but no revenue streams or costs attach to it.

For example, a professor's draft research paper, distributed electronically among his or her peers for comment, prior to publication. While there is no immediate financial value and it is less relevant to commercial management, from a legal point of view, rights still attach.

Such intellectual property falls outside the scope so far considered as DAM, but would still warrant DRM to minimize infringement, as well as aid editing and withdrawal leading to publication.

The difference between DAM and DRM is significant but not generally fully understood or agreed on, and, in some cases, not even acknowledged.

Again, per WIPO's recent deliberations:

From a functional perspective, DRM means many things to many people. For some it is simply about the technical process of securing content in digital form. To others, it is the entire technical process of supporting the exchange of rights and content on networks like the internet. For convenience, DRM is often separated into two functional areas.

The identification of intellectual property, rights pertaining to works and to parties involved in their creation and administration (digital rights management): "DAM"

The (technical) enforcement of usage restrictions (digital management of rights): "DRM"²

DIGITAL MANAGEMENT (DM)

The term DM is now emerging to encompass all aspects of both DAM and DRM, since there is little point for one without the other in the

commercial arena.

Given the growing role of intangible assets in today's businesses, combined with the necessary involvement of accountants and commercial managers in the relatively new digital intellectual property value chains, the need to properly account for intangible assets is rapidly moving front stage and center.

So DM is necessarily about meeting the identified need to account for, and protect, the creation, storage, distribution, access and control of intangible assets in digital form, wherever and whenever they are found or consumed. It has to develop, and quickly, to provide the full spectrum of fiduciary and management control.

The four cornerstone concepts, in well-known terms, are:

- ownership
- security
- accounting
- e-commerce/e-banking.

To be truly effective, DM should enable contract; the setting of terms and conditions of both use and access. Vitrally, to properly manage a digital asset or product, DM needs to be dynamic and flexible to permit alteration to any aspect of control over an asset after its deployment, preferably without being constrained by connectivity issues. So far there has been little or no success in this area.

The most effective way to provide an efficient, publicly available, DM system is via the internet using web service technology. A DM web interface, accessible to buyers and sellers of digital assets, should allow both negotiation and the exchange of value. It must support the set-up of legal agreements and their terms, and consequent deployment, in real-time. The system will then technically enforce rights such that contracts cannot be breached, with any hacking attempts resulting in the destruction or disablement of the product.

Digital management must also meet the needs of management by providing software, infrastructure, data and reporting functionality to digital asset owners and managers irrespective of their physical location.

The benefits of a well-designed DM system are improved management and administration of intellectual property leading to:

- revenue security
- lower costs of software application and content administration
- acquisition of product usage information.

In short, an infrastructure platform for accounting, billing, product development, technical support, sales, marketing and innovative customer service.

Digital management services must establish terms of use in e-contracts between product suppliers and customers, and these must be evidenced by all relevant parties on the system. These contracts form the basis of the security needs of a digital product when it is deployed, and should be continually monitored for conformance and compliance by the system.

Corporate governance would be well-served by efficient DM that securely ensured enforcement of all contract terms and conditions of deployment, and use of an owner's digital intellectual property. Usage data also lends itself to digital product procurement to help prevent overspending on software and content, a common problem for corporate management.

Digital management also needs to be supported by standards covering interoperability needs of all types of rights-holders in the digital environment.

The European Commission's INFO 2000 Programme Index Report, June 2000, identifies four guiding principles of any DM framework for supporting effective e-commerce, namely:

- Unique Identification — every entity should be uniquely identified within a unique namespace
- Functional Granularity — it should be possible to identify an entity whenever it needs to be distinguished
- Designated Authority — the author of an item of metadata should be securely identified
- Appropriate Access — everyone requires access to the metadata on which they depend, as well as privacy and confidentiality for their own metadata from those who are not dependent on it

The requirements of a successful DM technology would also be expected to include:

- No single points of failure such that loss of internet connectivity will not interrupt dm services or prevent users from accessing digital assets or products to which they are entitled

- universally availability of control over DM and administrative settings, and reporting tools, via the internet
- integration of application usage information with ERP/accounting, billing and payment systems
- little or no infrastructure impositions on existing IT environments

A good DM system must meet the needs for administering digital asset delivery on a world scale. It, thus, requires secure communications and these are now possible over the internet.

The already huge and rapidly growing market for intellectual property, and the internet globalization of business, require that successful DM systems interoperate and scale to millions of transactions, definitely by the hour, most probably by the second.

To be really effective, any DM service would scale easily to support the development and operation of a global system, with confidential data collection by a secure, real-time update and backed-up database. The database would meet the intellectual property reporting and accounting needs of managers.

Moreover, from macro to micro, individual user needs must be met or the DM system will simply not be used. DM must have rich functionality and flexibility to cater to the interest of all rights-holders by managing legal and licensing structures — past, present and future.

TRADITIONAL DEPLOYMENT PROCESSES AND LICENSE MANAGEMENT

An important aspect of DM will be its replacement of traditional licenses and license management regimes for software distribution. This, however, by no means diminishes the need for licensing. It is instead a necessary evolution along true Darwinian lines, through near-spontaneous mutation when comparing the respective lifespans of tangible asset management practices and the still young internet.

Extrapolating the conclusion of a recent study of the development of the “real world”, or contemporary tangible economy, it is a matter of economic survival:

The basis of capitalism ... is capital, and the basis of capital as an economic tool is rational property law.

Without a complex system to delineate and protect rightful ownership, capital is “dead.”

Hernando De Soto, *The Mystery of Capital: Why Capitalism Triumphs in the West and Fails Everywhere Else*, 2000.³

The software industry continues to offer its product on a “boxed” or “seat license” basis. In the main, this is an inefficient and costly model for both vendor and user. These inefficiencies are particularly easy to identify in complex environments where there is periodic workflow, or project work. Expensive software, needed for short spells, remains idle and unused for a significant proportion of the time. Commercial pragmatism dictates that consumers impose restrictions on the number of costly licenses they acquire, resulting in too few copies during peak activity and too many once work is complete.

Investmentwise, software procurement decisions are often made without any empirical evidence of value to the purchasing enterprise, especially when renewing maintenance contracts. This contributes to higher than necessary corporate software costs through overbuying.

The traditional distribution model is estimated to cost software users, in wasted capacity, administration and under-used assets, a significant percentage of their software purchase and maintenance costs.

These inefficiencies also impact software sellers. Organizations needing software generally conduct lengthy, albeit inadequate, capital evaluations before they acquire. The result is longer selling cycles, expensive sales processes and higher prices. Higher prices cause acquisition decisions to be forced up management hierarchies, making purchasing decisions the victim of corporate politics.

Further, the process of software evaluation before purchase has spawned the “evaluation copy.” This can add to distribution costs and increased risk of revenue leakage as producing evaluation software is expensive, has to be administered, and often, actively reduces revenue as customers capture software value without purchase. Many a project has been completed using a 30-day trial.

Another problem attributed to boxed product or seat license is the failure of vendors to develop education and training as a sales tool. Long sales cycles cause management to focus on corporate

sales and marketing activities at the expense of educational activities with actual users. Smaller user bases and poorer user capability, in turn, result in less than optimum value received by both parties.

It is now evident that the capabilities are there for "pay as you use" sales models to be effectively employed, similar to those already making a success of the telecommunications services sector.

There are no valid reasons why software deployment cannot include all means to globally manage all commercial terms of use in real-time. Software and digital content access can now be negotiated, concluded and administered online, in a real-time or near real-time electronic trading environment.

New web services with functionality for flexible, dynamic, and transparent transaction interfaces, providing secure and automatic enforcement of agreed software usage contracts, are rapidly changing the global e-commerce environment.

ADMINISTRATION

Distribution administration has always been a core aspect of corporate management. The internet has simply introduced an additional electronic delivery mechanism to the product deployment armory. This has increased the ability of all companies to deliver digital intellectual property on a global scale. Vastly larger revenue opportunities are created, but a corresponding set of challenges arise.

These challenges predominantly relate to administration and compliance issues in accounting, tax and legal legislation, governing the different locations to which product is delivered. Smaller companies find these challenges harder to overcome than larger companies because the latter usually have experience of, and resources for, business conducted over multiple locations, and often countries, prior to their exposure to electronic trading systems.

The internet, while a great leveler on many fronts, does not reduce administrative need at the moment. However, this is precisely because fully-fledged DM systems do not exist and that there is a deficiency in the offerings of the technology sector for comprehensive, easily integrable, international compliance systems.

YET ANOTHER GROWTH SECTOR ON THE HORIZON

Taxation

All governments collect money from their citizens, with taxes levied on commercial activities subject to relevant legislation and judicial boundaries. To fund public infrastructures and institutions, and support the living standards of the people, the highest value categories of taxes are generally those on trading profits, sales revenues, and custom duties.

Governments seek to influence the commercial activities of their citizens by varying rates of different taxes and granting concessions for defined activities. This creates the opportunity for business managers to reduce statutory liabilities by designing corporate structures and commercial transactions with taxation in mind.

These structures and transactions move tax crystallization points to coincide with lower tax rates and available concessions. Much of this activity involves the shifting of revenue streams between jurisdictions by transfer-pricing between corporate entities. In response to tax management activities, governments, in turn, enact more complicated legislation to protect their revenues.

Consequently, business managers are now faced with significant administration and reporting requirements imposed on them by legislation. This is not peculiar to digital products, applying equally to all business.

However, a particularly onerous obligation is going to be placed on digital product distributors. This is the obligation to collect tax on behalf of governments in each jurisdiction in which tax liabilities are incurred. The breadth of digital product markets means digital asset managers must now comply with the legislative requirements of every jurisdiction where they are deemed to operate. In other words, they will act as tax collectors in as many regimes as their transactions are seen to fall.

The operation of different tax systems, different rates, different compliance requirements, as well different legal systems with their own interpretation of contract, makes the task faced by an administrator of a widely distributed digital product daunting in the

extreme. In fact, without a comprehensive DM system it is difficult to comprehend how these needs can be met.

Accounting

In common with all products, digital delivery requires sales and marketing to communicate the value and benefit to customers. This requires infrastructure and resources to be effective. If a company does not possess these, it is forced to acquire them.

When third-parties become involved in the digital delivery process the problem of accounting for contributions to the business effort, and share of resulting proceeds, becomes a serious matter.

Other issues include the transfer of ownership between digital product owners, third-party distributors and customers, and the corresponding responsibility for warranties and support obligations. Digital asset owners have to address control issues of their product outside their own controlled business environs. These particularly relate to the exercise of adequate standards for accurately recording accrued revenues generated by agents on their behalf in far distant lands.

The inability to record access to, and log use of, digital product also impacts customers. Consumers of the asset generally have no means of measuring the ongoing internal cost or value of its use by, and within, their organization.

This lack of adequate accounting control over deployed digital products is a major problem for digital asset managers and is becoming increasingly important as the value of digital assets to businesses grows. DM technology development is largely being driven by the need to overcome these problems.

CONCLUSION

Digital management properly developed, will introduce another badly needed dimension to the business of buying and selling intellectual property in digital form. It will solve the problem of not being able to securely deploy product and successfully account for it.

It will do this by moving responsibility from the technical programmer, where it should not be, and gives it squarely to the business manager where it should be. Thus, new capabilities arise for collection and analysis of relevant data for new business models and sales channels. In other

words, increased revenues and higher efficiencies for all.

Digital management offers tremendous benefit to companies seeking to expand their geographic market without having to make the corresponding investment in administration that global distribution requires.

Digital management revolutionizes accounting and administration of all the economic and commercial aspects of digital intellectual property. It is especially beneficial to small technology companies developing high value intellectual property suitable for digital delivery which requires access to far distant larger markets, as commonly experienced by Australian enterprises.

As a catalyst for new associated businesses, DM is also beginning to create a demand for specialist paralegal/accounting services to advise intellectual property creators and owners on how best to get to market.

These services will assist clients in:

- meeting improved digital asset deployment goals
- development and analysis of selling models
- optimum pricing levels and selling strategies
- treasury and accounting administration
- global tax compliance and statutory obligations
- billing and collection services via payment and banking portals
- automatic integration of e-commerce and e-banking transactions with financial accounting systems.

These services will be a boost in the arm for the professions. Or a new one in the making?

For information technology itself, DM will benefit the industry directly and considerably, since the software sector is by far the largest producer and seller of digital assets. In turn, these are used by customers to produce their own digital assets, in other words, content. Both parties can only increase their profits and margins over the long term, through more flexible pricing models for both increasing revenues and reducing costs.

Efficient as it is in rolling out new versions of applications, no industry in history has been able to maintain such growth without providing the means to properly measure the claimed benefits of its product. Given Moore's Law and the interdependency of software applications within

commercial environments, customers are becoming increasingly resentful at having to upgrade sites completely when, in some cases, a single vendor puts out a new release.

More cynically, some customers have started to believe that software vendors act deliberately to create the knock-on effect so the industry as a whole can boost its revenue for a particular period.

The latest BSA Global Software Piracy Study, carried out by IDC in July 2004, computed the global cost of software piracy to be more than US\$28bn in 2003, and rising due to the increasing popularity in broadband services. Even discounting some of the self-serving assumptions used in calculating total market values for deriving the number of pirated installations, this is of epic proportions.

It also starkly illustrates a growing phenomenon: the industry's perceived value of itself and its product is diverging dramatically from that perceived by its customers and end-users.

Moreover, the same study recognizes that piracy affects many, from the individual salesperson and their commission, through to the

growth rates and potential of so-called developing economies. The latter can only become of increasing concern to institutions such as the World Trade Organization and United Nations, to name but two.

Given that the software industry is effectively mature, technology is a ubiquitous component of virtually everything the world uses, and that the industry prides itself on making everyone's life more productive and efficient, the honeymoon period is over and the writing is on the wall. Users of digital assets will pay-as-they-go and demand quality information for making their purchasing decisions. Effective digital management technology is not a "nice-to-have" but now an essential layer of modern business.

References

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Original Article

Using metadata to support DRM, trading and administration of globally deployed digital products

Leo Mullins

is an Australian Chartered Accountant with over 28 years' experience. He trained as an auditor with KPMG and then worked for KPMG, PwC and EY. For the last 15 years, he has been working as a consultant for the oil and gas and ICT industries. He has authored numerous publications, and has invented and patented a digital management technology.

ABSTRACT There is growing need by owners, developers and consumers of digital products for a metadata platform to create commercial application and content profiles of digital products for the purposes of digital rights management (DRM) and digital product trading. To meet this demand a metadata-based digital management platform is needed to support both the production and consumption life cycles of digital products. This involves the creation, definition, use and relevant reporting of metadata for the control and administration of 'point-of-use'-based DRM, as well as the associated legal and commercial requirements of such a service. Developing and implementing a metadata digital management platform must be based on a global infrastructure and the needs of Intellectual Property Rights governance over digital products. In all sectors, a metadata-based digital management platform is required to adequately deal with and provide for security, authentication, identification, permissions, data storage, metadata ownership, digital products ownership and liability responsibility, business models, legislation, taxation, sovereignty, interoperability, multilingual interfaces, transaction types, biometrics, continuity of service, off-line functionality, licensing models, pricing models, application metrics for technical support and e-commerce.

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Keywords: digital management; digital rights management; intellectual property rights; metadata metrics; metadata frameworks; transparent transactions

INTRODUCTION

Metadata, IPR and DRM

Intellectual Property Rights (IPR) are the foundation for measuring and protecting the utility of digital products, and, hence, value accumulation. They are necessary to support and justify investment in the digital economy.

As more and more business processes and knowledge are transferred to the digital environment, the nature of the participants, their activities, tools, resources and associated dynamics change profoundly. Previous management practices and tools are no longer sufficient to support value creation and maintenance in this

new environment. Hence, it is imperative that new tools, new thinking and new ways to measure, control and administer these products, activities, processes and participants are developed.

To meet this challenge, the development of a new metadata-based digital product management platform is required. This platform must aim to achieve real-time global management and administration of digital products serving the needs of property owners and users, while being consistent with commercial deployment and procurement processes. The ability of owners to manage the deployment of their digital products, and, equally, for consumers to evaluate their

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expenditure in real-time, is essential for the survival and evolution of commercial enterprises in an increasingly highly connected economy.

IPR governance

IPR governance is the process of identifying specific digital objects and setting terms of use and access. These terms and conditions must then be enforced by another process, commonly known as digital rights management (DRM). Traditional DRM has centered on technical enforcement of these ownership rights, but is largely considered to have failed, giving rise to growing consumer disquiet. This is mainly because of poor communication between consumers and the digital product's rights owners. Illegal use of digital products is, therefore, unmeasured and consequently ungovernable.

The only avenue currently available to owners when faced with failure of DRM technology and theft of their digital property is recourse to the courts, an avenue only open to corporations with very large financial resources. However, such a remedy has been of limited success, as evidenced by the consumer backlash in the music and entertainment industries.

Using dynamic metadata-based information to achieve 'active' DRM for IPR governance is the way of the future. Doing so will provide information vital to securing ownership and measuring the value of digital products. New, more efficient business models and sales channels will be made possible. Creative and innovative products will find quicker and cheaper roads to market. Separate systems for managing the different needs of data and metadata introduce dynamics and efficiencies not possible by traditional *ad hoc* co-mingling of data and metadata on common infrastructures and business processes.

Metadata and global commercial deployment of digital products

The development by the Dublin Core Metadata Initiative of application-profiling¹ saw the beginning of the use of metadata in the document management and content publication industries. It has traditionally been focused on standardizing terms and naming conventions of metadata items deemed necessary to provide for efficient use and administrative control over

digital products, primarily in the field of library science. Its objectives are, therefore, to support the needs of content publication, transmission, storage, retrieval, copyright and attribution.

Similar needs for administering the output of developers have been growing in other areas of software applications and content. Traditional solutions for digital product owners of license management and/or subscription-based access have resulted in high levels of illegal use of digital products.² Inadequate communication between users and owners creates the differing perceptions of value at the center of this problem.

The scale of the IPR governance problem grows as the Internet expands and connectivity increases, creating an increasing demand for effective real-time digital management of IPR by both creators and consumers of digital products.

The underlying concepts of digital management are as follows:

- Identification (owners, products, users and rights);
- Custody (enforcement of rights);
- Measurement (evidence of enforcement of rights); and
- Settlement (transfer of value).

A digital management service platform using metadata in the above conceptual framework will enable owners, in accordance with a legal contract with consumers, to set and enforce all terms and conditions necessary for effective IPR governance over deployed digital products.

The implementation of digital management services on a global scale is fundamental to the future development of the digital economy.

Digital products

An identifiable digital object, content or application is commonly referred to as a digital product. The ability to measure the use of a digital product requires that it be uniquely identified to be of relevance to any metadata schema. A digital product must rely on the uniqueness of identification against a set of characteristics of a product, rather than on an individual instance of the product, because of the ease with which digital products can be replicated. That is to say, users generally do not

get to own digital products in the same way consumers of physical goods get to own their consumption, for example an owner of a car.

The limited exception is the case of open-source licencing, in contrast to proprietary software licenses: ownership of a particular copy of the software does not remain with the software publisher. Instead, ownership of the copy is transferred to the end-user. As a result, the end-user is, by default, afforded all rights granted by copyright law to the copy owner. Note that 'copy owner' is not the same as 'copyright owner,' as ownership of a particular copy is transferred, whereas ownership of the copyright remains with the software publisher. Additionally, open-source software licenses typically grant to the end-user extra rights, which would otherwise be reserved by the software publisher.³

The costless replication nature of digital products makes it vital to proper IPR governance that digital management of digital products occurs at their point-of-use. Further, digital management of common ownership over different digital products is possible only through a system where ownership characteristics can be associated with different digital objects, which together achieve a unique identity required for control.

Obviously, the less metadata applied to the management of a digital product, the less information is available about the use of the product. Similarly, the more specifically the needs of a digital product can be connected to its utility metrics, the more fine-grained the management of control and reporting on that product.

Owners and consumers

Individuals or enterprises having claims to identifiable digital products through creation or purchase will always need to protect their property to justify their investment. Investments are justified in many ways, most commonly by measuring income derived through distribution or consumption. Therefore, an essential element of IPR governance must be the ability to measure the use of digital products by authorized users. In a dynamic control environment as envisaged by metadata-driven digital management, a user not complying with terms and conditions must be capable of being

prevented from using digital products both before and after access has occurred.

The use of metadata-based digital management cannot have a negative impact on available distribution channels of digital products if it is to have any chance of being implemented, that is, it must support traditional sales models in addition to the new.

These new avenues to the customer made available by the use of digital management will have a significant positive impact on digital product sales by supporting (1) commercial deployment of digital products in peer-to-peer networks, (2) post-deployment changes in terms of use (SaaS – Software as a Service) and (3) PAYU (Pay As You Use) access to digital products.

Users have rights over their access and use of digital products. These rights originate from their agreements made with the digital product owner, from common law and from consumer protection legislation. These rights can be better guarded and the utility of the user experience enhanced by metadata-based digital management services. Dissatisfaction arising from bad consumer experiences can be minimized by better communication and information provided by digital management. Extending available metadata, to include error log and performance metrics for dynamic technical and customer support digital management, will also provide real-time customer relations and technical support services.

Digital management providers and metadata ownership

Metadata used to manage and control the use of digital property is created by a digital management platform. Initial ownership of this metadata is assumed to lie with the digital management system provider unless case law states otherwise.

Access by owners and users to metadata as part of their own business processes could be supported by the digital management service provider by making the relevant metadata available to their customers' internal systems, separate from the digital management system.

The ownership of metadata may prove to be a problem where metadata is created and collected by third parties for content owners, and it is required that data privacy issues are

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The European Commission's INFO 2000 Programme Index Report⁴ identifies the four following guiding principles of any metadata framework for supporting effective ecommerce:

- *Unique Identification*: every entity should be uniquely identified within a unique namespace;
- *Functional Granularity*: it should be possible to identify an entity whenever it needs to be distinguished;
- *Designated Authority*: the author of an item of metadata should be securely identified; and
- *Appropriate Access*: everyone requires access to the metadata on which they depend, as well as privacy and confidentiality of their own metadata from those who are not dependent on it.

Financial transactions

Use of metadata to control and measure use of digital objects in real-time gives rise to financial transactions and settlement of obligations between owners and users in real-time. The use of metadata enables far more sophisticated financial engineering of digital product selling and pricing models. Examples of this could be a real-time co-joining of products from different owners to provide a unique solution to a user, use of micro-payments to reduce the costs of electronic health-care services to third-world consumers, service contracts for PAYU or prepaid access to digital products, or even digital product-use billing via telephone or utilities providers.

METADATA DRM IMPLEMENTATION

Foundations of metadata-based digital management

Current metadata taxonomies reflect two-way- or single-dimension relationships among digital products, users and owners. The dynamic nature of metadata-based management in a connected world requires a more encompassing view of the relationships that interact.

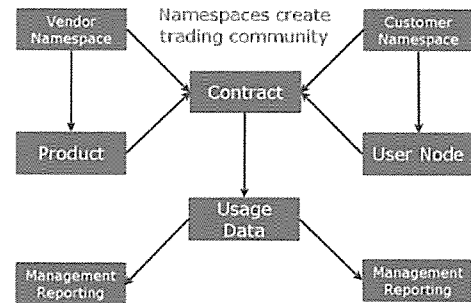


Figure 1: Dynamic commercial metadata flows.

Owners and users of digital products must be identified in system-registered Namespaces or Domains (see Figure 1). Namespaces or Domains need only differ in that owners have 'product-use' rights and 'product-sales' rights, and users have 'product-use' rights. 'Product-sales' rights need to allow the owners to create metadata-identifying products to which they apply contracts. 'Product-use' rights need to allow acceptance of these contracts. These contracts would outline the terms and conditions under which registered users on the system could use the digital product.

Product interaction and metadata can only be effective using very secure, three-party communications among users, owners and digital products (see Figure 2). In addition, storage of metadata, enforcement processes and transaction transparency requires a central communication point with metadata storage managed by a trusted arbiter, mediator and transaction broker.

Metadata-based digital management requires a paradigm shift in understanding the differences in control exhibited over traditionally unmanaged products and control over metadata-managed products.

The fundamental basis of the digital management process is the creation of Internet-product avatars that represent the digital products to be controlled (see Figure 3). These product avatars are given ownership and control attributes that define their behavior subject to instructions. The product avatar must be able to have a degree of secure communication with the digital product being controlled in order to effect these instructions. The controlled digital product will therefore have had Application Programming Interface (API) calls embedded

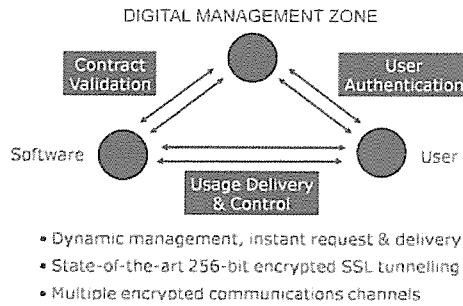


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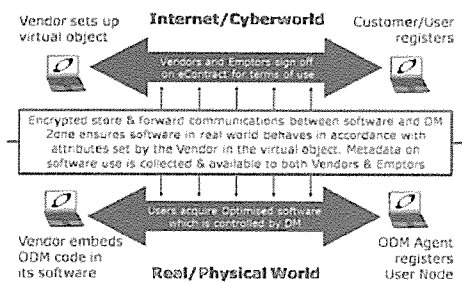


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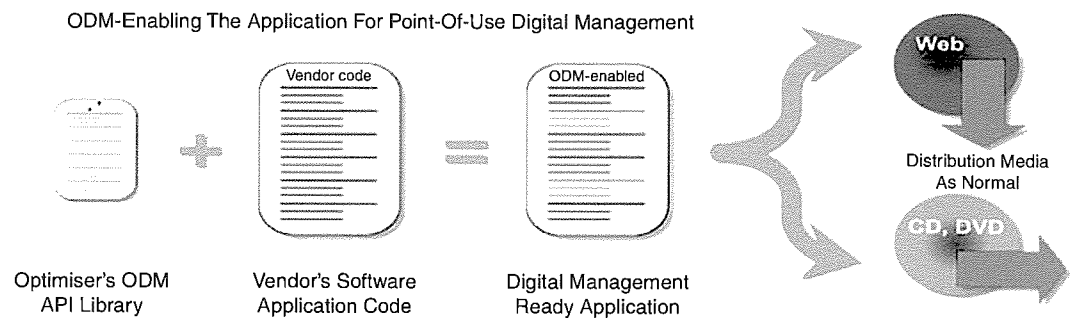


Figure 4: Metadata APIs integrated in digital object.

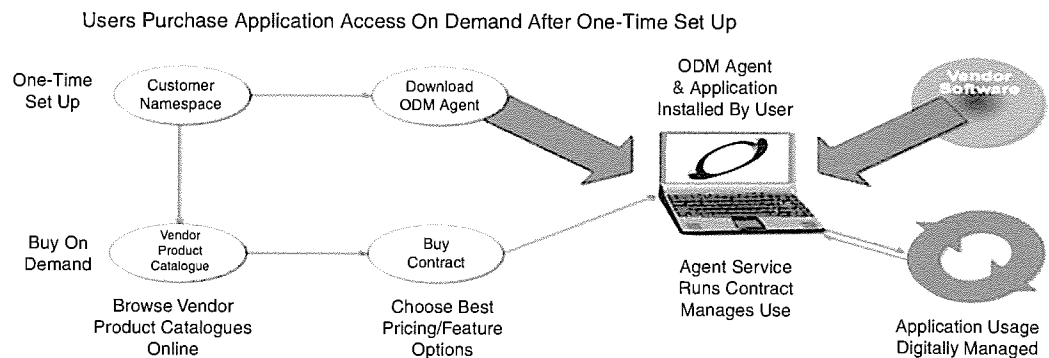


Figure 5: Digital management operational processes.

Implementation of metadata-based digital management

Implementation of digital management requires analysis of the metadata essential to meet the business needs of relevant digital products. Detailed value and support metrics for micro-payment, and/or modular access and other support, requires very detailed analysis, and results in proportionately more metadata being created both on implementation and in operation. In contrast, simple on-off control requires next to no analysis, and results in minimal metadata creation or use, other than authentication messages and initiation and cessation instructions.

A digital management system's ability to identify and control the legal rights of a user to access and enforce terms, and to measure activity, is determined by the amount and type of metadata generated from embedded APIs in the source code or digital management wrapper of a product. APIs embedded in digital product initiates calls out to the DM Agents that are required to provide access and permissions information in order to execute and remain operational. This allows the digital product to be distributed freely without fear of illegal use (see Figure 4).

Complex utility and support metrics are able to be supported by relevant digital management APIs being added to the source code of the product. These APIs cause the product to interact with metadata for permissions, and to communicate events for measurement and control. The more complex the management requirement of a digital product, the more APIs will be embedded, and, hence, the more metadata is created and used.

Digital products can thus be distributed through different channels than those of the access to them. This effectively separates the problem of growing an installed userbase from that of selling the value of the product. Effectively used digital products that were digitally managed could be made available for free, but access or use thereof could be subject to a multiplicity of sales channels (see Figure 5).

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Metadata is the data that describe the relevant contextual information consisting of the

identification of the digital object, its owner and all the terms and conditions created to measure use, users and utility by digital management services.

The ability of metadata to securely control products is largely dependent on securing the metadata communication channels and storage repositories. This can be achieved by using the Internet's standard Secure Socket Layer, Public Private Key and Certificate Authentication processes between transaction parties and the products, and by using A-Class Data Centers to centrally store metadata.

The degree to which security layers are implemented in and over any digital management product is determined by the product's intrinsic value and the value degradation time curve of the information value requiring protection. In other words, relatively inexpensive software applications and content the value of which comprises information of a very time-sensitive nature require relatively little security to be implemented. Alternatively, highly valuable systems software or content of a long-term value would benefit from a high investment in security.

Technology infrastructure

Any infrastructure supporting digital management services will include the following:

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Infrastructure supporting digitally managed products needs to effectively serve standalone PCs, Small Office Home Offices and enterprise networks without compromising security or disabling offline control (see Figure 6).

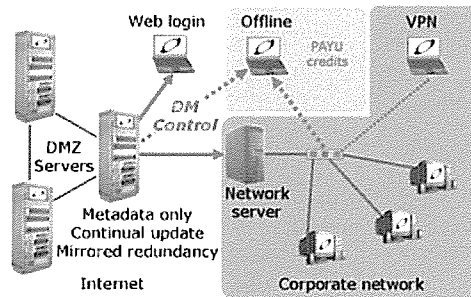


Figure 6: Authoritative metadata engine infrastructure architecture.

THE METADATA-CENTRIC BUSINESS MODEL

Digital management

Digital management creates value in two main ways. First, it creates the possibility to transaction-snip, or, in other words, charge a percentage fee, or share in the revenue between owners and users of digital products. Secondly, it can build a large userbase very quickly. Large userbases create significant capital value for any business. Other opportunities deriving revenue from userbases for business value arise from opportunities for the sale of advertising, market intelligence and metadata services for provisioning and procurement. This will extend aggregation services, which currently only deal with content and data, to products from different vendors comprising solution sets of different expert systems products combined and customized to suit specific enterprise environments.

Digital management- and metadata-centric services will become significant business activities in the near future, with major impacts on how business processes are organized. For example, metadata services will develop to link Geographical Information Systems-based control of transport and enable consumers to create and manage self-governing transport services, where vehicles used by multiple users are administered and managed via digital management services. Another example might be the building of virtual processing plants using supplier data to integrate and enable real-time supply of construction and maintenance material and parts to plant owners. Savings worth many billions of dollars are possible, but this cannot be done

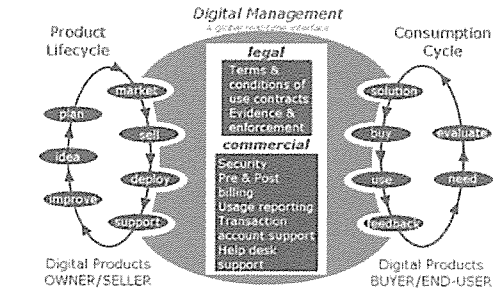


Figure 7: Commercial metadata-profiling business space.

while supplier data remains unmanaged in the digital environment.

Effectively, digital management is the framework of functionality that links producers and consumers of digital products in a legal auditable system providing security of ownership, measurement of value and flexibility to better support commercial activities (see Figure 7).

By using metadata profiles via digital management services to manage products in production and consumption lifecycles, the needs of both parties can be met far more efficiently than is currently the case.

Regulators, taxation, legal obligations and liabilities

Access to a digital product can only be denied where the digital product is subject to enforcement of legal rights. These rights are recognized by law in the form of contracts, copyright, trademarks and patents. In the instance of a digital product being subject to a right of ownership, no user can demand use of the product without referring to an agreement where such rights have been extended to include the intended user by a digital management system.

The communication of legal intent, transmission and storage of value, and evidence thereof, is also subject to regulation and legal sanctions. The sources of this regulation come from corporate, financial, communication and consumer protection legislation. Legal sanction is required to show authentication, and evidence of agreements and compliance between relevant parties. Digital management services meet the needs of regulators and legal obligations in the electronic connected economy.

Further, there is a growing urgency from Governments to find effective ways to enclose the digital economy within the fiscal walls of sovereign regimes in order to bring the associated economic activity into their taxation orbits. These needs of Governments to measure economic activity and tax transactions within the digital economy can only be effectively met by broadly deployed digital management services. When this is realized, one can confidently predict that digital management services will be made compulsory for businesses operating in the digital economy.

In summary, the speed and extent of the Internet has overtaken the ability of traditional law and government institutions to administer legal requirements of a connected environment in a timely and efficient manner. For these reasons, a broad uptake of digital management services can be realistically expected to occur in the near future, in order to electronically facilitate government administration of tax and legislation, and meet the legal and commercial needs of the digital economy.

CONCLUSION

The use of metadata for commercial deployment and consumption of digital products will dramatically change the nature of digital product procurement and provisioning of enterprises and individuals.

The future of the traditional software industry in the digital economy, previously based largely around boxed software products, the enterprise software industry of big deals, and concentrated corporate and local computing, is changing. The next generation of digital product value builders is going to be serviced-based and metadata-managed. Even hardware value will become dependent on the services that it

supports, and will be subject to metadata management.

The move to controlling digital product by metadata, trading digital products and management at point-of-use, is inevitable. The technology to support point-of-use metadata control and to administer IPR metadata already exists.⁵ The market is increasingly demanding change. Software on Demand, SaaS and PAYU are terms and concepts that were largely unknown a year or two ago, but are now common in the digital product marketplace.

Metadata management of digital property will become the 'Digital Land Titles Administration' aspect of the cyber-world. It will enable proper ownership of digital property, and will support efficient and effective business metrics required to account for 'digital rent' that underpins the accumulation of ultimate digital capital.

Ultimately, economic value is about measurement that can only be achieved by effective metadata-based management of digital products.

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Original Article

Using metadata to support DRM, trading and administration of globally deployed digital products

Leo Mullins

is an Australian Chartered Accountant with over 28 years' experience. He trained as an auditor with KPMG and then worked for KPMG, PwC and EY. For the last 15 years, he has been working as a consultant for the oil and gas and ICT industries. He has authored numerous publications, and has invented and patented a digital management technology.

ABSTRACT There is growing need by owners, developers and consumers of digital products for a metadata platform to create commercial application and content profiles of digital products for the purposes of digital rights management (DRM) and digital product trading. To meet this demand a metadata-based digital management platform is needed to support both the production and consumption life cycles of digital products. This involves the creation, definition, use and relevant reporting of metadata for the control and administration of 'point-of-use'-based DRM, as well as the associated legal and commercial requirements of such a service. Developing and implementing a metadata digital management platform must be based on a global infrastructure and the needs of Intellectual Property Rights governance over digital products. In all sectors, a metadata-based digital management platform is required to adequately deal with and provide for security, authentication, identification, permissions, data storage, metadata ownership, digital products ownership and liability responsibility, business models, legislation, taxation, sovereignty, interoperability, multilingual interfaces, transaction types, biometrics, continuity of service, off-line functionality, licensing models, pricing models, application metrics for technical support and e-commerce.

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Keywords: digital management; digital rights management; intellectual property rights; metadata metrics; metadata frameworks; transparent transactions

INTRODUCTION

Metadata, IPR and DRM

Intellectual Property Rights (IPR) are the foundation for measuring and protecting the utility of digital products, and, hence, value accumulation. They are necessary to support and justify investment in the digital economy.

As more and more business processes and knowledge are transferred to the digital environment, the nature of the participants, their activities, tools, resources and associated dynamics change profoundly. Previous management practices and tools are no longer sufficient to support value creation and maintenance in this

new environment. Hence, it is imperative that new tools, new thinking and new ways to measure, control and administer these products, activities, processes and participants are developed.

To meet this challenge, the development of a new metadata-based digital product management platform is required. This platform must aim to achieve real-time global management and administration of digital products serving the needs of property owners and users, while being consistent with commercial deployment and procurement processes. The ability of owners to manage the deployment of their digital products, and, equally, for consumers to evaluate their

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expenditure in real-time, is essential for the survival and evolution of commercial enterprises in an increasingly highly connected economy.

IPR governance

IPR governance is the process of identifying specific digital objects and setting terms of use and access. These terms and conditions must then be enforced by another process, commonly known as digital rights management (DRM). Traditional DRM has centered on technical enforcement of these ownership rights, but is largely considered to have failed, giving rise to growing consumer disquiet. This is mainly because of poor communication between consumers and the digital product's rights owners. Illegal use of digital products is, therefore, unmeasured and consequently ungovernable.

The only avenue currently available to owners when faced with failure of DRM technology and theft of their digital property is recourse to the courts, an avenue only open to corporations with very large financial resources. However, such a remedy has been of limited success, as evidenced by the consumer backlash in the music and entertainment industries.

Using dynamic metadata-based information to achieve 'active' DRM for IPR governance is the way of the future. Doing so will provide information vital to securing ownership and measuring the value of digital products. New, more efficient business models and sales channels will be made possible. Creative and innovative products will find quicker and cheaper roads to market. Separate systems for managing the different needs of data and metadata introduce dynamics and efficiencies not possible by traditional *ad hoc* co-mingling of data and metadata on common infrastructures and business processes.

Metadata and global commercial deployment of digital products

The development by the Dublin Core Metadata Initiative of application-profiling¹ saw the beginning of the use of metadata in the document management and content publication industries. It has traditionally been focused on standardizing terms and naming conventions of metadata items deemed necessary to provide for efficient use and administrative control over

digital products, primarily in the field of library science. Its objectives are, therefore, to support the needs of content publication, transmission, storage, retrieval, copyright and attribution.

Similar needs for administering the output of developers have been growing in other areas of software applications and content. Traditional solutions for digital product owners of license management and/or subscription-based access have resulted in high levels of illegal use of digital products.² Inadequate communication between users and owners creates the differing perceptions of value at the center of this problem.

The scale of the IPR governance problem grows as the Internet expands and connectivity increases, creating an increasing demand for effective real-time digital management of IPR by both creators and consumers of digital products.

The underlying concepts of digital management are as follows:

- Identification (owners, products, users and rights);
- Custody (enforcement of rights);
- Measurement (evidence of enforcement of rights); and
- Settlement (transfer of value).

A digital management service platform using metadata in the above conceptual framework will enable owners, in accordance with a legal contract with consumers, to set and enforce all terms and conditions necessary for effective IPR governance over deployed digital products.

The implementation of digital management services on a global scale is fundamental to the future development of the digital economy.

Digital products

An identifiable digital object, content or application is commonly referred to as a digital product. The ability to measure the use of a digital product requires that it be uniquely identified to be of relevance to any metadata schema. A digital product must rely on the uniqueness of identification against a set of characteristics of a product, rather than on an individual instance of the product, because of the ease with which digital products can be replicated. That is to say, users generally do not

get to own digital products in the same way consumers of physical goods get to own their consumption, for example an owner of a car.

The limited exception is the case of open-source licencing, in contrast to proprietary software licenses: ownership of a particular copy of the software does not remain with the software publisher. Instead, ownership of the copy is transferred to the end-user. As a result, the end-user is, by default, afforded all rights granted by copyright law to the copy owner. Note that 'copy owner' is not the same as 'copyright owner,' as ownership of a particular copy is transferred, whereas ownership of the copyright remains with the software publisher. Additionally, open-source software licenses typically grant to the end-user extra rights, which would otherwise be reserved by the software publisher.³

The costless replication nature of digital products makes it vital to proper IPR governance that digital management of digital products occurs at their point-of-use. Further, digital management of common ownership over different digital products is possible only through a system where ownership characteristics can be associated with different digital objects, which together achieve a unique identity required for control.

Obviously, the less metadata applied to the management of a digital product, the less information is available about the use of the product. Similarly, the more specifically the needs of a digital product can be connected to its utility metrics, the more fine-grained the management of control and reporting on that product.

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Individuals or enterprises having claims to identifiable digital products through creation or purchase will always need to protect their property to justify their investment. Investments are justified in many ways, most commonly by measuring income derived through distribution or consumption. Therefore, an essential element of IPR governance must be the ability to measure the use of digital products by authorized users. In a dynamic control environment as envisaged by metadata-driven digital management, a user not complying with terms and conditions must be capable of being

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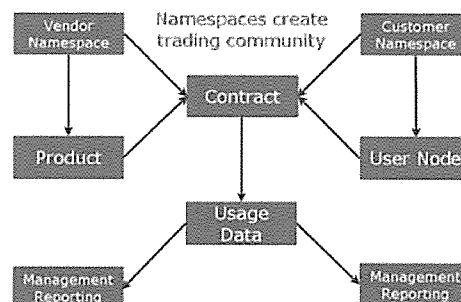


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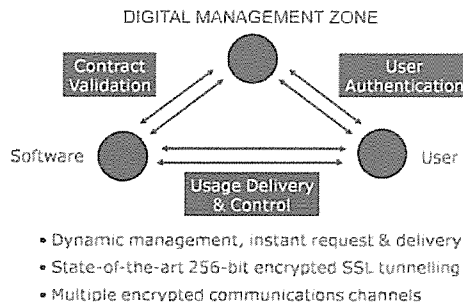


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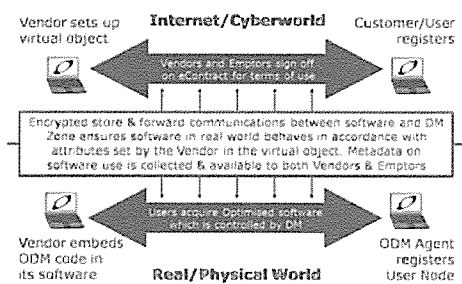


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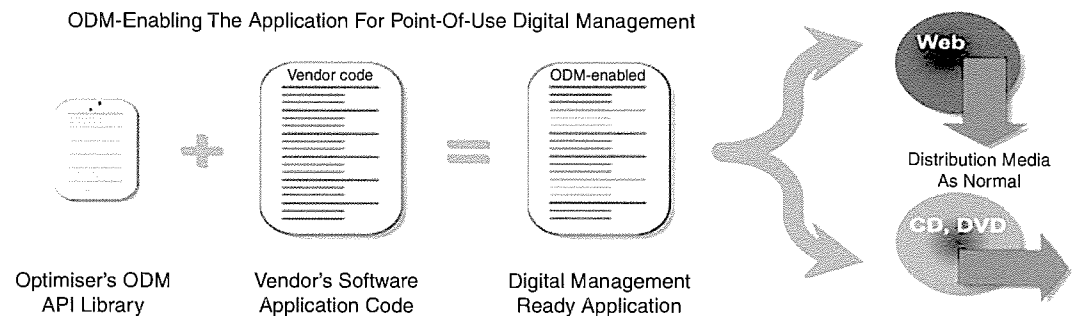


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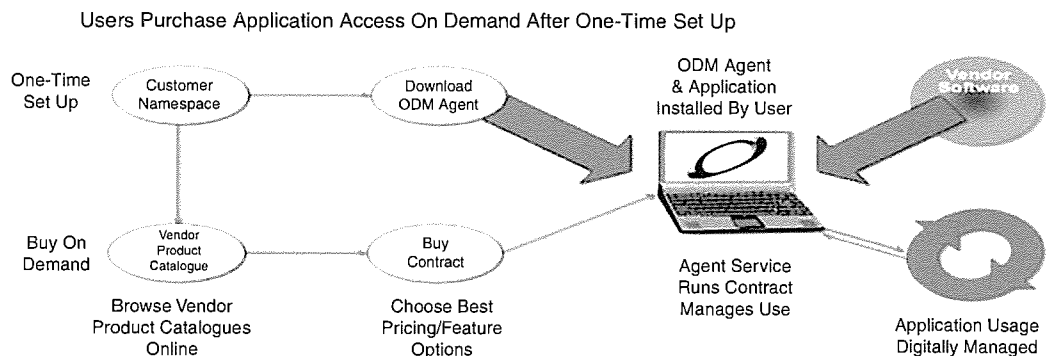


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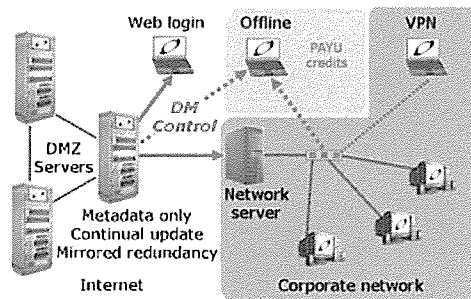


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Digital management

Digital management creates value in two main ways. First, it creates the possibility to transaction-snip, or, in other words, charge a percentage fee, or share in the revenue between owners and users of digital products. Secondly, it can build a large userbase very quickly. Large userbases create significant capital value for any business. Other opportunities deriving revenue from userbases for business value arise from opportunities for the sale of advertising, market intelligence and metadata services for provisioning and procurement. This will extend aggregation services, which currently only deal with content and data, to products from different vendors comprising solution sets of different expert systems products combined and customized to suit specific enterprise environments.

Digital management- and metadata-centric services will become significant business activities in the near future, with major impacts on how business processes are organized. For example, metadata services will develop to link Geographical Information Systems-based control of transport and enable consumers to create and manage self-governing transport services, where vehicles used by multiple users are administered and managed via digital management services. Another example might be the building of virtual processing plants using supplier data to integrate and enable real-time supply of construction and maintenance material and parts to plant owners. Savings worth many billions of dollars are possible, but this cannot be done

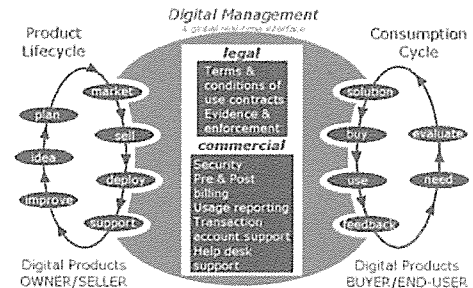


Figure 7: Commercial metadata-profiling business space.

while supplier data remains unmanaged in the digital environment.

Effectively, digital management is the framework of functionality that links producers and consumers of digital products in a legal auditable system providing security of ownership, measurement of value and flexibility to better support commercial activities (see Figure 7).

By using metadata profiles via digital management services to manage products in production and consumption lifecycles, the needs of both parties can be met far more efficiently than is currently the case.

Regulators, taxation, legal obligations and liabilities

Access to a digital product can only be denied where the digital product is subject to enforcement of legal rights. These rights are recognized by law in the form of contracts, copyright, trademarks and patents. In the instance of a digital product being subject to a right of ownership, no user can demand use of the product without referring to an agreement where such rights have been extended to include the intended user by a digital management system.

The communication of legal intent, transmission and storage of value, and evidence thereof, is also subject to regulation and legal sanctions. The sources of this regulation come from corporate, financial, communication and consumer protection legislation. Legal sanction is required to show authentication, and evidence of agreements and compliance between relevant parties. Digital management services meet the needs of regulators and legal obligations in the electronic connected economy.

Further, there is a growing urgency from Governments to find effective ways to enclose the digital economy within the fiscal walls of sovereign regimes in order to bring the associated economic activity into their taxation orbits. These needs of Governments to measure economic activity and tax transactions within the digital economy can only be effectively met by broadly deployed digital management services. When this is realized, one can confidently predict that digital management services will be made compulsory for businesses operating in the digital economy.

In summary, the speed and extent of the Internet has overtaken the ability of traditional law and government institutions to administer legal requirements of a connected environment in a timely and efficient manner. For these reasons, a broad uptake of digital management services can be realistically expected to occur in the near future, in order to electronically facilitate government administration of tax and legislation, and meet the legal and commercial needs of the digital economy.

CONCLUSION

The use of metadata for commercial deployment and consumption of digital products will dramatically change the nature of digital product procurement and provisioning of enterprises and individuals.

The future of the traditional software industry in the digital economy, previously based largely around boxed software products, the enterprise software industry of big deals, and concentrated corporate and local computing, is changing. The next generation of digital product value builders is going to be serviced-based and metadata-managed. Even hardware value will become dependent on the services that it

supports, and will be subject to metadata management.

The move to controlling digital product by metadata, trading digital products and management at point-of-use, is inevitable. The technology to support point-of-use metadata control and to administer IPR metadata already exists.⁵ The market is increasingly demanding change. Software on Demand, SaaS and PAYU are terms and concepts that were largely unknown a year or two ago, but are now common in the digital product marketplace.

Metadata management of digital property will become the 'Digital Land Titles Administration' aspect of the cyber-world. It will enable proper ownership of digital property, and will support efficient and effective business metrics required to account for 'digital rent' that underpins the accumulation of ultimate digital capital.

Ultimately, economic value is about measurement that can only be achieved by effective metadata-based management of digital products.

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THE ECONOMY, COMMERCE, VALUE AND DIGITAL MANAGEMENT

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Abstract

This paper discusses issues of intellectual property rights governance, particularly those pertaining to the new digital environment, and associated creation and maintenance of economic value through appropriate administration, integration and management of digital product. It serves to provide a better understanding of what Digital Management (DM) means to communities and global economies, information about current commercial practise and DM's impact on future management best practice, the importance of DM's contribution to business processes and commercial value in future global ecommerce markets. It explores the general nature of, and issues relating to intellectual property governance, economic value, and community wellbeing, especially with regard to created, stored and distributed product in digital form, as well as some of the main implications to Government, business managers and the Information Communication Technology (ICT) industry in general. The broad topics and historic background covered include: The current macroeconomic environment and expected future for ICT economic development, the importance of good intellectual property rights (IPR) governance in communities and government, problems of integration and the digital product environment and value creation, the fundamentals of Digital Management, the need for dynamic enforcement of terms and conditions of contracts in DM, the inefficiencies inherent in traditional practices, the need to improve administration of digital ICT on a global scale for associated general taxation, accounting and administration issues.

Keywords

Change, Intellectual Property Rights, Digital Rights Management, digital economy, digital property, integration, measurement, appropriate access rules, metadata, unique product identity, enforcement, evidence,

The Industrial, Technical and Communication/Connectivity Revolutions

Recent social history of the world is marked by change points evidencing the bifurcation of social eras. These eras are characterised by accelerating change and increasing economic impact on communities and institutions. The Industrial Revolution was the first, beginning in the early eighteenth century, whose impact continues today. The next era, the Second Industrial Revolution also known as the Technology Revolution, ushered in the nuclear age and man's ability to destroy the world. The acceleration and concentration of the causes of the original Industrial Revolution around technology development magnified effects of the second era in terms of global and social impact. The Technology Revolution brought about as much social, political and scientific change in the last half of the twentieth century as did the one hundred fifty years following the Industrial Revolution. This illustrates an accelerating pace of change in modern times that continues into the most recent era, the current Connectivity or Communication Revolution. Consequently, the early twenty first century is a time of massive global technical, social and political change.

The Industrial Revolution severely impacted the landed gentry and the agrarian peasant classes who were the dominant institutions and communities of the previous agricultural eras. That revolution saw in: the beginnings of democratic government, the beginning of the end of royal family realms and divine rule, the growth of the state, the associated developments of colonial policy by the European powers that first embraced industrialisation, and the introduction of the corporate enterprise.¹ Governments gave birth to corporations who developed and organised resources to manufacture goods in factories. This was the beginning of industrialisation, manufacturing, and commerce trade driven by economies of scale. The Industrial Revolution was characterised by the growth of factory labour and manufacturing commerce and trade, the development of the State and collapse of agrarian labour. It was responsible for European and the New World catastrophic social changes of the eighteenth century: the huge rural to city population shifts and mass transnational migration. At the same time it saw the end of regular country-wide famines.

As with the previous revolutions the Connectivity or Communication Revolution will continue to impact the social fabric, but they will be of a more global nature happening at higher speed and frequency. These impacts will severely affect the current dominant social institutions and political power blocks that developed out of previous eras. Without responsive change being implemented quickly and effectively these institutions will quickly become ineffective and unable to take advantage of future opportunities or maintain their relevance to the communities they serve.

The Technology Revolution was characterised largely by rapid technology developments, a high regard for concepts of corporate competition, mass markets, and the growth of the financial size and power of the Multi-National Corporation (MNC). Social and political change introduced by the Industrial Revolution was continued by the Technology Revolution. It was assisted by world wars that exacerbated social disruption on a global scale that encouraged rapid implementation of the technological discoveries of the age. The growth in size and number of corporate enterprises accelerated and captured the resulting value that new technology developed. It was the start of the nuclear age.

The Technology Revolution has overseen: the development and acceptance of democracy as the dominant political legitimising process of State power, the collapse of empirical colonialism, and the growth of the State as the primary basis of law administration and enforcement. As with the Industrial Revolution, Western Society benefited the most and was the dominant driver of the times. Its institutions measured success and economic growth in financial terms alone. These communities saw responsibility for their welfare as resting primarily in the hands of the State and the MNC's who governed and employed them. The size of corporations grew to support their new needs and to capture the global opportunities technology offered. They then needed to operate on a global scale requiring increasingly sophisticated administration to manage complex global transactions and transnational processing and trading activities. These MNC's tended to keep their national character and their processes were organised, administered and hierarchically managed by groups of skilled managerial people. Their size and financial strength however made them almost immune to Government control. As with the Industrial Revolution, managers instructed and supervised relatively unskilled labour undertaking simple tasks in complex manufacturing processes using highly refined centralised command and control management techniques. It was the time of the welfare state, responsible government, and largely unaccountable MNC's. This environment spawned the largest frauds in history. (Enron, Worldcom, BCCI, Tyco)

The Industrial and Technology Revolutions have shaped our institutions as we know them today. Our education, healthcare, legal, and governance institutions and activities developed and were organised mainly to support the needs of commerce and the corporate entity. They are viewed as the prime commercial beings of our time. Technology was boundary focused and individuals tend to be depersonalised and have largely become resources of the corporation. As a result MNC's grew in power so as to be able to dominate or significantly influence the majority of Governments of the world today.²

As we enter the twenty-first century we are now experiencing a very different revolution. It is the age of the knowledge worker, of global data access and instantaneous transactions, the empowerment of the individual, the blurring of technical enterprise boundaries and democratisation of the MNC. The power of MNC dictatorial control over global trade and domination of mass markets is waning. This is due to the Communication or Connectivity Revolution consolidating the global digital economy and seeing the growth of niche markets, integrated cross-enterprise commercial transactions and mass personalisation by more and smaller companies. They are increasingly influencing the world of commerce and trade at the expense of the MNC.

The increasing commercial power of individuals and small and medium enterprises (SME) able to operate globally enable them to compete with MNC's. These smaller operators are also providing services to MNC's through out-sourcing and in-sourcing activities. As transaction costs fall, more sophisticated processes become better able to be performed by smaller specialised entities and individuals than MNC's. This is the age of integration. Where the Technology Revolution emphasised competition, this revolution demands integration and cooperation as the most important and significant aspect of entities and communities from which to generate value.³

The new revolution is also changing the world's concept of value. It is generating a growth in awareness of environmental costs, the health and well being of participants and the environmental sustainability of commercial activities. These are vital components to be accounted for together with traditional financial metrics in the more appropriate, fuller, measurement of value. This revolution is demanding the collation of yet more information from commercial systems.

The driving force of the Communication or Connected Revolution is the Internet. This networked anarchy of networks is connecting the globe. Its primary affect is on the size of effective commercial entities; corporation size is related to transaction costs.⁴ Before now corporations grew to their present size in order to optimise their ability to minimise transaction costs. Smaller entities are now able to

handle complex transactions that were previously only able to be undertaken by MNC's. Competition to MNC's is now provided by smaller, swifter, integrated, enterprises working quicker and cheaper. Individuals and small groups are more able to do the same complex transactions as large organisations because of integration made possible by the Internet. This change has eliminated large swathes of barriers built and used by MNC's to previously deny entry to their lucrative commercial domains.

The effectiveness of the traditional corporate organisation is now being challenged by individuals. Corporate and managerial power is being undermined by the power of knowledge workers. Their communities are no longer tied to the city and the MNC, but they will still need effective Government in order to help them optimise and support their ability to attract and do the work of the knowledge age.⁵

To take advantage of the new opportunities created by the global reach of the Internet and fall in the cost of transacting, nationally and internationally, Government will have to ensure in future that their communities are appropriately educated and have access to the necessary infrastructure, information and IPR to enable them to accumulate knowledge locally so that they can participate globally in the increasingly connected world economy.

Communication, Connectivity, Law, Government, and the Economy

The future will see economic value and growth increasingly become community responsibilities carried out by individuals and SME's supported by their Government. Individuals and small groups of people are looking to using MNC's and Government institutions as centres of influence and law, enforcers of commercial contracts, and sources of infrastructure resources and finance. If this can be done effectively, MNC's will increasingly become centres of cooperation in those communities rather than the command and control centres or primary task agents as before. Governments must act as commercial enablers for citizens in their interactions with MNC's in order to be relevant in the future. This will help create value by assisting innovation and protecting ideas. Value is also created by cooperating with MNC's to access necessary resources and infrastructure. The Communication or Connected Revolution is ushering in the Digital (Symbiotic) Age, the age of cooperation and integration.

To protect themselves, Governments of the future will need to be increasingly supportive of their communities' commercial activities, their entrepreneurial individuals and their SME's in order to interact with MNC's and operate globally. This requires intense communication between Government, their communities and MNC's in the areas of communities' educational, legal, commercial and

environmental needs to fully develop adequate interfaces with MNC's. Government/community cooperative activity is essential if its overall community's global competitive capacity and comparative advantage is to be achieved. This development of communities' commercial ability to contribute to their own economic wellbeing is becoming a primary function of future Government. Any failure to ensure their communities competitiveness in the global economic and commercial trading environment undermines Government's existence.⁶

Connectivity is the central agent of change. Communicating and connecting are major aspects of Governments obligation to their communities. Today, even Australia is considered to be lagging the world with only 70 percent of its population being connected to the Internet. Sweden, Iceland, Japan, Korea, and many other countries outstrip Australia in both actual connectivity and data volume access capacity with Australia and the United States dropping to 19th and 10th in the ranks of the world's OECD's communication infrastructure environments.⁷ With communication and connectivity now a prime requirement for economic competitiveness, especially in the fast growing and increasingly significant area of digital product and ecommerce value, such issues become a real cause for concern for all Governments.

The Role of IPR, Digital products and the Economy

Digital product and electronic commerce is an increasingly significant sector of the global economy

...intangibles account for 70 percent of the current value of equities in the United States.

The Federal Reserve study found (...) that 47 percent of all intangible investment lies in computerized information (software and databases).⁸

The growing value of the knowledge economy makes it very important for communities to have good access to global information and protection of their own, and externally contributed accumulated knowledge. This is the foundation of a communities' wellbeing in the global knowledge economy. The Government's role in IPR governance is vital. To conduct and capture the value of their economic activities communities will, together with reliable access to global data, need a consistent body of commercial law that they can rely on. Communities need to be assured of fair and strict enforcement of IPR law to protect their own and others intellectual property. Without secure ownership rights a community has no incentive to generate value or attract externally owned IPR.

Enforcement of ownership rights and recourse to law is essential to protect and accumulate property. As the digital age rolls forward a growing proportion of economic wealth is built on digitally-based activities and digital property.

Thus the well-being of communities in the digital age is increasingly dependent on their access and secure possession of digital IPR. This is therefore an important determinant of their ongoing ability to influence global economic activity and to participate in—increasingly electronic—commercial trading.

Accepting the criticism of TRIPS (Trade Related Intellectual Property Services) in disputed areas of the commons and community rights to access gene pools, environment access, and other traditional knowledge or practices, the value of good IPR governance in the digital arena is undisputed. Countries with bad IPR reputations, especially with regard to digitally based products, and underdeveloped or weak legal institutions, poor legal governance and enforcement, are now severely disadvantaged with respect to future economic development because the Communication or Connectivity Revolution is already well underway. The situation will become increasingly worse for them if nothing significant is done. For a community to participate in the coming new digital age and influence the Communication or Connectivity Revolution without the proper tools or support is impossible.

Unless these Countries make serious attempts to improve the global perceptions of their IPR governance they will be permitting a huge disservice to their citizens. By failing to fully participate in the global economy communities will not be able to leverage their regional comparative advantages. Governments thereby reduce their relevance to their communities by being unable to help develop their community's economies. In failing their community they threaten their own existence.

A real world example

China is currently actively accused, at the highest levels, by MNC's such as Sony and Microsoft, and by the European Union, USA, and others, of significantly and deliberately breaching its WTO (World Trade Organisation) TRIPS obligations. The Annual Report on China in 2006 to the US Congress had the following to say.

The Chinese government tolerates intellectual property rights (IPR) infringement rates that are among the highest in the world. The Chinese government has not introduced criminal penalties sufficient to deter IPR infringement, and steps taken by Chinese government agencies to improve the protection of foreign intellectual property have not produced any significant decrease in infringement activity. The Chinese government's failure to provide effective criminal enforcement of IPR has led foreign companies to turn to civil litigation to obtain monetary damages or injunctive relief. Civil litigants continue to find, however, that most judges lack the necessary training

*and experience to handle IPR cases, and damage awards are too low to be an effective deterrent.*⁹

The damage to both the global ICT market and to China itself is unequivocal but no expectation of significant change is currently held by the world's ICT opinion shapers. The following is an excerpt from the Economist's report of the state of IPR governance in China.

Technology Forecasters, a US electronics outsourcing and supply chain consultant, reckons that the street value of counterfeit electronics could be anywhere between US\$1bn and US\$10bn a year. ...

The world's "top 10" countries by piracy rate in 2003

1)Vietnam 92%, 2)China 92% 3)Ukraine 91%, 4)Indonesia 88%, 5)Zimbabwe 87%, 6)Russia 87%, 7)Algeria 84%, 8)Nigeria 84%, 9)Pakistan 83%, 10) Paraguay 83%

Piracy has deterred until recently the world's top makers of video games consoles, Microsoft and Sony, ... Microsoft's business model is to sell its Xboxes at a loss, hoping to generate profits through software sales and royalties. Given that rampant software piracy would undermine its business model, Microsoft is unlikely to release the Xbox in China. Ironically, Microsoft makes its consoles in China.

Weak IPR protection can hurt Chinese interests as well. In the popular music industry, local pop bands and record labels have struggled to emerge in an environment that leaves them with little ability to earn money from their efforts.

*A KPMG study estimates that IT companies lose as much as US\$5bn each year globally, as a consequence of grey markets, in which sales amount to US\$40bn.*¹⁰

The interconnectedness of the future economy can be illustrated by the potential damage this situation is expected to cost China as it prepares to host the Olympic Games in 2008. China will find it difficult to fully develop the Olympics' marketing opportunities because the largest corporations and leading world Governments such as the USA and the EU will be using the opportunity to draw attention to their allegations of China's breaches of its WTO obligations and their consequential commercial damage and losses..

China will thus find it imperative to find a quick solution. Inward ICT investment will be significantly reduced over the next decade if a solution to its IPR governance obligations is not found before the Olympic Games commence. Otherwise it will certainly lose out on one of its most timely and strategically significant opportunities to draw ICT capital into its economy. This Investment capital

is vital for China to meet its aspirations as a future leading global economic player in the digital age.

In order to provide the IPR governance needs of a community there needs to be a full understanding of the nature of digital product and the current value drivers of the digital environment and commercial economy. The following discussion centres on issues of digital value and administration.

The Problem with Digital Product and the Internet

There are many perceived problems with value and the Internet. The nature of these problems, however, generally depends on the precise standpoint of the complainant: Governments see the Internet as anarchistic in nature, a haven for criminals to operate and organize using secure communication technologies, difficult to monitor and administer and therefore a threat to society, law and order. Established market-dominating corporations, now affected by electronic file sharing technology and digital replication of their products, see their businesses threatened by dishonest thieving freeloaders. Individual Internet users see Corporations as greedy overcharging highwaymen and find their computers deluged by Spam and infected by malicious software (viruses, Spyware, worms, Adware etc.).

The Internet is a graveyard for investors. They invest anticipating business bonanzas expecting immediate revenue-positive operations based on blindingly effective global business processes. Given that inefficient markets are in part characterised by monopolistic domination, the ICT market for digital products is, in fact, inefficient. This is despite its greatest aspect, the Internet, being generally described as the basis for more efficient commerce.

The Internet itself suffers from an identity problem. It is viewed simultaneously and alternatively as a new medium of communication, entertainment, sales, and education; as the new way of business, from worship to terrorism.

The Internet, however, is simply a global network of computers. The nature of the Internet, therefore, cannot be attributed or be considered as a basis for the perceived problems of commercial and economic trading activity in the digital product environment. Approached at its most basic level, like all business problems, the problems of digital product and Internet are about value.

Digital product value is directly associated with exchange of utility. The increasing ubiquity of the Internet and connectivity convergence towards the Internet is having increasing impacts on all value concepts concerning use and ownership of digital product and digital assets.

Digital product and digital assets include incidences and process related to all and any data, stored, transmitted,

altered, digitally manipulated and exchanged. From email, to video, including VOIP, software, games, music, text, graphics, data storage, security, and any other digitally conveyed value imbedded in hardware to control consumer and industrial appliances.

The Internet's imperfection and its lack of commercial effectiveness in the context of current digital product trade exchanges can be understood by delving into the basic fundamental assumptions of Internet users, their understandings and expectations. By examining relevant elements it is possible to better understand the underlying causes of the perceived problems of the Internet.

The beginning of the digital age

Long before the Internet, economic value was created by physical exchange of goods and services. People's needs were met and generated value by people trading wants and surpluses. At its root, trading is based on the fundamental concept of "fair exchange". A fair exchange is one where a party gives up possession of a good or services in reciprocation of another taking possession of an equivalent value good or service and vice versa. Exchange transactions take place by exchanging goods directly (bartering) or using money and money equivalents that provide primary functions of a store of value and units of measurement to facilitate trading activity.

The reason for trading is for surplus to meet scarcity. It is the commercial foundation of human society. The mountain of value attributed to human possessions is founded on trading, a process of exchanging fair value. The act of exchange creates the concept of value by involving opposing forces negotiating perceptions of stored utility to achieve a mutual agreement on value of the units exchanged in trading. Because this value agreement is based on the interactions of willing buyers and willing sellers, the results are consensual, and thereby considered to be the most reliable basis for measurement of value.

Commercial trade results in balanced transaction recording and measuring people's perceptions of value exchanged by the parties involved. In short, the primary nature of trade is its consensual agreement of value based on perceptions of fairness and equal dealing.

The digital age has extended the geographical reach of traders and increased the speed and volume of trade transactions to vastly increase the scope, nature, and range of traded goods. More importantly it has seen in a vast accumulation of data to support the creation of new value and information never before available. Although the Internet has introduced scale and new complexity to traditional trading, it has changed nothing of its fundamental nature.

The Internet and Digital Intellectual Property Rights

Contrary to the usual expectation of decreased value from increased supply, the digital age has seen increases in value from increases in the supply of information. Further, with the advent of global digital communication, this digital product (information, data, and the ability to manipulate data, or software) has added new and different goods for people to exchange. The value of this information is growing and now far exceeds that of traditionally traded physical goods.

In the digital environment new complexities are introduced to the trading process. Without adequate IPR protection the most obvious is the almost costless capacity to replicate valuable digital product. The implication being that it enables surpluses to meet needs without exchanging possession, that is, one party still has their product after they have sold it. Other complexities relate to: the high speed degradation of data's value, instantaneous transactions, global transactions, transaction volumes, and problems attributed to the incorporeal intrinsic nature of the traded goods.

Digital trading, the very system responsible for creating value now becomes the system that can instantly destroy the value created, if effective IPR governance is not built into the digital economic environment. Unless the ability to replicate data is kept in the hands of the supplier, the value of a surplus data commodity vanishes once trading commences. Where suppliers of data product are unable to prevent buyers from distributing these data products, the value of the surplus will collapse after the first trade. The scarcity need, which is the basis for the data value, is quickly fulfilled because the new possessor of the data can replicate it and globally distributes it instantly, without cost.

When data is traded for money, a kernel of unfairness is injected into the exchange. One of the parties is exchanging money that is given up, and the other exchanges data, which is not given up. This additional complexity arises in the digital trading environment because it unsettles people's essential need to balance the exchange. In this case the exchange of possessions can be validly perceived as one-sided because one party has exchanged data, which they retain, and the other, money, which is not.

An example of the importance and relevance of the digital IPR governance phenomena is most clearly illustrated today by the struggle of the MNC establishment to prevent the collapse of their traditional music and movie industries in the face of digitisation. This clearly shows why new digital IPR governance systems are needed.

The response to date of the Recording and Movie Industries has resulted in failure to curb the 36% year on year growth of the DVD piracy market.¹¹ The traditional methods of IPR governance based on legal enforcement and legislative processes have failed to stop digitisation technology. Replication of content by "ripping" (formatting music content for Internet file exchange) and file sharing networks like Napster, and Kazaa and can only be controlled by dynamic digital IPR processes. These can only be provided by implementing adequate DM systems on an industry or digital environment-wide basis.

The Impact of the Internet on the Value of Digital Property

The scale of the IPR governance problem grows as the Internet expands and connectivity increases. Correspondingly there are a growing number major industry-wide debates and legal confrontations taking place that are increasing the general level of awareness of the need for environment-wide integrated digital IPR systems. This is creating demand for effective implementation of DM by users and owners of digital content.

The problems of value and digital product trading fuel the debates between the old and the new. Between those who want change and those who do not. The outcomes of which will determine the commercial development of the Internet. The debates are heated by perceptions of unfair trade exchanges and complicated by digital trade exchanges occurring partially in the new digital (incorporeal) environment, and partially in the old analogue (corporeal) environment. That is, infinitely replicable digital product being exchanged for old-fashioned money, which can't be replicated in the same way.

The debates and confrontation are principally between the establishment controllers of traditional trading market mechanisms, the MNC suppliers, and individual buyers. The dispute is about the perceived value of product exchanged and evidenced by:

- File sharing – "who owns the music".
- Open source code licensing – "free or open code licensing versus propriety code licensing".
- Patenting software code – "ownership of ideas and application of copyright law".
- Software on demand, software as a service – "price of access to software",
- Copyright of data and content ownership – "stopping piracy without destroying distribution channels"

A solution to trading and exchange of value in the digital market is required for all these confrontations and debates and can only be implemented when the problem as outlined above is commonly understood.

Analogue and Digital Trade Exchanges

Traditional goods are exchanged from surpluses in order to meet needs. The value of a unit of trade is a measure of its perceived ability to meet the needs to the party acquiring it. This can be called its utility value as established by trading.

At the most basic level of trading corporeal or tangible physical goods, the utility value of goods exchanged is indelibly bound up in the physical nature of the item exchanged. That is, an axe is an axe.

With the development of human society there occurs an increase in the complexity of human needs. This adds components that make up the potential utility value of a tangible physical unit of trade. Correspondingly there is a lessening of the link between the physical nature of the traded items and its unit of utility measure. With increasing market sophistication, more and more extraneous factors begin to add to the make up of utility value of an item attributed by a purchaser. This is most clearly evident in the value of items susceptible to brand marketing, and in the fashion and antiques markets.

In the modern trading environment the utility value of an item of exchange varies along a spectrum, from that of a commodity where physical attributes equals utility, through to fashionable products where utility value is only a vague value aspect tenuously attributed to its physical existence.

The trading systems of today have evolved out of physical goods trading and adapted along with society to cope with a huge range of value concepts, from commodities to brands. It is able to do this because even at the highest levels of complex value measurement, the underlying physical nature of the traded item is always present.

With the advent of the digital age, this link between a traded item's physical attributes and its utility has vanished because of costless replication of digital products. Trading systems have attempted to cope with this by pretending replication doesn't happen from which some interesting and elegant work-arounds have evolved.

The principle work around has been to artificially create a physical attribute with which to link and identify utility value. This is the reason for the box that software applications have always, until recently, been sold in. To reinforce and secure the physical attribute the trading system also developed the concepts of encryption and licensing that has created the license management and security industry.

Licensing and encryption have developed extensively as an extension of the link between data's utility value and its physical attributes in order to manage and administer the box or the physical media of the digital product. Vastly complex license and sophisticated encryption technology has been developed to create a pretence of physical attributes of digital product in trade transactions.

However, as the Internet has developed and bandwidth increases the viability and usefulness of this artificial physical attribute has become an increasing liability to the efficient trading of digital product. This is mainly because the utility of data can never be adequately represented by a license or a physical representation. Licensing and encryption have become instead the basis for mechanisms to introduce inefficiency to the market place. This market inefficiency is clearly evidenced by overpriced software, increasing piracy, and monopolistic trading environments.

Digital Product Administration and Digital IPR Governance

Any solution must lie in recognizing that the utility value of data cannot be efficiently traded at the "point of physical exchange". It has to involve recognizing value at the "point of utility exchange". This is where and when data or information is accessed or used by the buyer.

The originating source of Internet discontent must therefore be attributed to the lack of an Internet-based commercial layer required to measure this "point of utility exchange" value. Without a commercial layer there is no inherent security and no business metrics to administer the ownership of digital product and thus control their use at their owners' direction. The Internet currently has no inherent functionality to support and facilitate the conduct and needs of proper trading of digital product.

A system of trading digital product administering the "value produced" or "utility value" of a digital product (pay as you use) rather than the traditional "media transfer" types of exchange is fundamental to the future of digital IPR governance and proper integration of the Internet.

This requires digital trading platforms of the future to: secure data and information continuously, authenticate access at a digital product's point of use, use accurate and flexible measurement metrics to measure and report all and any value exchanges, enforce trading rules over access to uniquely identified digital product value events governed by auditable legal agreements between suppliers and consumers, and to provide evidence of agreement terms and conditions of values traded. The system has to work in real-time or near real-time on a global basis in order to support proper trading of digital product now and into the future.

This is leading to the market's fast growing realisation that the future is SaaS (Software as a Service), SoD (Software on Demand), and PAYU (pay as you use). Dynamic digital IPR systems and DM are here to stay.

The move to trading digital product and data at its point of use is inevitable. The technology to support point of use data exchange and to administer IPR metadata already exists and the market is increasingly demanding it. Software on demand, software as a service, and pay as you use are terms that were unknown a year ago but are now common terms and concepts in the digital product market place. Only normal human desire to resist change is preventing wholesale immediate change to the traditional sales practises of the current ICT market.

The future of the traditional software industry as we have known it, based largely around boxed software product, the enterprise software industry of big, deals, and concentrated corporate and local computing, is untenable. The next generation of digital product value builders is going to be serviced-based. Hardware value is going to become totally dependent on the services that it supports; that is, hardware sales models will follow those of the mobile phone market, being free hardware connected to pay as you use software services.

Above all, economic value is all about measurement. Government, accounting and consulting professions must also take notice if they are to be relevant in the development of the future of business systems and processes. The centre of this digital product trading revolution will be the development, implementation and use of a commercial billing layer on the Internet. This is the "Digital Land Titles Administration" aspect of the Cyber-world that has yet to happen in order to enable proper ownership of digital property and supporting efficient and effective business metrics required to account for "digital rent" that underpins the accumulation of ultimate digital capital. The days of trading based in the physical possession of software and virtually free unhindered and uncontrolled distribution of digital content are numbered.

The Commercial Need for Digital Management

The fundamental reason for management, its *raison d'être*, is the protection and administration of assets. Its principal weapon is measurement. Without measurement, value cannot be ascertained, wastage cannot be eliminated and wealth cannot be maintained. Assets are commodities. They are, by definition, valuable in themselves, as well as being the tools used by a business to create more value. Conversely, anything that incurs a cost to a consumer is an asset and, hence, expense is viewed as the consumption of assets. Business processes for managing tangible assets are accepted worldwide, having developed over the last 600

years, and are designed to measure revenue against the cost of assets consumed.

General ledger accounting and ERP systems have traditionally managed tangible assets using the double entry system, recording ownership and transactions through various functional modules that comply with Generally Accepted Accounting Practices, or GAAPs. Intangible assets, however, have never been satisfactorily accounted for in the same way because of their incorporeal nature and the associated problems of measuring them. However, though sometimes contentious, serious investment has been made in the attempt to manage and value them. For example, brands valued on the strength of marketing spend and sales potential are carried on a company's balance sheet as goodwill. Why is this not the same with digital assets and products?

True, the Internet space and online marketplace are relatively new, but the underlying economics and commercial imperatives are as they ever were. Plus, capitalism has already fostered sophisticated accounting and legal systems that are mature enough to be able to contribute immediately and directly to increasing value of the world's digital economy. Now, 21st Century ratios of intangible to tangible asset values are three to ten times higher than just a decade ago¹² Then, intangible assets comprised approximately ten to fifty percent of the tangible asset value of an enterprise. Today it is likely that an enterprise's intangible assets are worth far more than its tangible assets.

Intangible asset values are growing faster and becoming more important than tangible assets. This trend can only continue, as service economies become the norm with more and more associated activities carried on over the Net. This is solid evidence of the increasing importance of intangible assets, not just to corporate performance and wealth creation, but also as another layer of capital bedrock. Yet, no adequate system for managing and accounting for them has yet been accepted. According to the World Intellectual Property Organisation's Report (WIPO) of November 2003:-

"Today DRM remains a fledgling industry ...

Several initiatives ... promise to create a networked environment that is trusted, based on the secure identification of users, devices and software modules, ensuring that content can only be exploited in line with rules set by the owners of the material...

*...However, this technology is still some way off (and, according to some, will never succeed) and for the moment, it is necessary to concentrate on specific technologies solely designed for the protection of intellectual property rights".*¹³

The evidence and consequent effects of this situation are apparent in virtually every organisation, given society's reliance on Information Technology. Software, an example of a vendor's intellectual property, still has to be purchased outright. The costs are either written-off or amortised according to inadequate depreciation policies that assume the consumption rate of each asset to be the same. When organisations create digital assets, there is usually no accounting for them at all when used internally. Consider any software company where its employees use its own product. Current accounting practice considers that the use of such assets cannot be correlated with revenue performance over time, and is without cost. Clearly this treatment is deficient.

Additionally, when digital assets are deployed externally, the intellectual property owner loses control. Consider, an architect sending out plans for a tender, or the lawyer with client confidential communications, over email. Anything can happen to that email and its attachments once it has left the corporate network boundary. The result is plain to see: No meaningful management or accounting for a digital asset's value, either created or consumed. Furthermore what should be of concern to every business manager, no information for commercial decision-making.

Digital Management and the Law

The new age will impact the way law works with Digital IPR governance.

The basis for laws governing digital management is essentially the same as that for traditional trading activities. Laws have evolved out of the need to exchange value between buyers and sellers. Technology has not changed these needs. What has changed is the ability of buyers and sellers to extend their geographic reach; increase their potential transaction volumes; and speed up business processes.

This does not change the fundamental needs of trading for fairness, honesty, transparency, and reasonable terms for delivery and payment. However, the new capacity to trade digital intangibles requires that traditional trading law also be extended, to maintain its relevance and effectiveness in the electronic marketplace. The responsibility of the legal profession and Government is to develop practical "Cyber Laws" to apply the accepted norms of commercial, contract and trading law to ecommerce.

Because of the global nature of DM legal transactions are now taking place in more than one national jurisdiction and subject to differing legal and cultural environments. It is thus essential then that any future IPR governance relies on a DM system providing dynamic enforcement of real time legal agreements. To rely on traditional legal avenues of recourse to protect the value of digital product is no longer feasible as can be seen from the current levels of

digital piracy in the world today. To be effective IPR protection now has to be based on dynamic, global, enforcement of digital contracts. These contracts must be validated on the authentication of users' rights to access before digital value is obtained. This would not jeopardise the rights of anyone or prevent enforcement disagreements being taken up. But they would negotiate between the parties before IPR ownership was breached and evidence of agreed terms and conditions would be available from the DM system. An effective DM system must provide real-time evidence of transactions together with audit trails and contract agreements and signing process that are subject to proper system-wide internal accountability control will enhance the universal legal processes of IPR governance for all parties.

The Failure of DRM to date

An identifiable digital item is an asset. It has two natures, one being associated with its utility or intrinsic value and the other relating to its ownership. When considering the need for DM the current IPR industry does not as yet separate the digital asset's nature from its "rights" metadata, and manages the whole digital item from the perspective of a single physical entity, that is, as though it was a tangible thing. At present digital IPR management is the preserve of thirty year old Digital Rights Management (DRM) technology and processes that manages "Rights" from strict legal and restriction of physical access perspectives. Consequently, the need to grant access post distribution is poorly met and no account is made of the two natures of a digital product; that is, its content or physical utility and its ownership attributes, under which the original legal concepts of "Rights" were originally developed.

Consequently, the traditional business of "Rights" management known as Digital Rights Management ("DRM") is a legal licensing one, primarily aimed at restricting usage. Its function is excluding access to intellectual property by any party which does not have legal capacity, or permission, to use or consume a specific digital product. The technology basis of DRM and the "License Management" industry relies on static processes that have to be implemented pre-distribution of digital product. The accepted methods of DRM rely primarily on static encryption based technologies to protect digital content from unauthorised access. Its purpose is to prevent unauthorised use and also relies heavily on the legal profession and institutions to pursue remedies in the event of failure of DRM.

DRM is largely unsuccessful because encryption keys to unlock digital content can and are freely distributed with the product they are meant to protect, primarily because of the increasing connectivity of the Internet. Current efforts to curb this using legal enforcement are increasingly inefficient and costly to apply.

Restricted largely to software licensing, DRM technology has failed because it cannot prevent the distribution of the decryption keys upon which protection depends. Further, rather than encouraging and supporting distribution and sales it acts as a negative restricting attribute of digital product. This therefore tends to encourage piracy rather than prevent it and together with easy duplication of digital assets provides subsequent consumers with almost infinite and cost-free access to digital IPR without recompensing the owners, or penalising legitimate users who pass on digital product and its encryption keys to those unauthorised users without permission.

Protection of IPR "Rights" has become increasingly a legal enforcement issue because technical protection cannot be relied on. This is due to DRM's over-emphasis on content encryption as the keystone to security. Even so this static DRM technology offers no dynamic management capability to add value to digital product beyond an unreliable "Give Access or Deny" event when it is initially deployed. Conventional DRM cannot meet the needs of digital IPR governance in the future connected world.

Digital asset management (DAM) is another aspect of DM and is generally concerns the management, storage, and version control of digital assets in enterprise environments, For example "document management" is a form of DAM. DAM and DRM are all IPR governance issues that are the preserve of DM as outlined here above, but DM of the future must also provide for the overall commercial trading and value management aspects of digital intellectual property. At present DM, DAM and DRM are distinguished apart from each other but are not generally fully understood or agreed on by the ICT industry, and, in some cases, DM is not even acknowledged as per WIPO's recent deliberations: -

"From a functional perspective, DRM means many things to many people. For some it is simply about the technical process of securing content in digital form. To others, it is the entire technical process of supporting the exchange of rights and content on networks like the Internet. For convenience, DRM is often separated into two functional areas.

The identification of intellectual property, rights pertaining to works and to parties involved in their creation and administration (digital rights management) "DAM"

The (technical) enforcement of usage restrictions (digital management of rights)" "DRM"¹⁴

The rise of Digital Management (DM)

The failure of DRM is accompanied by the development of DM. The term DM is now emerging to describe a more all encompassing approach to IPR governance which encompasses both DAM and DRM. Given the growing

role of digital products and assets in today's businesses, combined with the necessary involvement of accountants and commercial managers in the relatively new digital intellectual property value chains, the need to properly account for digital assets is rapidly moving front stage and centre.

DM is necessarily about meeting the identified need to account for, and protect, the creation, storage, distribution, access and control of intangible assets in digital form, wherever and whenever they are found or consumed. It has to develop, and quickly, to provide the full spectrum of fiduciary and management control using the four cornerstone concepts of electronic commercial management:-

- Ownership (identity)
- Security (custody)
- Accounting (measurement)
- ecommerce/ebanking (settlement)

Proper dynamic DM relies on creating active online digital contracts to evidence and enforce the agreements of the relevant parties to terms and conditions of use and access.

Vitality, to properly manage a digital asset or product, DM needs to be dynamic and flexible to permit alteration to any aspect of control over an asset after its deployment, preferably without being constrained by connectivity issues.

The only effective way to provide an efficient, publicly available, DM system is via the Internet. A DM Web interface, accessible to buyers and sellers of digital assets, must facilitate and support all aspects of negotiation and the exchange of value. It must support the set up of legal agreements and their terms, and consequent deployment, in real-time. The system can then enforce rights such that contracts cannot be breached. Any hacking attempts to access content illegally will result in the destruction or disablement of digital products which are protected by the DM system.

DM also meets the needs of management by providing software, infrastructure, data and reporting functionality to digital asset owners and managers irrespective of their physical location. The benefits of a well-designed DM system are improved management and administration of intellectual property leading to:-

- Revenue security
- Lower costs of software application and content administration
- Acquisition of product usage information

In short, an IPR governance infrastructure platform for digital product accounting, billing, product development, technical support, sales, marketing and innovative customer service.

DM services establish terms of use in electronic or digital contracts between product suppliers and customers, and these are evidenced by all relevant parties on the system. These contracts form the basis of the security needs of a digital product whenever it is deployed, and are continually monitored for conformance and compliance by the DM system. Corporate governance is thus well-served by efficient DM that securely ensures enforcement of all contract terms and conditions of deployment, and use of an owner's digital intellectual property. Further, resultant usage data also lends itself to digital product procurement to help prevent overspending on software and content, a common problem for corporate management.

DM standards covering interoperability needs of all types of rights-holders in the digital environment are being developed. The European Commission's INFO 2000 Programme Index Report, June 2000¹⁵, identifies four guiding principles of any DM framework for supporting effective ecommerce, namely:-

- Unique Identification - every entity should be uniquely identified within a unique namespace
- Functional Granularity - it should be possible to identify an entity whenever it needs to be distinguished
- Designated Authority - the author of an item of metadata should be securely identified
- Appropriate Access - everyone requires access to the metadata on which they depend, as well as privacy and confidentiality for their own metadata from those who are not dependent on it

Any infrastructure supporting DM service will include:-

- No single points of failure such that loss of Internet connectivity will not interrupt DM services or prevent users from accessing digital assets or products to which they are entitled
- Universally availability of control over DM and administrative settings, and reporting tools, via the Internet
- Integration of application usage information with ERP/accounting, billing and payment systems
- Little or no infrastructure impositions on existing IT environments

Only dynamic Internet based DM systems using secure Internet communications capable of handling billions of transactions are able to meet the IPR governance needs for immediate user-based administration of digital product delivery on a world scale. Furthermore the value contribution to any economy employing an effective DM system to meet its IPR governance needs will be significant because of the ineffectiveness and cost of the systems used, at present, if used at all.

Traditional Deployment Processes and License Management

An important aspect of DM is its ability to replace traditional Licenses and License Management (LM) regimes for software distribution without diminishing the value contributed by LM and yet simplifying and expanding the ability of owners and users to access value. By being able to own and manage deployed software using DM, digital product owners no longer have to lose control of their property as part of the requirements of distribution, something LM does require. Extrapolating the conclusion of a recent study of the development of the "real world", or contemporary tangible economy, it is a matter of economic survival for the digital economy that IPR be properly governed. As Hernando De Soto states

"The basis of capitalism ... is capital, and the basis of capital as an economic tool is rational property law. Without a complex system to delineate and protect rightful ownership, capital is "dead." ¹⁶

Without DM the software industry has to offer its product on a "boxed" or "seat license" basis. In the main, this is an inefficient and costly model for both vendor and user. These inefficiencies are particularly easy to identify in complex environments where there is periodic workflow, or project work. Expensive software, needed for short spells, remains idle and unused for a significant proportion of the time. Commercial pragmatism dictates that consumers impose restrictions on the number of costly licenses they acquire, resulting in too few copies during peak activity and too many once work is complete. Also when purchasing, software procurement decisions are made without any empirical evidence of value to the purchasing enterprise, especially when renewing maintenance contracts. This contributes to higher than necessary corporate software costs through overbuying. The traditional distribution model costs software users, in wasted capacity, administration and under-used assets, a significant percentage of their software purchase and maintenance costs.

These inefficiencies further impact software sellers where organisations needing software conduct lengthy, albeit inadequate, capital evaluations before they buy. The result is longer selling cycles, expensive sales processes and higher prices. Higher prices cause acquisition decisions to be forced up management hierarchies, making purchasing decisions the victim of corporate politics. Further, the process of software evaluation before purchase has spawned the "evaluation copy". This can add to distribution costs and increased risk of revenue leakage as producing evaluation software is expensive, has to be administered, and often, actively reduces revenue as customers capture software value without purchase. Many a project has been completed using a 30-day trial.

Another problem attributed to boxed product or seat license is the failure of vendors to develop education and training as a sales tool. Long sales cycles cause management to focus on corporate sales and marketing activities at the expense of educational activities with actual users. Smaller user bases and poorer user capability, in turn, result in less than optimum value received by both parties.

With DM there are no valid reasons why software deployment cannot include all means to globally manage all commercial terms of use in real-time. Software and digital content access can then be negotiated, concluded and administered online, in a real-time or near real-time electronic trading environment. New Web services with functionality for flexible, dynamic, and transparent transaction interfaces, providing secure and automatic enforcement of agreed software usage contracts, are rapidly changing the global ecommerce environment. The efficiency gain potential in the fasted growing market from introducing DM technology and services makes almost criminal any decision to delay or otherwise fail to implement it.

Administration

Distribution administration has always been a core aspect of corporate management. The availability of DM has introduced an additional electronic commercial mechanism to digital product deployment capability that enables anyone to deliver digital intellectual property effectively and efficiently on a global scale. Vastly larger revenue opportunities are created by overcoming the traditional geographic and time problems of physical supply chains of the previous era. Those challenges are predominantly related to administration and compliance issues in accounting, tax and legal legislation, governing the different locations to which product is delivered. Smaller companies found those challenges harder to overcome than larger companies because the latter usually have experience of, and resources for, business conducted over multiple locations. DM and the Internet now reduce the administrative complexity and resource requirements of global supply chains and IPR governance.

DM, Accounting and Taxation

Governments seek to influence the commercial activities of their citizens by varying rates of different taxes and granting concessions for defined activities. This creates the opportunity for business managers to reduce statutory liabilities by designing corporate structures and commercial transactions with taxation in mind.

These structures and transactions move tax crystallisation points to coincide with lower tax rates and available concessions. Much of this activity involves the shifting of revenue streams between jurisdictions by transfer-pricing between corporate entities. In response to tax management

activities Governments, in turn, enact more complicated legislation to protect their revenues.

Consequently, business managers are now faced with significant administration and reporting requirements imposed on them by legislation. This is not peculiar to digital products, applying equally to all business.

With the growth of electronic commerce, the complexities of tax collection obligations shouldered by digital product distributors are daunting. Governments equally face increasing difficulty trying to distinguish tax liabilities of electronic commerce in their jurisdiction in. Its transnational nature makes it difficult to police on the part of Governments and digital asset managers are expected to comply with the legislative requirements of every jurisdiction where they are deemed to operate. Not only are they acting as tax collectors for multiple regimes but they face multiple complex tax laws as Governments fight for jurisdiction over Cyberspace.

The operation of different tax systems, different rates, different compliance requirements, as well as different legal systems with their own interpretation of contract, makes the task faced by an administrator of a widely distributed digital product daunting in the extreme. If fact, without a comprehensive community wide DM system it is difficult to comprehend how IPR governance can be adequately administered by suppliers, consumers or Governments. Digital sales and tax revenues will inevitably be lost.

As with taxation, accounting for digital IPR faces similar difficulties. In common with all products, digital delivery requires sales and marketing to communicate the value and benefit to customers. This requires processes, information infrastructure and resources to be effective. Without these, accounting for digital product cannot be carried out effectively in the future global economy. As more third-parties become involved in the digital delivery process the problem of accounting for contributions to the business effort, and share of resulting proceeds, becomes increasingly difficult.

Also included in IPR governance needs are the abilities to transfer ownership between digital product owners, third-party distributors and customers, and the corresponding responsibility for warranties and support obligations. Digital asset owners have to address the current loss of control of their product once it leaves their own controlled business environs. Properly implemented DM is required to exercise adequate accounting control to accurately record accrued revenues and liabilities generated by agents operating on their behalf in other countries. DM will also overcome customers' current inability to record access to, and log use of, digital product. Without DM consumers of the digital products generally have no means of measuring

the ongoing internal cost or value of its use by, and within, their organisation.

IPR governance therefore cannot be achieved where a lack of adequate accounting control over deployed digital products exists. It is a major problem for digital product managers and it is becoming worse as the value of digital products to businesses and the economy grows.

Conclusion

The digital industry, efficient as it is in rolling-out new versions of applications, cannot maintain its growth without adequate administration. No industry in history has been able to maintain growth without providing the means to properly measure the claimed benefits of its product.

Digital piracy is growing. Given Moore's Law and the interdependency of software applications within commercial environments, customers are becoming increasingly resentful at having to upgrade sites completely when, in some cases, a single vendor puts out a new release. Digital product is now demanded by the sip or cup, but not by the tanker.

Lack of IPR governance forces suppliers to sell in bulk. This drives diverging perceptions of value between consumers and sellers. More cynically, it causes a lack of trust that encourages piracy. Some customers now believe, with some credibility, that software vendors act deliberately to create these knock-on effects so the industry as a whole can boost its revenue for a particular period without providing real value in return. Piracy must therefore be expected and its solution lies not in the treatment of symptoms with narrow legal enforcement but in removing the root cause, poor IPR governance and lack of DM.

The latest DSA Global Piracy Study carried out by IDC in July 2006, computed the global cost of piracy to be more than US\$38 billion in 2005. Even discounting some of the self-serving assumptions used in calculating total market values for deriving the number of pirated installations, this is of epic proportions. It starkly illustrates this growing phenomenon: The industry's perceived value of itself and its product is diverging dramatically from that perceived by its customers and end-users. Moreover, the same study recognises that piracy affects many, from the individual salesperson and their commission, through to the growth rates and potential of so-called third-world economies. The latter is becoming of increasing concern to developing economy Governments and international institutions such as the World Trade Organisation and United Nations.

Given that the software industry is effectively mature, technology is a ubiquitous component of virtually everything the world uses, and that the industry prides itself on making everyone's life more productive and efficient, future development and economic growth are

dependant on effective IPR governance. Users of digital assets will pay as they go and demand quality information for making their purchasing decisions.

By solving the problem of illegal IPR access and providing effective legal and technical protection of digital property rights, communities are encouraged to develop and to access outside IPR to assist their economic development. New capabilities arise for collection and analysis of rights metadata to support new business models and sales channels. DM offers tremendous benefit to companies seeking to expand their geographic market without having to make the corresponding investment in administration that global distribution requires otherwise.

DM revolutionises accounting and administration of all the economic and commercial aspects of digital intellectual property. It is especially beneficial to small technology companies developing high value intellectual property suitable for digital delivery which requires access to far distant larger markets, as commonly experienced by developing ICT communities. The implementation of DM is also beginning to create a demand for specialist para-legal/accounting services to support IPR governance requirements of communities and Governments. For example, advising digital intellectual property creators and owners on how best to get to market.

These services assist communities in:-

- Meeting improved digital product deployment goals
- Development and analysis of selling models
- Optimum pricing levels and selling strategies
- Treasury and accounting administration
- Global tax compliance and statutory obligations
- Billing and collection services via payment and banking portals
- Automatic integration of ecommerce and electronic banking transactions with financial accounting systems

For the Information Technology Industry itself, DM will be of significant and direct benefit, since the software sector is by far the largest producer and seller of digital products. In turn, these are used by customers to produce their own digital products. All parties can only improve their economic performance over the long-term, through better IPR governance providing information and protection leading to more flexible pricing models thereby generating higher revenues and reducing costs.

Effective DM technology is not a "nice-to-have" but is now an essential layer of modern business and IPR governance. It is the responsibility of both Government and commercial communities to ensure its immediate implementation and development if they are to be relevant in the new digital age or participate in the global economy of the future.

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DIGITAL PRODUCT - WHEN & WHERE IS IT VALUABLE?

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Abstract

This paper explores the current commercial state of the marketplace for digital product. Issues discussed are the current state of commercial trading practice, how they came to be and how they are expected to change. Change drivers are considered and their likely impacts. The essence of the discussion is to highlight how current trading practices have been adopted from the analogue or tangible product world, why they can't support the needs of the digital trading world and how they must change and what is needed to effect that change

Keywords

Internet, digital product, measurement, security, value at point of use,

THE PROBLEM WITH DIGITAL PRODUCT AND THE INTERNET

There are a lot of perceived problems with the Internet, the overwhelming majority of which are related to security. The nature of these perceived problems, however, generally depends on the precise standpoint of the complainant: Governments see it as anarchistic, a haven for criminals to operate and organize using secure communication technologies, difficult to monitor and administer and therefore a threat to society, law and order. Established market-dominating corporations now affected by electronic file sharing technology and digital replications of their products see their businesses threatened by anarchists. Individual Internet users find their computers deluged by Spam and infected by malicious software (viruses, Spyware, worms, Adware etc.).

On the other hand, for all its proclaimed efficiencies, the Internet is still a graveyard for the vast majority of investors trying to build revenue positive operations based on Internet technologies and associated philosophies based on speed, efficiency, communications, boundary-less organization architectures, telecommuting and so on. If you hold fast to the idea that inefficient markets are in part characterised by monopolistic domination, then the ITC market should surely be considered to be inefficient despite its greatest aspect, the Internet, being generally described as the basis for efficient commerce.

To add insult to injury, the Internet itself also has an identity problem. It is viewed simultaneously and alternatively by the passing milieu of management consulting gurus as; a new medium of communication, entertainment, sales channels, education facilities, as the new business medium that is changing everything, and much more. The more extreme audiences go so far as to consider the Internet as a way to God and a way to threaten society. Rather than enter the debate at this level, a more informative view may be to call it what is and let its uses be decided by its users. To this end the Internet is simply a global network of computers, nothing more nothing less. In truth therefore, the nature of the Internet cannot be attributed or be considered as basis for the perceived problems of commercial and economic trading activity in the digital product environment.

A more extensive discussion of the problems of the Internet can be probably best be served by another fundamental approach, value. That is, approached at its most basic level, like all business problems, the Internet is about value. This value is a function of supply and demand of digital product. Even more plainly, it is about getting it and keeping it, or put another way, extracting and protecting value produced by the digital tree growing in the electronic garden fed by the Internet.

For the purposes of this discussion digital product value is associated with exchange of utility. The increasing ubiquity of the Internet and connectivity convergence towards the Internet is having increasing impacts on all value concepts concerning use and ownership of digital product and digital assets. The terms digital product and digital assets are used to include incidences and process related to all and any data, stored, transmitted, altered, digitally manipulated and exchanged. From email, to video, including VOIP, software, games, music, text, graphics, data storage, security, and any other digitally conveyed value imbedded in hardware to control consumer and industrial appliances.

This paper attempts to explore general perceptions of Internet imperfection and lack of commercial effectiveness in the context of current digital product trade exchange mechanisms. The following brief discussion delves into basic fundamental assumptions of Internet users, their understandings and expectations, in an attempt to distil the relevant elements in order to clearly present the underlying causes of these perceived problems of the Internet. This understanding should significantly help

predicting coming probable and possible solutions that will, hopefully, indicate the future direction of the Internet's future development.

IN THE BEGINNING

Long before the Internet, value was entirely created by physical exchange of goods and services. People's needs were met and generated value by people trading wants and surpluses. At its root trading is based on the fundamental concept of fair exchange. A fair exchange is one where a party gives up possession of a good or services in reciprocation of another taking possession of an equivalent value good or service and vice versa. Exchange transactions take place by exchanging goods directly (bartering) or using money or money equivalents providing primary functions of a store of value and units of measurement to facilitate trading activity.

The reason for trading is for surplus to meet scarcity and is the commercial foundation of human society. The mountain of value attributed to human possessions is founded on trading, a process of exchanging fair value. The act of exchange creates the concept of value by involving opposing forces negotiating perceptions of stored utility to achieve a mutual agreement on value of the units exchanged in trading. Because this value agreement is based on the interactions of willing buyers and willing sellers, the results are consensual, and thereby considered to be the most reliable basis for measurement of value.

It is useful to point out here that as the basis of commerce trade results in a two-sided transaction recording and measuring separate persons perceptions of value exchanged by the parties involved. In short, the primary aspect of trade is its consensual agreement of value based on perceptions of fairness and equal dealing.

The digital age has extended the geographical reach of traders and increased the speed of trade transactions to vastly increase the scope and range of traded goods. More importantly it has seen in a vast accumulation of data to support the creation of new value and information never before available. Although the Internet has introduced scale and new complexity to traditional trading, it has changed none of its fundamentals.

THE BASIS OF INTERNET PROBLEMS

Contrary to the usual expectation of decreased value from increased supply, the digital age has created increases in value from increases in the supply of information. Further, with the advent of global digital communication, this digital product (information, data, and the ability to manipulate data, or software) has added new and different goods to for people to exchange. The value of this information is growing and will potentially far exceed that of traditionally traded physical goods, as mass markets fracture into higher and higher valued niche markets catering more and more to individual needs.

In the digital environment new complexities are introduced to the trading process. The most obvious is the almost infinite capacity to replicate valuable digital product. The implication being that it enables surpluses to meet needs without exchanging possession, that is, one party still has their product after they have sold it. Other complexities relate to; the high speed degradation of data's value, instantaneous transactions, global transactions, transaction volumes, and in addition problems attributed to the incorporeal intrinsic nature of the traded goods introduced to the trading equation.

The result is a conundrum. Trading, the very system responsible for creating value also becomes the system that can instantly destroy the value created.

Unless the ability to replicate data is kept in the hands of the supplier, the value of a surplus data commodity vanishes once trading commences. Where suppliers of data product are unable to prevent buyers from distributing these data products, the value of the surplus will collapse after the first trade. The scarcity need, which is the basis for the data value, is quickly fulfilled because the new possessor of the data can replicate it and globally distribute it instantly, without cost.

When data is traded for money, it will also be noted that a kernel of unfairness is injected into the exchange. This being that one of the parties is exchanging money that is given up, and the other party exchanges data, which is not given up. This additional complexity arises in the digital trading environment because it unsettles the essential need to balance the exchange. In this case the exchange of possessions can be validly perceived as one-sided because one party has exchanged data, which he retains, and the other money, which he doesn't retain. This results in fundamental contravention of the human expectation fairness in a trade exchange and undermines the sense of credible value agreement being a product of the exchange. Even acknowledging that value received is represented by money given up, humans tend to measure other peoples money when deciding fairness.

An example of these phenomena is most clearly illustrated today by the struggle of the establishment to prevent the collapse of the traditional product based music industry. It is caused by the growth of file sharing networks like Napster, and Kazaa. Another is the fight by the Movie Industry to curb the 36% a year growth of the DVD piracy market.

IMPACT OF THE INTERNET PROBLEMS

However, the scale of the problem is more extensively felt as the Internet grows and connectivity increases. There are a number of major long running debates and increasingly fractious confrontations taking place at present that have the capacity to determine the direction and nature of the Internet and development of value of digital product in the future.

These issues of data and value trading, basically fuel these debates between the forces taking opposing positions in regard to commercial development of the Internet. They are exacerbated by the resulting perceptions of unfair trade exchanges, further impacted by the trade exchanges occurring partially in the digital (incorporeal) environment, and partially in the human (corporeal) environment. That is data being exchanged for money.

The principle areas of debate and confrontation are between the establishment controllers of traditional trading market mechanisms, the suppliers, and the buyers, individuals who dispute the fundamental value attributes of the suppliers surplus and who can now do something about it:-

- File sharing – “who owns the music”.
- Open source code licensing – “free or open code licensing versus propriety code licensing”.
- Patenting software code – “ownership of ideas and application of copyright law”.
- Software on demand, software as a service – “price of access to software”,
- Copyright of data and content ownership – “stopping piracy without destroying distribution channels”

A common solution to trading and exchange of value in the digital market lies at the heart of all of these confrontations and debates. This solution can only be implemented when the problem is commonly understood and the solutions identity agreed as the as a result of the market revaluating its common underlying assumptions of the trade equation in the markets trade processes.

Traditional goods are exchanged from surpluses in order to meet needs. The value of a unit of trade is a measure of its perceived ability to meet the needs to the party acquiring it. This can be called its utility value as established by trading.

At the most basic level of trading corporeal or tangible physical goods, the utility value of goods exchanged is indelibly bound up in the physical nature of the item exchanged. That is, an ax is an ax.

With the development of human society there occurs increases in the complexity of human needs. This adds components that make up the potential utility value of a tangible physical unit of trade. Correspondingly there is a lessening of the link between the physical nature of the traded items and it's unit of utility measure. With sophistication, more and more extraneous factors begin to add to the make up of utility value of an item attributed by a purchaser. This is most clearly evident the value of items susceptible to brand marketing, and in the fashion and antiques markets.

In the modern trading environment the utility value of an item of exchange varies along a spectrum, from that of a commodity where physical attributes equals utility, through to fashionable products where utility value is only a vague value aspect tenuously attributed to its physical existence.

The trading systems of today have evolved out of physical goods trading and adapted along with human society to cope with a huge range of value concepts, from commodities to brands. It is able to do this because even at the highest levels of complex value measurement, the underlying physical nature of the traded item is always present.

With the advent of the digital age, this link between a traded item's physical attributes and its utility has vanished. Trading systems have attempted to cope with this by pretending it didn't happen and some interesting and elegant work-a-rounds have evolved.

The principle one has been to artificially create a physical attribute with which to link and identify utility value. This is the reason for the box that software applications have always, until recently, been sold in. To reinforce and secure the physical attribute the trading system also developed the concepts of encryption and licensing that has created the license management and security industry.

Licensing and encryption have developed extensively as extension of the link between data's utility value and its physical attributes in order to manage and administer the box or the physical media of the digital product. Vastly complex license and sophisticated encryption technology has been developed to better represent a pretence physical attribute of digital products in trade transactions.

However, as the Internet has developed and bandwidth increases the viability and usefulness of this artificial physical attribute has become an increasing liability to the efficient trading of digital product. This is mainly because the utility of data can never