The <in*d*ecs> metadata framework

Principles, model and data dictionary

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Contents

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1 Introduction

This document summarises the technical work of the <in*d*ecs> project. It describes the <in*d*ecs> *metadata framework,* a reference model

It is compiled in part from material from the original <in*d*ecs> metadata model description (WP2a-004-3.1). This document supersedes all earlier published versions of the model.

The <in*d*ecs> project, and its successor the not-for-profit Indecs Framework Ltd, was created to address the need, in the digital environment, to put different creation identifiers and their supporting metadata into a framework where they could operate side by side, especially to support the management of intellectual property rights. The background and objectives of the <in*d*ecs> project are documented elsewhere[1], but to put this document in context this introduction deals with the question of interoperability: what does interoperabilityt mean in practice?

1.1 A model of commerce

People make stuff. People use stuff. People do deals about stuff.

The stuff and the deals may come in any order, but neither come before the people.

This is the basic *model of commerce* that underlies the <in*d*ecs> framework and models. While the approach described here may be usefully applied in many domains, the main focus of <in*d*ecs> is on the use of what is commonly (if imprecisely) called *content* or *intellectual property*.

The model applies in many contexts, but is particularly useful in the digital and Internet environments where the problems of metadata interoperability are becoming especially acute.

Commerce is used here in its broadest sense, not necessarily having financial gain as its object. The model applies equally to *cultural* transactions in places such as libraries in which people "make deals" that enable others to have free access to "stuff".

The <in*d*ecs> schema rests on certain fundamentals, or *axioms,* about electronic commerce.

1.2 Axiom 1: Metadata is critical

"Metadata is the lifeblood of e-commerce" (a phrase coined by John Erickson, then of Yankee Book Peddler). Electronic trading depends to a far greater extent than traditional commerce on the way in which things are identified (whether they are people, stuff or deals) and the terms in which they are described (*metadata*, or *data about data*).

E-commerce requires the linking of identifiers that connect people with goods and services: *stuff*. In dealing with intellectual property these identifiers form complex and dynamic chains. All kinds of metadata elements find their way into them. Where there is a gap or an ambiguity in these elements, it is likely that the chains will be broken, or misrouted, and the required transaction will not happen, or will have the wrong results. As e-commerce grows, reliance on metadata chains grows with it.

1.3 Axiom 2: Stuff is complex

The second axiom on which <in*d*ecs> rests is that, when dealing with intellectual property, *stuff is complex*. The generic <in*d*ecs> term for a piece of stuff which may carry intellectual property rights is a *creation*. While an apple bought at a market stall is a single physical entity owned entirely by one person, a single digital audiovisual creation may contain hundreds or even thousands of separate pieces of intellectual property. These may include moving pictures, recorded audio, still photographs, graphics, text and software applications, some only in part or in modified form. Each of these separate *manifestations* of intellectual property may have rights.

These manifestations are normally *expressions* of abstract works or *abstractions* in which there may be further rights; and those expressions may come into being be through the medium of statio-temporal *performances* in which yet further rights may exist. All of these rights may be owned or controlled by different people for different places and different periods of time. The trading of one digital creation may involve rights transactions affecting thousands of people and companies, from whom permissions may be required and to whom payment may be due.

To take an example from music, an audio CD "greatest hits" compilation containing twenty tracks is in fact a manifestation, owned (say) by a record company. It contains twenty sound recordings, each of which embodies an expression or performance perhaps owned by different record companies or artists and in which, in some territories, each contributing performer has certain rights. Each performance in turn expresses one or more songs (abstractions) in which the composer(s) and publisher(s) have rights. Through deals that have been made, various payments are required whenever the CD is bought or used. These deals (*agreements*) may be brokered individually or by collective licensing arrangements.

While this example is taken for music, similar kinds of complex relationship can be found in any other creation type. From type to type, the importance and quantity of different elements may vary (for example, in text-based creations the *performance* element is often unimportant) but the functional requirements are the same, in structure if not scale.

1.4   Axiom 3: Metadata is modular

Because stuff is complex, *metadata is modular*. e-commerce metadata is made up of connecting pieces created by different people.

Each of the basic entities (*parties, creations, transactions*) must have its own metadata set if stuff is to be found and used, and rights are to be protected and rewarded. If the rights in a complex creation come from many different people, so inevitably must the metadata. Constraints of cost, time and knowledge ensure that the multimedia producer is dependent on his suppliers of content also to provide the metadata on which future management depends. The same dependency is increasingly true for others in the chain, including non-profit-driven organisations such as libraries and academic institutions.

Metadata in the digital environment can therefore be viewed as a set of "modules", produced in different places and for different purposes, which must link together easily into complex forms to create new metadata modules for different stuff, people and deals. The result can be described as the *metadata network*, or in a narrower context, the *semantic web*.

1.5   Axiom 4: Transactions need automation

In an increasing range of cases, *transactions need to be highly or completely automated*. In physical commerce, much metadata complexity has been dealt with (if at all) in administrative systems within bounded organizations such as publishers or collecting societies, each operating their own local data standards and systems. The scale and nature of e-commerce has made it imperative that these local standards and systems can interoperate in automated ways with others.

For example, in the non-digital environment, securing copyright "permissions" is a complicated, time-consuming and often unsatisfactory process. Owners and publishers are already often unable to cope with the volume of low-value permissions requests made in conventional ways.

In the digital environment the volume and nature of such uses is increasing exponentially. Because stuff is complex and technology is ingenious and the virtual world does not recognise national boundaries, the number of creations, agreements and potential rights holders and users multiplies rapidly and continually. Without automation, all but the most valuable permissions will become impossible to administer.

1.6 Interoperability

In the <in*d*ecs> framework, interoperability means enabling information that originates in one context to be used in another in ways that are as highly automated as possible. *Commerce* does not necessarily mean the exchange of money: any environment where *creations* are *made* or *used* employing electronic means is encompassed by commerce in this sense.

The information that needs to interoperate here is *metadata:* data of all kinds relating to *creations*, the *parties* who make and use them, and the *transactions* which support such use. The problems to be overcome are often as simple as the fact that a term such as "*publisher*" has a quite different meaning in two different environments which now need to exchange metadata; they are also as complex as the fact that a single creation may contain a hundred distinct pieces of intellectual property, the rights of which are owned or controlled by many different people for different purposes, places and times. In the persistent environment of the Web, changes in the status or control of these rights, recorded in different and unconnected systems will need to be capable of being communicated automatically in many different ways.

1.7 Types of interoperability

Interoperability in e-commerce has many different dimensions. As traditional sectors and business models break down, organisations increasingly face the need to combine or access information that arrives in a variety of forms and that comes from a variety of sources. The creator of metadata about a piece of intellectual property will want to be sure that the accuracy and effectiveness of the information he creates (often at substantial cost) can survive intact as it negotiates a range of barriers. A serious approach to the problem needs to support interoperability of at least six different types:

- Across *media* (such as books, serials, audio, audiovisual, software, abstract works, visual material).

- Across *functions* (such as cataloguing, discovery, workflow and rights management).

- Across *levels* of metadata (from simple to complex).

- Across *linguistic* and *semantic* barriers.

- Across *territorial* barriers

- Across *technology platforms.*

A good e-commerce metadata system therefore needs to be *multimedia, multi-functional, multi-level, multilingual, multinational* and *multi-platform.* Such an approach may be said to be *well-formed.*

The failure of interoperability in each of these dimensions can be seen as *trade barriers* to e-commerce interoperability. These barriers are not all yet generally critical, only because the volume of e-commerce traffic in intellectual property is relatively modest: yet we are now seeing an unprecedented explosion in the development of IP-based metadata schemas. Listed alphabetically below are just some of the major initiatives where substantial metadata vocabularies, models, databases and/or interchange formats are currently being developed or deployed, showing the communities in which they currently operate or from which they were originated:

abc[2]	
CIDOC[3]	(museums and archives)
CIS[4]	(copyright societies)
DCMS[5]	(recording industry)
Dublin Core[6]	(library originated)
EPICS/ONIX[7]	(book industry)
IFLA FRBR[8]	(libraries)

IMS[9]   (education)
International DOI Foundation[10]   (book/journal industry originated)
IEEE LOM[11]   (education)
MPEG7[12]   (audiovisual originated)
MPEG21[13]   (audiovisual originated)
P/META[14]   (audiovisual)
SMPTE[15]   (audiovisual)

This is by no means a complete list, although it represents the most of main initiatives with which <in*d*ecs> has communicated to date. These schemes, developing from different starting points, are all converging on the "barriers" we have identified. To some degree, each is finding that is has to become multi-media, multi-function, multi-level, multi-lingual and technology neutral. As convergence renders the traditional sector divisions increasingly meaningless, they will inevitably need to interoperate with one another substantially. In future, essentially the same metadata about, for example, a web document, may need to be handled within each of these schemes, and many more.

1.8   The limits of technology

Web-driven tools such as XML (the Extensible Mark-Up Language) and RDF (the Resource Description Framework), and their derivatives and successors, will provide part of the solution: but they only go so far. They do not deal with the underlying issue of semantic identity. Ultimately it is only the deployment of unique identifiers across a wide range of critical pieces of metadata – well beyond what is currently practised – which will allow trade barriers to be surmounted without an uneconomic level of human intervention and interpretation.

Such unique identification systems are more or less implicit in the schemes listed above: but as things stand today these systems risk, unintentionally, finding themselves in competition to no good purpose. The <in*d*ecs> framework is being developed to provide a reference model for system implementers to avert a costly clash of standards and to provide an underlying infrastructure for semantic interoperability between them. To be successful, the cost of compliance with this infrastructure must be low, its implementation relatively straightforward and it must facilitate, not obstruct, the development of local systems or schemas like those listed above.

Such an infrastructure will depend on *semantic mapping* through *metadata registries*. The development of such tools lies beyond the scope of the project and, at the time of writing, is in its very early stages. However, the implication of the <in*d*ecs> analysis is that powerful tools and systems for mapping and *transforming* metadata across the barriers described above will provide the necessary technical key to interoperability.

The project also has also recognised that "make once, use many times" metadata is the only viable economic model for the future As far as possible such metadata needs to be an automatic by-product of other processes.

1.9   Intellectual property metadata

The focus of <in*d*ecs> is intellectual property: "rights management". However, this is not a domain separate from other metadata. While there are particular legal aspects involved in the establishment and use of rights, these are intimately connected with the everyday activities of the making and use of creations. A well-formed system must provide means for the interoperation of for this metadata, if it is to enable automated rights management.

Intellectual property issues are wholly pervasive in e-commerce: every transaction that involves the use of a digital creation at any point in the "supply chain" is, in some sense, a rights transaction, even where no money changes hand. Rights management is as important

for the protection of the freedom of legitimate "fair use" by libraries as it is for the protection of rights owners.

The <in*d*ecs> framework is neutral on the merits of any given right or practice. It is concerned only with the mechanism for describing the transactions that take place.

1.10 Characteristics of the <in*d*ecs> framework

The framework recognises:

- metadata relating to any types of *creation;*

- the integration of *descriptive* metadata with *commercial transactions* and *rights;*

- that metadata should be created once, used many times for different purposes;

and proposes:

- a *generic attribute structure* for all entities;

- *events* as the key to complex metadata relationships;

- a *metadata dictionary* for multimedia intellectual property commerce;

- unique identifiers (*iids*) to be assigned to all metadata elements;

- the need for *transformation* processes to express the same metadata at different levels of complexity for different requirements.

At the heart of the model lies the assumption that it is indeed possible to produce generic systems to handle complex metadata for all different *creation* types. So, for example, instead of treating sound carriers, books, videos and photographs as fundamentally different things with different, albeit similar, characteristics, all are recognised as creations requiring for their description different values of identical higher-level attributes, whose metadata can therefore be supported in a common environment.

The <in*d*ecs> framework is designed to help bridge the gap between the powerful but highly abstract technical models such as that expressed in the Resource Description Framework (RDF) and the more specific data models that are explicit or implicit in sector- or identifier-based metadata schemes.

1.11 The Directory of Parties: outline specification

This <in*d*ecs> proposal for the interoperability of party identifiers, developed in parallel with the metadata schema, is not included here but is available from the <in*d*ecs> website[16]

2 Principles

The <in*d*ecs> framework recognises four guiding principles for the development of "well-formed" metadata to support effective e-commerce. In practice, it is rare that any of these is fully realised; but the extent to which they are realised largely determines the ultimate usefulness and resilience of any given metadata schema in terms of its effective interoperability with other domains.

The principles relate to the *origination* of well-formed metadata, not to the means by which different metadata may be integrated (what might be called the *point of interoperability*). Metadata that does not conform to these four principles will be found to be in some way deficient when it arrives at the point of interoperability (say, a central repository, or a third party system).

Previous versions of this document have recognized a fifth principle, the principle of application independence: "*metadata structures should be independent of any specific technical expression*". While still endorsing the general notion that metadata systems whose

development is shaped by technical rather than semantic constraints will be less than optimal, the framework now recognizes that technological differences must be resolved at the point of interoperability, since they cannot be wholly anticipated at source.

2.1 The principle of Unique Identification
Every entity should be uniquely identified within an identified namespace.

It is difficult to overstate the importance of this simple and commonplace principle. At one level it can be said that the basis of interoperable metadata is simply about the relationships of recognisably unique identifiers. In pre-digital bibliographic and commerce systems, effectiveness depends to a great extent on the robustness of their identification systems: the UPC/EAN product numbers, the ISBN book identifier and the CAE composer/author/publisher identifier are among the most successful identification systems in use in the world of content management; they form the backbone of highly effective distribution systems in their respective industries.

In contrast, where unique identifiers for major entities do *not* exist or are poorly implemented within a domain, data management costs are higher – and simple, effective management systems difficult to develop. The absence of unique "party" identifiers for creators and publishers in the major content industries, the scarcely visible implementation of the ISRC for sound recordings, and the lack of a standard agreement or licence identifier in any copyright community, are each examples of gaps that are crippling for interoperability within a domain, let alone between traditional domains.

Multi-media, multi-lingual, multi-national, multi-purpose metadata also requires that unique identification applies at all levels, including the use of "controlled vocabularies" for values of properties such as measures, form and type. In truly well-formed metadata, the only "free text" properties of an entity are found in its names or titles; in some instances (for example, in trademarks and in Actors Equity), even names may be protected to ensure their uniqueness in a given domain.

Some issues that were once central to debates on identifiers have become much less important in the electronic domain: in particular the question of *intelligence*, and of *multiple identifiers* for the same entity.

Intelligent identifiers (that is, identifiers which carry some information in their structure relating to the entity they identify, such as a format, date or producer code) are of some value in particular circumstances, but problems of ambiguity or volatility often render much of this apparent "intelligence" unreliable.

It is also less important that an entity may have more than one unique identifier, even in the same domain. On the contrary, as entities like multimedia become more complex, or parties such as publishers operate in multi-media, multi-national environments, it becomes inevitable that they will acquire more and more domain identifiers, which may or may not require reconciliation. The question of whether – or how – different identifiers for the same entity should be reconciled is both practical and political; it is well beyond the scope of this document.

The development of *domains* or *namespaces* within the Internet has helped in the relaxation of pressure on the need for absolute uniqueness in the structure an identifier. URLs or URIs provide mechanisms for universal disambiguation that allow even common terms to assume unique, global status.

For wider interoperability, the most important properties of an identifier are (1) uniqueness within a given domain; (2) stability (identifiers should never be changed or transferred); (3) security, whether through protection by watermarking or encryption, and/or by internal consistency through the use of check digit algorithms; and (4) the public availability of some basic descriptive metadata for the entity identified, without which the identifier has only limited use.

2.2 The principle of Functional Granularity
It should be possible to identify an entity whenever it needs to be distinguished.

When should an identifier be issued? In this deceptively simple question lies the most basic question of metadata: for which data is it *meta-*?

Resources – *stuff* - can be viewed in an infinite number of complex ways. Taking this document as an example, it has an identifier in the <indecs> domain: WP1a-006-2.0. But to what does this refer? Does it refer to the original Word document, or to a pdf version available on the Website? Or does it refer to the underlying "abstract" content irrespective of delivery format?

If it refers to the Web document, is this also adequate as a reference to local copies that have been downloaded onto other computers or servers?

The document's parts may require identification at any level (for example, this section 2.2, or Diagram 14). If you wish to make a precise reference to this sentence from another document, you will need a more precise locator, and its nature will depend on whether your reference is intended to allow automated linking.

As this document has been through many stages of preparation, how many different versions need to be separately recorded?

Each of these requires the exercise of *functional granularity*: the provision of a way (or ways) of identifying parts and versions whenever the practical need arises.

The application of functional granularity depends on a huge range of factors, including the type of resource, its location in time and place, its precise composition and condition, the uses to which it is or may be put, its volatility, its process of creation, and the identity of the party identifying it.

The implication of this is that a resource may have any number of identifiers

The same entity may be subjected to functional granularity across a range of views. The basic "elements" of a resource may be entirely different according to your purpose. Stuff may be analysed, for example, in terms of molecular entities (chemistry), particles such as electrons, quarks or superstrings (physics), spatial co-ordinates (geography), biological functions (biology, medicine), genres of expression (creations), price categories (commerce), and so on. In the digital environment, stuff can be relatively easily managed at extreme levels of granularity as minute as a single bit.

Each of these process will apply identifiers of different types at different levels of (functional) granularity in different "dimensions"; these may need to be reconciled to one another at a point of higher granularity.

Functional granularity does not propose that every possible part and version is identified: only that the means exists to identify *any* possible part or version when the occasion arises.

2.3 The principle of Designated Authority
The author of an item of metadata should be securely identified.

"Who says?" is a big question in metadata interoperability. The quality or trustworthiness of the metadata statements on which we increasingly rely ("this person is the translator", "this CD costs $20", "this company is the owner of this right", "this is a good product") becomes a profound question when *metadata is modular* and *transactions need automation*. Well-formed metadata must provide mechanisms for declaring the authorship and for authenticating claims of veracity in any item of metadata.

2.4 The principle of Appropriate Access
Everyone requires access to the metadata on which they depend, and privacy and confidentiality for their own metadata from those who are not dependent on it.

In a distributed environment, metadata has to be accessible where it is needed. At first sight this is an unremarkable notion. However, the availability of metadata poses very similar problems of security and standards to those posed by the availability of primary data. In order to secure control of rights in a distributed environment, it is necessary to disclose, and to some extent to distribute, information about the identity of rights owners and the nature and scope of the rights that they control. This raises commercial, legal and political issues which are likely to become increasingly complex and significant. The <in*d*ecs> framework is neutral on the specifics of these issues: but the *ability* to express metadata in standardised forms is a prerequisite for any level of appropriate access.

2.5 A definition of metadata

An item of metadata is a relationship that someone claims to exist between two entities.

In the process of developing the <in*d*ecs> metadata model, we have developed this general definition of metadata that we believe is helpful in separating "metadata" from "data".

This provides a concise paraphrase of much of the <in*d*ecs> framework. It stresses the significance of relationships, which lie at the heart of the <indecs> analysis. It underlines the importance of unique identification of all entities (since otherwise expressing relationships between them is of little practical utility). Finally, it raises the question of authority: the identification of the person making the claim is as significant as the identification of any other entity.

3 Semantics

3.1 Basic terms

The <in*d*ecs> model elaborates a logical and semantic framework for describing *entities,* their *attributes* and, where appropriate, *values* of each. Entities, attributes and values are referred to as types of metadata *elements*.

Basic terminology is adapted in part from the vocabulary of information systems as defined in ISO 11179, in part from terminology more familiar to users of XML (Extensible Markup Language) and the RDF (Resource Description Framework)

Numbers in superscript (for example, *entity[1]*) refer to <in*d*ecs> element identifiers (iids) (see 3.3) whose definitions are found in the Framework Metadata Dictionary.

Defined terms are presented using the XML/RDF convention of lower case (eg *creation*) with terms of two or more words presented as a single string with intermittent capitals (eg *sourceCreation*).

The syntax used for the *genealogy*, the relationship of terms to one another, that is shown in all the tables is explained in *dictionary syntax* (14.4).

Where the term "(derived)" appears in a definition this means that the definition has been created by combining definitions from constituent terms in the element's genealogy, and does not add any new primary semantic material to the dictionary. For example, in table 4.2 the definition of "percept" ("An entity which is perceived directly with at least one of the five senses") is made up from the terms and definitions of terms in its genealogy ("perceived_entity").

Table 3.1 **Basic <in*d*ecs> metadata terminology**

element[iid]	*definition*	*genealogy*
element[491]	An item of metadata (*aka* **metadataElement**) *(see 3.2)*	entity/
entity[1]	Something which is identified	concept/

attribute[9]	A characteristic of an **entity** (adapted from ISO 11179); something which an **entity** has (aka **property**) *(see 5)*	relation/
value[10]	An instance of an **attribute** (from ISO 11179-3)	concept/
iid[227]	A unique **identifier** allocated to an **element** of metadata within the <indecs> framework (*aka* **Indecs-id**) *(see 3.3)*	identifier/

3.2 Metadata elements

Each element identified in the framework is listed in the Framework Metadata Dictionary (see 14) with an English language name, a description in the form of one or more compatible definitions, and a numeric <in*d*ecs> element identifier (called an indecs-id or *iid*).

3.3 <in*d*ecs> element identifier (iid)

Within the framework all data elements are assigned a unique "dumb" numeric identifier An iid may be considered as a logically equivalent and interchangeable synonym for an element name: for example, **event** and *iid=7* denote the same entity. Not all elements identified in the <in*d*ecs> project work have been included in the published Framework Metadata Dictionary, so iids referred to in this document do not form a continuous numeric sequence.

3.4 Element roles

A single element of metadata can play different metadata *roles* according to its context. Most elements can function as attributes, types or values, or as entities which in turn have their own attributes and types. For example, the element *name* may be an attribute of an entity *person* or a type of the attribute *label* or it may be an entity in its own right with attributes such as *type, form* or *language.*

4 Entities

Data models normally recognise *entities* which have various *attributes*, or properties, which characterise them. In the <in*d*ecs> framework an entity is *something which is identified.* This is more specific than the idea behind the word *thing* in the Oxford English Dictionary definition of "a material or non-material entity, idea, action etc. that is or may be thought about or perceived", for it requires that a thing must be both thought about or perceived *and identified* before it exists in a metadata framework. This is more like the term *resource* in the sense adopted by the World Wide Web Consortium. The underlying idea – that nothing exists *in any useful sense* until it is identified – combines the first two principles of *unique identification* and *functional granularity.*
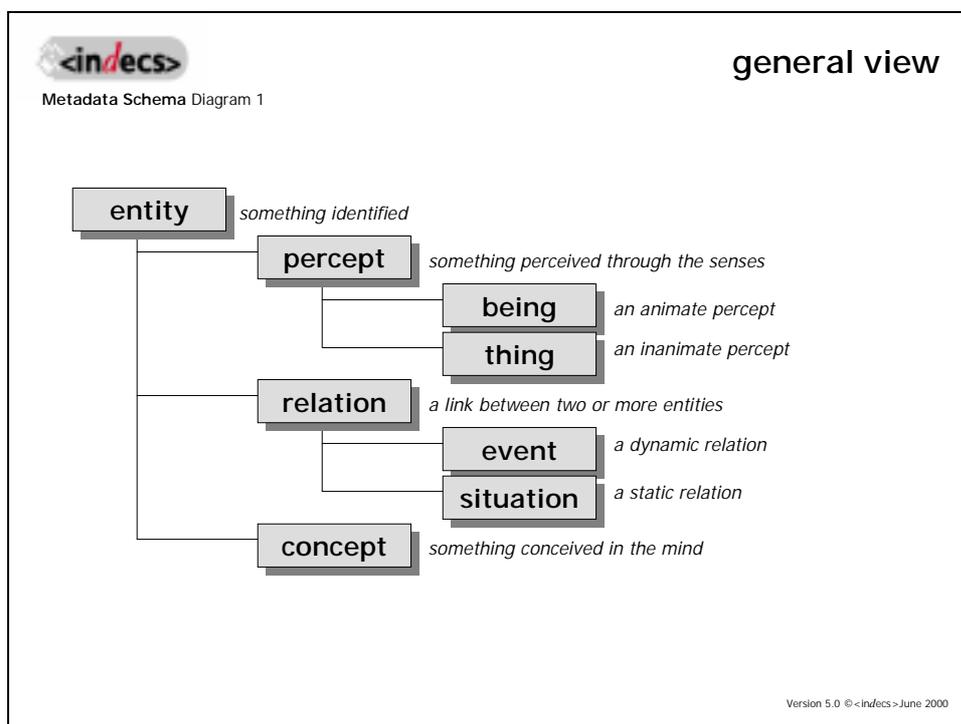
4.1 Different views, common structure

The fifth axiom ("*everything is a view*") means that there are many different ways of identifying and describing any entity. This of course creates serious complications for interoperability. At the same time, it is possible to find common approaches that will allow quite different things to be described in similar terms.

<in*d*ecs> takes into account three distinct but overlapping views of entities – a *general* view, and within that a specific *commerce* view and an *intellectual property* view. These three views enable us to describe the main metadata concerns in relation to e-commerce. A fourth, very specific view, is then recognised in the *generic attribute structure* (see 5), which applies to any entity seen in any view.

4.2 The general view

This view, which will make sense to most people most of the time, divides entities into three basic types: those which are perceived with the senses *(percepts)*, those which are conceived in the mind *(concepts)*, and those in which two or more of these are connected *(relations).*

Taking one further step, we can recognise percepts as either animate (*beings*) or inanimate (*things*), and relations as being dynamic (*events*) or static (*situations*) (Diagram 1 and Table 4.2):


Table 4.2 General view, primitive entities

element[iid]	definition	genealogy
entity[1]	Something which is identified	concept/
percept[2]	An **entity** which is **perceived** directly with at least one of the five senses (derived);	perceived_entity
being[5]	An **entity** which has the characteristics of **animate** life (derived); anything which lives and dies	animate_percept
thing[6]	An **entity** without the characteristics of **animate** life (derived)	inanimate_percept
relation[4]	The interaction of **percepts** and/or **concepts**; a connection between two or more **entities**	entity/
event[7]	A **dynamic relation** involving two or more **entities** (derived); something that happens; a **relation** through which an **attribute** of an **entity** is changed, added or removed	dynamic_relation
situation[8]	A **static relation** involving two or more **entities (**derived); something that continues to be the case; a **relation** in which the **attributes** of **entities** remain unchanged	static_relation
concept[3]	An **entity** which cannot be perceived directly through the **mode** of one of the five senses (derived); an **abstract entity**, a notion or idea; an **abstract** noun; an unobservable proposition which exists independently of time and space	conceived_entity

In this view, one type of entity – the **event** – plays a special role. The event is the "glue" of the model: all metadata relationships are either events in themselves, or rely on events to establish them. This analysis underpins the <indecs> framework, which recognises that mechanisms to

transform metadata into representations of events appears to provide the most powerful approach to extensive interoperability (see 6, *Relations*).

4.3 The commerce view

The second view relates to what is often called *descriptive* metadata and is generally concerned with how things are made. In this view *people make stuff* and *people use stuff.* People also frequently make stuff out of other stuff: they are both users and creators at the same time. Alongside this, *people do deals about stuff* which allow their stuff to be used by others (Diagram 2):
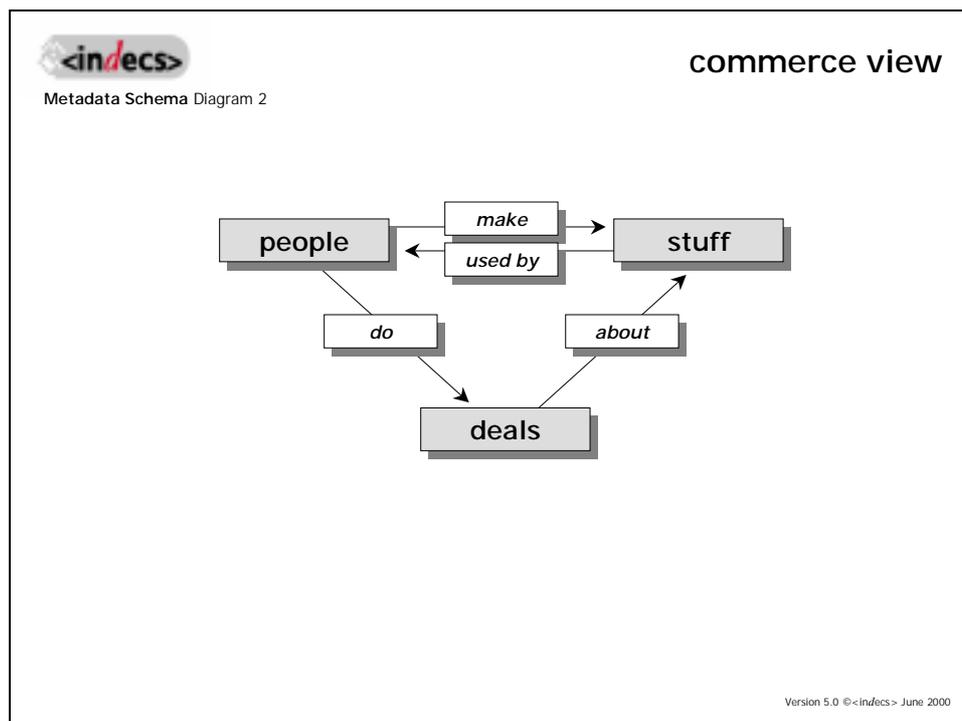
The cycle of making and using can go round and round indefinitely, new stuff being constantly made out of old, although ultimately there will be "end users" who simply *perceive* or "enjoy" a creation with one or more of their senses.

In the framework this gives rise to three basic types of commerce entity (Diagram 3 and Table 4.3):

Table 4.3 **Commerce entities**

element[iid]	*definition*	*genealogy*
party[68]	An **agent** undertaking an activity or task in a creative or commercial **event**	agent/
creation[94]	The **output** of creative activity (see 7)	created_entity
transaction[22]	An **event** determining or recording the **use** or possible use of an **entity** (see 8)	event/
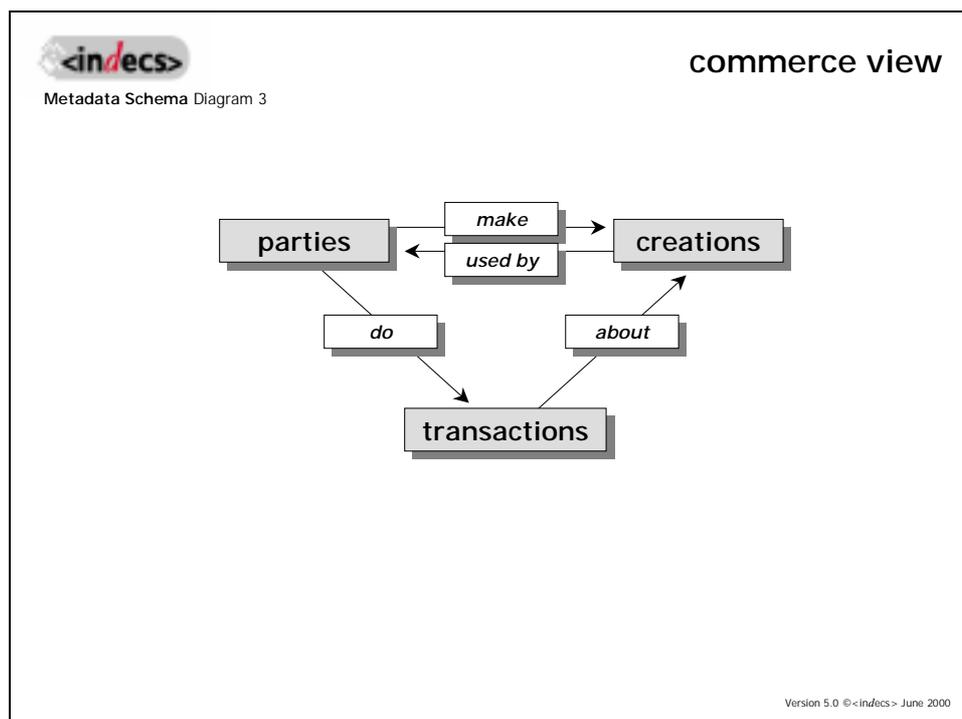
Commerce in intellectual property is related to the exercise of *rights,* and this introduces the third and last view:

4.4 The intellectual property (legal) view

In the final view, *people* (or *legal persons*) make and use *intellectual property (IP)* in which *rights* are owned (Diagram 4 and Table 4.4). These entities and their subtypes are defined in legal terms (see 9).

Table 4.4 **IP legal concepts**

element[iid]	definition	genealogy
intellectual Property[204]	An **entity** defined by law or international convention to be intellectual property	legal concept/
intellectual Property Right[208]	The authority granted by law or international convention to do or to authorise another **person** to do a defined act to **intellectual property**	legal concept/
person[205]	An **entity** possessing the capacity in law to exercise or enjoy an **intellectual property right**	legal concept/

Metadata Schema Diagram 4

legal view

persons — make → intellectual property
persons ← used by — intellectual property
own
in
rights

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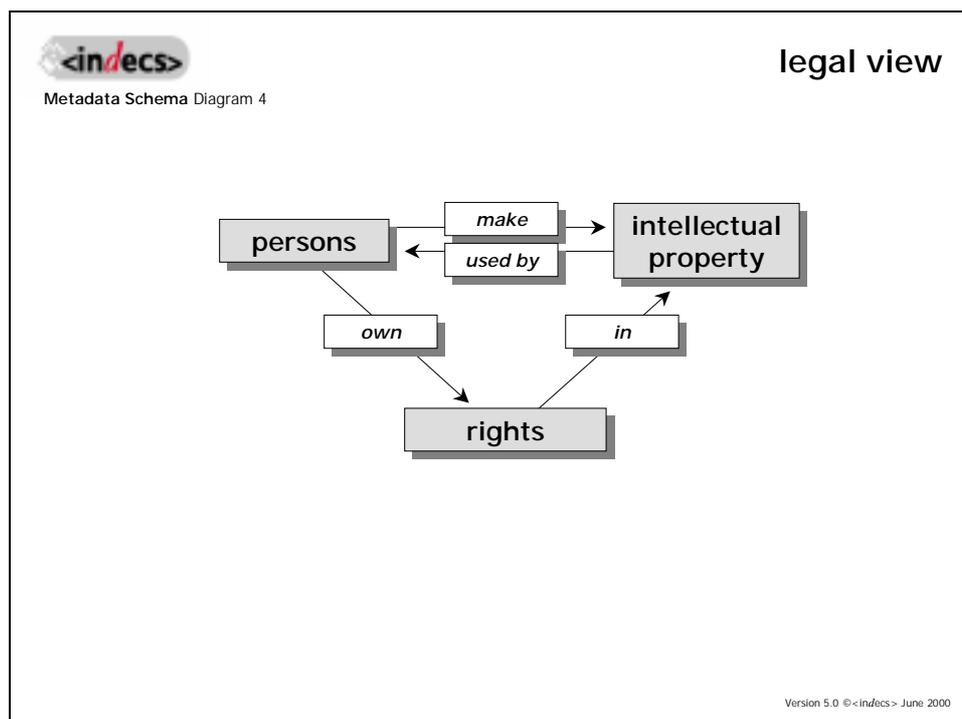
4.5 One model, three views

One of the keys to interoperability is to discover mechanisms for relating the different ways of identifying what may (mistakenly) be viewed as the same entity. In the three views above, an "entity" named as John Smith may be identified in the general view as *a human being*, in the commerce view as a *party* and in the intellectual property view as a legal *person*. Each of these has different attributes (and therefore metadata) and so must be treated as a distinct entity. Yet it is commonplace for metadata from one of these "John Smith entities" to need to interoperate with metadata from another.

5   Attributes

5.1   Generic attributes

The <in*d*ecs> framework asserts that the attributes of any entity may be usefully understood as being of five types – *labels, quantities, qualities, types* and *roles* – each of which has its own particular structure and behaviour, and this provides a *generic* structure for the development and interoperation of metadata sets and systems for diverse kinds of entity (Diagram 5 and Table 5.1).

Metadata Schema Diagram 5

generic attributes

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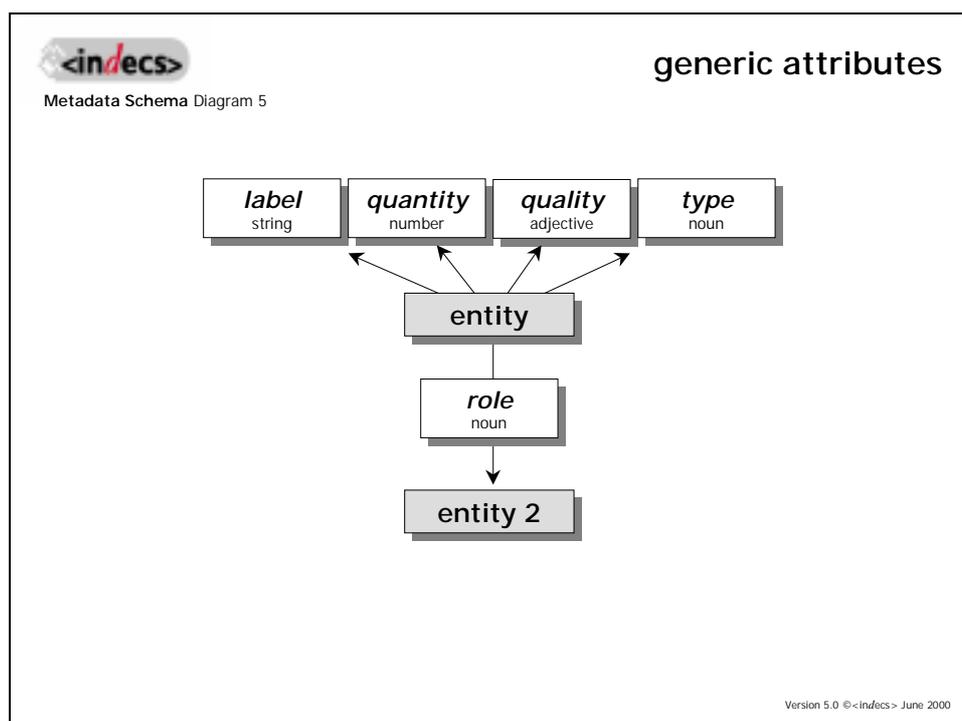
Table 5.1 **Generic attributes**

element[iid]	definition	structure	examples of subtypes
label[11]	A **string** whose function is to distinguish one **entity** from another	string + form	**identifier**[26] **name**[29]
quantity[12]	A **number** measuring some aspect of an **entity**	number + measure	**dimension**[50] **duration**[57] **force**[59] **count**[61] **rate**[62] **evaluation**[64]
quality[13]	A characteristic of the structure or nature of an **entity**; an intrinsic characteristic	adjectival	**language**[35] **mode**[46] **genre**[34] **colour**[36] **gender**[31] **continuity**[39] etc
type[15]	A categorisation of one or more characteristics of an **entity** through which it belongs to a **group** of entities; a characteristic **role** played by an **entity**	noun	Any
role[14]	A part played or function fulfilled by an **entity** in relation to another entity or entities; a classification of an **entity** in terms of its external **relations**; an extrinsic classification	noun	**agent**[67] **input**[87] **output**[93] **context**[116] (see 6.2)

5.2 Characteristics of generic attributes

There are two characteristics of an <in*d*ecs> generic attribute.

The first, shown in the table above, is that the values of an attribute have a common form and are supported by other common elements, even though they may be derived from more

complex data. For example, quantity is a *number* value, and needs to be supported by a *measure* (such as *centimetres*) to create a complete attribute.

Secondly, it should be possible for any value from any namespace at any level to be substituted intelligibly as a value of one of its supertypes within the dictionary hierarchy (for example, a *height* of *15 cms* remains intelligible, though less informative, if shown as a value of its supertypes *distance, dimension* or *quantity*. These characteristics provide part of the framework of interoperability to allow values originated in one namespace to be recognised and used in another, with greater or lesser degrees of precision.

6 Relations

Metadata, as it is data *about* data, is built on the relationships between entities. To say that *x* has attribute *y* is to describe a basic *relation*. Relations, particularly events, are the most important structures in the <in*d*ecs> framework.

6.1 Relation types

Metadata relationships may be described at three levels of complexity, *events, situations* and *attributes. Events* and *situations* are defined in Table 4.2. *Attributes* are described in 5.

Events are relations in which something changes, and are defined by active verbs.

Situations are relations in which something remains the same. Two important subtypes are: a *possessingSituation* in which an agent has something, and an *association* where two things are passively related. possessingSituations are determined by possessive verbs (such as *have* or *owns*), and associations by *is*.

Attributes have been described in 5. One of them (*role)* plays the central part in relations.

6.2 Relation structure

Like any entity, a relation may possess all the generic attributes (*labels, quantities, qualities, types* and *roles*), and its structure is illustrated in Diagram 6:
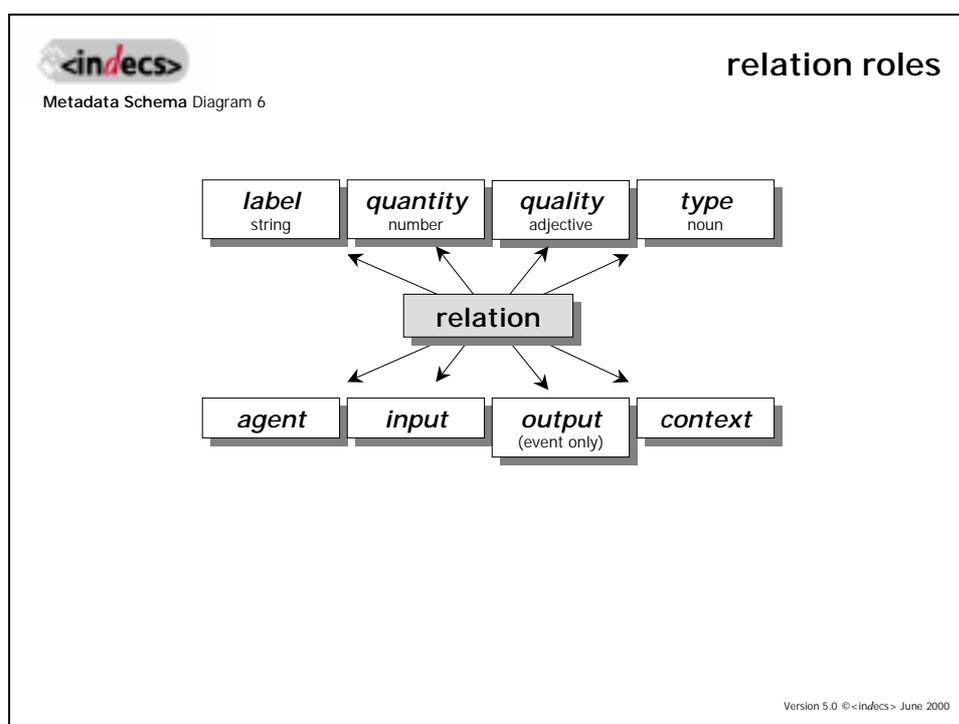
6.3 Roles

Relations consist of two or more entities that play *roles* in relation to one another. Four generic roles provide the framework for the <in*d*ecs> relation structure:

Table 6.3 **Relation generic roles**

element[iid]	definition	genealogy
agent[67]	An **entity** acting in an **event** or sustaining a **situation**; a characteristic active **role** undertaken by an **entity**	role/
input[87]	A pre-existing **entity** which participates in a relation in a passive, qualifying or supportive role	role/
output[93]	An **entity** created or changed through an **event**	role/
context	An **entity** within which an **event** took place or a **situation** exists (typically, **time** or **place**)	role/

All these roles have many subtypes. *Agent, input* and *context* roles may apply to any type of relation; *outputs* apply only to events.

6.3.1 Agent roles

Agent roles are normally fulfilled by people or other beings, or by organizations of beings, although in principle anything capable of action may be an agent. Agents determine the nature of the event or situation. If a relation is thought of as a sentence, the agent is the subject of the verb. In the <in*d*ecs> commerce view, the agents are known as *parties* and the verbs of making (*contributors*) and using (*users*) are important. Some agent roles are simultaneously types of both contributor and user.

Contributor roles are intimately related to the establishment of rights, and user roles to the exercise of rights, so the identification of agent roles is central to the schema. Those listed below provide the basic framework, for agent roles are often complex entities that identify not only the basic act (for example, *director*) but the aspect of the creation that is affected (for example, *art director*) and any number of formal qualifiers (for example, *third assistant graphic art director*). In many domains the precise description of contributor roles has a significant impact on the grant and exercise of rights.

The same applies to *user roles* (some of which as we have seen overlap with creating roles); permissions are commonly explicit about types of use and the roles of users (for example, a creation might be licensed to be passed by a *disseminator* to a *student* or *scholar* but not to a *consumer).*

Table 6.3.1 **Generic party roles**

element[iid]	definition	genealogy
party[68]	A **party** undertaking a role in a creative or commercial **relation**	agent/
contributor[69]	A **party** contributing to the making of something, in whole or in part	party/
creator[70]	A **party** contributing to the making of an **original creation**, in whole or in part	(original_creati on).contributor
modifier[71]	A **party** contributing to the making of a **modification**, in whole or in part	modification.con tributor; user/
excerpter[72]	A **party** contributing to the making of an **excerpt,** in whole or in part	excerpt.contribut or; user/
compiler[73]	A **party** contributing to the making of an **compilation**, in whole or in part	compilation.cont ributor; user/
replicator[74]	A **party** contributing to the making of a **replica**, in whole or	replica.contribut

	in part	or; user/
producer[75]	A **contributor** responsible for the realisation of a **creation**	contributor/
director[76]	A **contributor** directing the activity of others in the making of a **creation**	contributor/
performer[77]	A **contributor** performing or interpreting an **abstraction** in an **expression**	contributor/
operator[78]	A **contributor** operating equipment to create content in a **creation**	contributor/
recorder[79]	A **contributor** recording an **event** in the making of a **creation**	contributor/
facilitator[80]	A **contributor** providing support services to other **contributors**	contributor/
user[82]	A **party** making use of an **entity** for any **purpose**	party/
disseminator[81]	A **party** making an **entity** available to potential **users**	user/
recipient[512]	A **party** to whom an **entity** is **disseminated**	user/
audience[120]	A **being** or **group** of beings experiencing or enjoying a **percept** in one or more **modes**	user/
possessor[84]	A **party** retaining possession of an **entity** in a **situation**	party/
granter[730]	A **party** tranferring rights to another in an **iprTransfer**	party/
grantee[731]	A **party** to whom rights are transferred to in an **iprTransfer**	party/
consenter[732]	A **party** to a concluded **agreement**	party/

6.3.2   Input roles

Input roles are passive roles that qualify, support, or are subject to, acts of agents. This definition of an input role is broad enough to cover all entities playing a role in an event or situation which is not that of an *agent*, *context* or *output*. Some principal input roles for the commerce view are shown in Table 6.3.2:

Table 6.3.2 **Generic input roles**

element[iid]	*definition*	*genealogy*
patient[86]	An **entity** which is the object of the act in an **event**, or is possessed or associated in a **situation**	party/
usedEntity[195]	An **entity** made use of by a **user**	patient/
disseminatedEntity[196]	An **entity** made available by a **disseminator**	patient/
possession[197]	An **entity** retained by a **possessor**	patient/
associate[660]	A **party** in an **association**	patient/
tool[90]	A **bounded thing used** directly by a **contributor**	input/
material[91]	An **unbounded thing used** directly by a **contributor**	input/
subject[92]	An **entity** described or otherwise significantly covered by the contents of a **creation**; what a **creation** is about	input/
component[89]	A **creation** which is part of another **creation**	input/
sourceCreation[88]	A **creation** from which another **creation** is wholly or partly made; a **creation** which is the basis for another	input/
controlled Creation[733]	A **creation** in which **intellectualPropertyRights** exist	input/
transferred Right[734]	A **right** which is the subject of an **iprTransfer**	input/

6.3.3 Output roles

Outputs are entities resulting from an event which were not pre-existent, or which are new versions of pre-existing entities with different attributes. In the commerce view, *output roles* are fulfilled by creations.

6.3.4 Context roles

Context roles are those played by *time* and *place*.

6.3.5 Role qualification

A role may carry a variety of qualifications, including the *sequence* in which it appears among a group of roles (for example, chapter 1 of 20) and the *quantity* of an entity included in the relationship (for example, 15 seconds of an audio recording included in a soundtrack).

6.3.6 Roles and types

All the same elements feature as both *roles* and *types*: when *roles* are attributed to an entity outside of the setting of an event or situation they become characteristic *types*. For example, Beethoven was the *composer* of Fidelio in an event; so from this and other events it is established that Beethoven was a entity of the type *composer*. Similarly if a *translation* is be the output of a translating event, then translation is a *type* of the output creation.

Any entity fulfilling a role in a relation may then be said to be of the type described by the role, although in practice such attribution tends only to occur when an entity is identified *regularly* with a particular role (if a person once played a brief part in an amateur stage production, it would be technically correct but misleading to characterise them generally as an "actor").

6.4 Events

An event may be simple or complex. Any number of beings, things, concepts, times and places may be involved in events, each playing different roles. Events may contain, or overlap with, other events or relations to any degree: any number from one to all relations may be common to two events, each qualified to a different level of granularity.

In contrast to the conventional resource-based ("stuff-centred") approach to commerce metadata, the event structure offers at least three major attractions for metadata interoperability:

First, it is a way of creating the maximum number of metadata relationships with the minimum amount of duplication. For example, where many parties play several contributor roles at different times and places, using different tools (as, for example, in the making of a film), this can be most simply described as a series of events.

Secondly, it provides a single, common and endlessly repeatable structure for integrating the whole range of distinct creative, commercial and legal events which comprise the different views relevant to IP e-commerce. The event structure is proposed as the long-term *glue* for e-commerce metadata interoperability.

Thirdly, the event structure provides the most efficient means to track changes that relate to persistent entities. *Beings, things* and *concepts* have things happening to them constantly (some of which need recording), while they retain a consistent identity. In rights management in particular, tracking complex changes in ownership and in licensing terms and conditions is critical.

6.4.1 Event types

Event types are determined by the agent role(s) they contain. Principle event types in the commerce view include:

Table 6.4.1 **Commerce view principal event types**

element[iid]	definition	genealogy
expression[105]	A **creation** which is an **event**	event/
creatingEvent[19]	An **event** which results in the making of a **creation**	creating_event
transformingEvent[20]	An **event** which results in the making of a new **creation** including elements of at least one existing **creation**; an **event** in which both **creating** and using **occur**	event/
usingEvent[21]	An **event** in which a result is the **use** of an **entity**	using_event
disseminatingEvent[226]	An **event** in which a result is the **dissemination** of an **entity**	disseminating_event
transaction[22]	An **event** determining or recording the use or possible use of an **entity**	event/
agreement[23]	An **event** in which a written or unwritten accord is made between two or more **parties**	transaction/
offer[24]	An **event** in which a **party** makes known the terms on which an **agreement** may be made	transaction/
payment[25]	An **event** in which a **party** gives money to another **party**	transaction/

The structure of typical *creatingEvents* and *usingEvents* are shown in Diagrams 7 and 10 below, and *agreements* in section 10.

<indecs>

Metadata Schema Diagram 10

usingEvent

| label | quantity | quality | type |

usingEvent

agent	input		context
user	usedCreation		time
(=party)	(=creation)		place
	tool		
	(=thing)		

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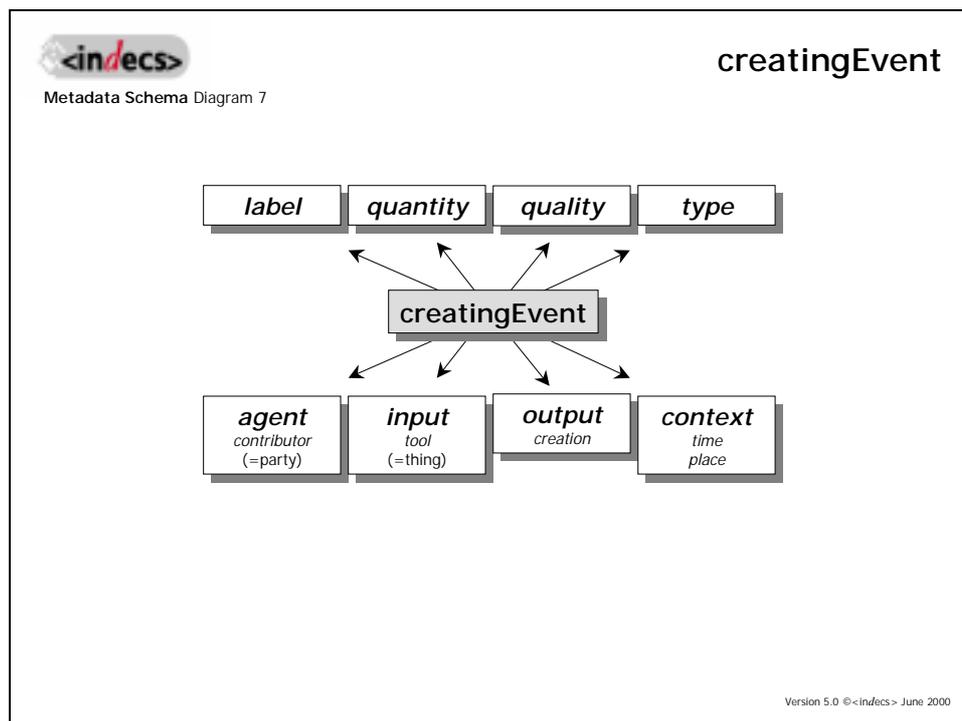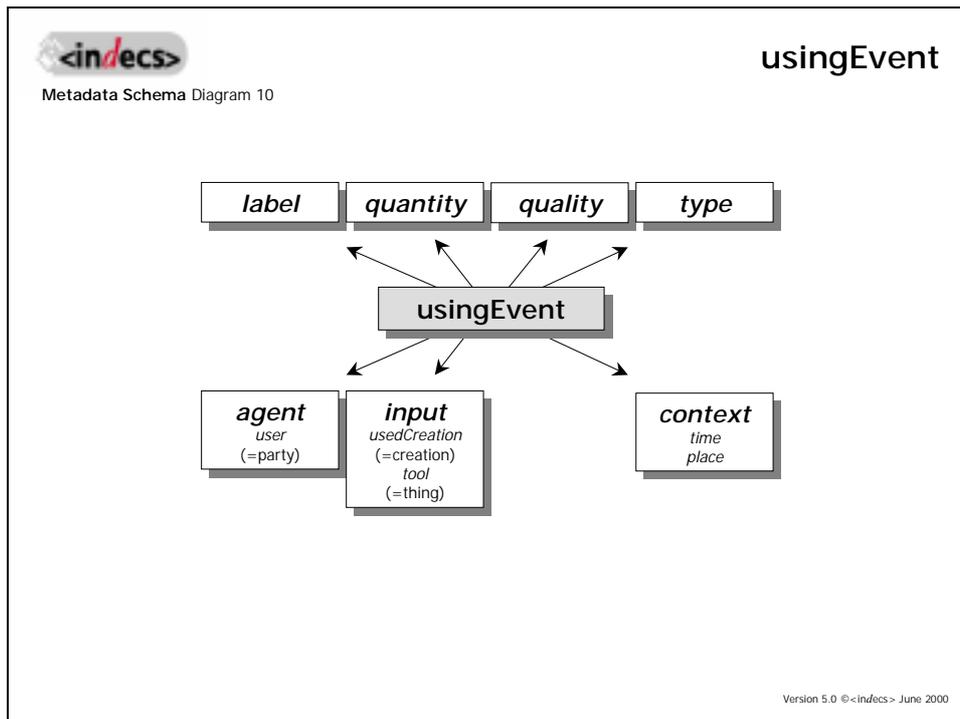
Events which involve the use of one creation in the making of another combine both these types and become *transformingEvents* (Diagram 8):

<indecs>

Metadata Schema Diagram 8

transformingEvent

| label | quantity | quality | type |

transformingEvent

agent	input	output	context
contributor	sourceCreation	creation	time
user	(=creation)		place
(=parties)	tool		
	(=thing)		

Version 5.0 ©<indecs> June 2000
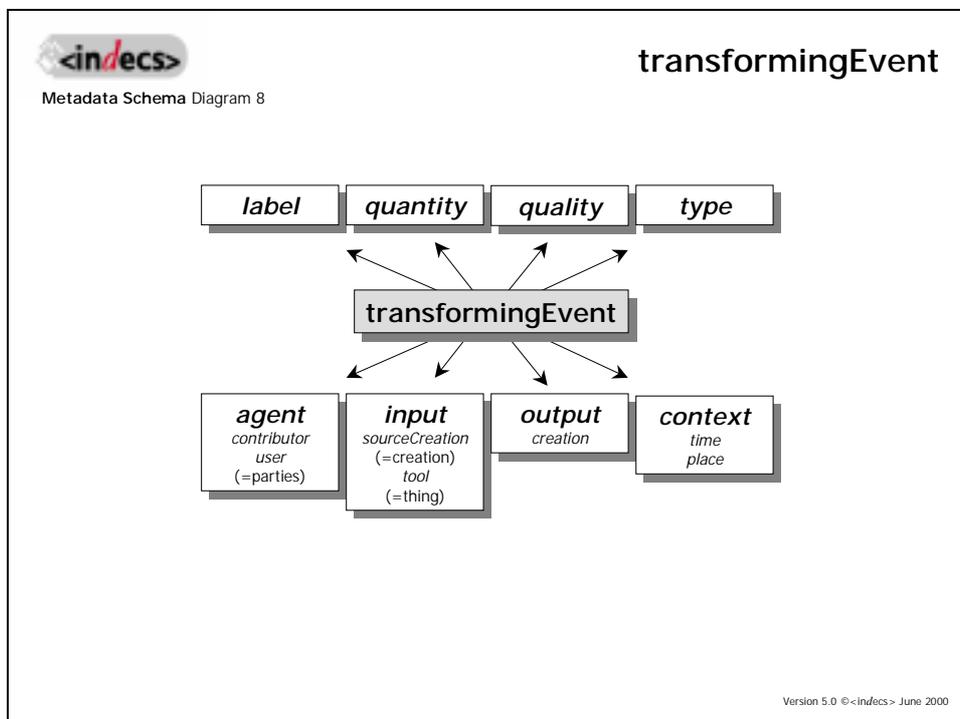
6.4.2 Event granularity

Events may be as big or small as needed, as determined by functional granularity. An event may contain any number of other events, but what defines a *single* event is strictly constrained by syntactic rules. The syntax of <in*d*ecs> events reflects the structure of simple sentences. A valid <in*d*ecs> event must conform to these syntactic rules:

1 Each entity in an event plays at least one **role** expressed as a relation between the entity and the event.

2 Each event has at least one **agent** playing at least one **agent role.**

3 Entities may play more than one role in one event.

4 Two or more entities may play the same role in one event.

5 Within any one event, all non-agent roles (**input**, **output** or **context roles)** must apply directly to all **agent** roles.

Rule 5 is the key to the structure, as this rule controls the level of granularity required in any group of events. Here is an example to illustrate this:

Two people (A and B) collaborate in writing and illustrating a book (X), in England in 1999. This can be shown as a single event which includes:

Author A (agent) + Illustrator B (agent) + Book X (output) + England (context) + 1999 (context).

However, if we wish to record that the text was written between March and August in Manchester, and the illustrations completed in October in Nottingham, we require two separate events, as the context roles no longer apply to both agent roles:

Author A (agent) + Book X (output) + Manchester (context) + March-August 1999 (context).

Illustrator B (agent) + Book X (output) + Nottingham (context) + October 1999 (context).

These two separate events can themselves be shown as being an *input* of the larger "parent" event already described. The description can be made more granular by, for example, identifying the day on which each illustration was completed, and by identifying chapters and illustrations as individual outputs of specific events, and inputs into larger events. There is no logical limit to the level of granularity. Such a structure can be applied to describing, for example, the complex creative process involved in a film or multimedia creation, allowing specific aspects to be recorded in great detail while others are treated more simply. Events may have any degree of granularity: extreme granularity is required to record many technical processes for many purposes, including rights management, multimedia production and scholarship.

6.5 Situations

A *situation* is a relation that continues to happen for a period of time and/or in a given place without changes in status. For example, a person being resident in a certain place, or a person owning certain rights in a creation for a period of time, can be described using the relation structure and syntax. The verbs used here include those of possession (*has*) and being (*is*). Situations share many of the characteristics of events, but do not have outputs. There are two types of situation:

Table 6.5 **Situation types**

element[iid]	definition	genealogy
possessingSituation[403]	A **situation** in which an **entity** is owned or kept by another entity; a relation based on the verb *to have*.	possessing_situation
association[124]	A **situation** in which two or more **entities** are passively	situation/

related; a **relation** based on the verb *to be*

In a *possessingSituation*, the owner or **possessor** plays an *agent* role. In an association, all associated parties play an *input* role of **associate**.

7 Parties

In the commerce model, a party is defined by what it *does*: that is, the *agent role* it plays in a creative or commercial event. So it is meaningful, for example, to say that John Williams, Marilyn Monroe, the London Philharmonic Orchestra and Mickey Mouse are all performers, even though one is a "real" human being, one is using a stage persona, one is a name that represents a constantly changing group of individuals, and one is a fictional cartoon character.

However, although the commerce model is not primarily concerned with describing people and organizations, parties commonly require their own metadata, independent of creative and commerce events, to fulfil some basic functions of interoperability. How do we know or record the fact that the John Williams performing here is the same as the one composing there, or that Fred Astaire is an alias of Frederick Austerlitz, or keep track of the members of the London Philharmonic Orchestra, or record the relationship between Mickey Mouse and the performer speaking his voice? While much of this can be done through the events described above, party metadata provides a different but essential view.

Party metadata conforms to the generic attribute structure: parties have *labels* (such as names), *quantities* (such as age), *qualities* (such as gender), *types* (such as individual or organization) and play *roles* in relations (such as birth, death, marriage and membership of groups).

The need for stable party identifiers and related metadata is covered in more detail in the <in*d*ecs> Directory of Parties proposal[17]. The principal party types are given below:

Table 7 **Principal party types**

element[iid]	definition	genealogy
humanBeing[17]	A man or woman of the species homo sapiens [OED]	being/
animal[16]	A living organism which feeds on organic matter, usually possessing specialised sense-organs and a nervous system [OED]	being/
plant[18]	A living organism of the species Plantae, usually containing chlorophyll enabling it to live wholly on inorganic substances and lacking specialised sense organs and the power of voluntary movement [OED]	being/
organization[615]	A **group** of **human beings** (whether legally incorporated or not)	group_party
ensemble[596]	A **group** of **creators**	organization/

8 Creations

8.1 A model of making

The top-line relationship of the commerce view (*people make stuff*) involves *creating* and *using* events. Different types of creation come into existence through these, with different attribute subtypes (and giving rise to different intellectual property rights). These different

types and relationships can now be understood by combining the *general* and *commerce* views through the events model into this *model of making* (Diagram 42):
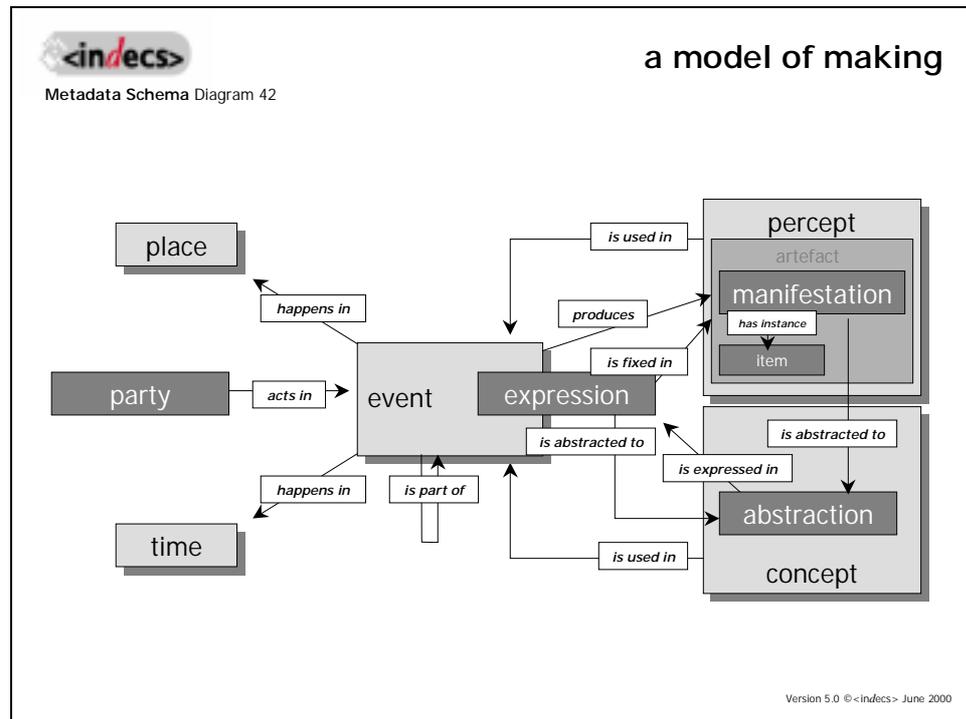
8.2 Creation types

Table 8.2 **Creation types**

element[iid]	definition	genealogy
artefact[406]	A **creation** which is a **thing** (derived)	created_thing
item[98]	A single instance of an **artefact**	artefact/
manifestation[101]	An **artefact** containing an **infixion** of an **expression**	artefact/
format[32]	An **artefact** on which an **expression** may be **infixed** to create a **manifestation**	artefact/
expression[105]	An **event** which is a **creation**	event/
abstraction[106]	A **creation** which is a **concept**; an **abstract creation** whose existence and nature are inferred from one or more **expressions** or **manifestations**	concept/

The relationship of four of these creation types is further elaborated in Diagram 11 (which is a "detail" of Diagram 42). The main function of these distinctions is that each of these different types of creation may give rise to a different intellectual property right; for example, in an audio CD there are separate rights in the physical product (manifestation), the recorded performances (expressions) and the songs performed (abstractions), and these each require distinct metadata at some point in the commerce chain. These rights have different values in different jurisdictions, and will commonly be owned or controlled by different people and organisations. While music is used as an example, parallel situations exist for all other genres of creation. Without the clear structural distinctions of this kind, effective rights management is impossible.

Metadata Schema Diagram 11

creation types

atoms, bits *"I made it"*

artefact

manifestation

perceived

has instance

identifiers include...
isbn
upc/ean
umid
doi

item

is fixed in

actions *"I did it"*

identifiers include
isrc
doi

expression

spatio-temporal

is abstracted to

is abstracted to

is expressed in

abstract

abstraction

identifiers include
iswc
isan
issn
pii
doi

Concepts *"I conceived it"*

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8.2.1   Artefact, Manifestation, Item and Format

An *artefact* is a created, inanimate percept: anything from a nail to a book to a computer file to a skyscraper.

A *manifestation* is a particular type of artefact in which *expressions* and/or *abstractions* are recognised which may have underlying intellectual property. Manifestations include the books, CDs, videocassettes, films, newspapers, software programs, digital objects and all the other forms of created stuff which manifest "content". Manifestation metadata is in the front-line of e-commerce requirements.

However, a manifestation is typically not an individual creation but a class of creations. For example, in describing a book with its ISBN, format, title, author and subject classes, we are describing *all instances* of that book. However, if 50,000 copies are distributed, each of these may require its own metadata for identification, location, ownership and so on, and these become *items*, which inherit metadata from the manifestation which may be supplemented by local metadata specific to the item.

A *format* is an artefact which requires content to become a manifestation: a blank DVD, an empty computer file or a book without words. A manifestation might be thought of as the combination of *format* and *expression.*

8.2.2   Expression

An *expression* is a performance – an event which is in itself regarded as a creation and may or may not be recorded or fixed in a manifestation, and may be reproduced by some form of recording playback.

The expression is the *event* which is recorded, not the physical or digital recording itself, which is a manifestation. One expression may be recorded and copied onto many media while maintaining its integrity.

An expression may give rise to an abstract work; at the same time it may be an expression of an existing abstract work.

Separate rights frequently exist in expressions. Recorded audio and audiovisual performance are the most commonly identified expressions. Live performances are also creations that may require identification and description for rights purposes, even if the performance itself is not recorded in audio or audiovisual form. *Static* manifestations such as texts, paintings or photographs are the results of creatingEvents, but these events themselves (the act of writing or photographing, for example) are not generally treated as expressions (or intellectual property) in themselves.

8.2.3 Abstraction

An abstraction is the entity often popularly called a *work*. However, in the <in*d*ecs> framework a work is a piece of *intellectual property (ip)* defined directly in terms of the legal provisions of the Berne Convention, so while all works are abstractions, all abstractions are not necessarily works in the legal sense. Abstractions are the hardest types of creations to pin down. They are recognised as the common denominator between various different performances or manifestations. For example, the same work may be recognised underlying a dozen different performances of *Hamlet*, or different recordings of *My Way*, or editions and translations of *Moby Dick*. In the bibliographic community, abstractions are sometimes referred to by *uniform titles*.

Common formal elements, such as a storyline, or a melody, or the arrangements of words and images, are typical evidence of a common underlying abstraction, and it is these elements of expression which are subject to copyright; but the precise characteristics by which such recognition is secured are elusive and are settled by editorial, commercial or, ultimately, by a legal judgement. The point at which new abstract works or versions of works are identified is therefore imprecise, and subject to the principle of *functional granularity*. This will vary considerably from genre to genre and form to form. Rights are one of the major drivers of functional granularity. For example, if a translation has different rights from the original work (which will almost certainly be the case), it must be identified as a distinct creation.

8.3 Creation identifiers

Creation identifiers are among the most important elements of intellectual property metadata. An initial set of these is included in the Framework Metadata Dictionary:

Table 8.3 **Some significant creation identifiers**

element[iid]	definition	genealogy
bici[172]	Book Item and Component Identifier	creation.identifier/
catalogNo[620]	An **identifier** given to an **entity** in a **disseminator's** catalog	identifier/
doi[174]	Digital Object Identifier	creation.identifier/
ean13[175]	European Article Number	artefact.identifier/
isan[176]	International Standard Audiovisual Number; draft ISO standard **identifier** for **audiovisual abstractions**	abstraction.identifier/
isbn[177]	International Standard Book Number; ISO standard **identifier** for **books**	manifestation.identifier/
ismn[178]	International Standard Music Number; ISO standard **identifier** for **printed music**	manifestation.identifier/
issn[179]	International Standard Serial Number; ISO standard **identifier** for **serial** publications	serial.identifier/
isrc[180]	International Standard Recording Code; ISO standard **identifier** for **audio** and **video recordings**	expression.identifier/
iswc[181]	International Standard Musical Work Code; draft ISO standard 15707 **identifier** for **compositions**	composition.identifier/

pii[183]	Publisher Item Identifier; an **identifier** for **textual abstractions**	abstraction.identifier/
sici[185]	Serial Item and Contribution Identifier; a NISO standard **identifier** for **components** of **serials**	creation.identifier/
umid[186]	Universal Media Identifier; an SMPTE standard **identifier** for digital content	creation.identifier/
upc[187]	Universal Product Code	artefact.identifier/

8.4 Creation qualities

The number of possible formal characteristics of creations is limitless. Some of the most significant are given in the table below:

Table 8.4 **Some significant creation qualities**

element[iid]	definition	genealogy	subtypes
mode[46]	A sensory **mode** or modes through which an **entity** may be **perceived**	form/	**audio**[160] **gustatory**[161] **visual**[162] **olfactory**[163] **tangible**[164]
origination[209]	A process by which a **creation** is made	form/	**original**[214] **excerpted**[211] **compiled**[212] **modified**[213] **replicated**[215] **natural**[216]
genre[34]	A style or manner of the **expression** of an **abstraction**	expression.form/	**lexical**[288] **musical**[282] **pictorial**[283] **audiovisual**[295] **narrative**[504] etc
language[35]	A particular **form** of verbal or symbolic **expression** of an **abstraction**	lexical_expression .form/	all languages
colour[36]	A **visual attribute** of an **entity** resulting from the separation and combination of particular wavelengths of light	visual_expression. form/	all colours
substance[37]	The **form** of the material of which an **entity** is made	form/	**physical**[132] **digital**[133]
infixion[33]	The means of representation or fixing in which an **expression** of an **abstraction** is established in or on a **manifestation** (*aka* **encoding**)	manifestation.for m/	**analogue**[134] **bitEncoded**[135]
continuity[39]	The nature of **dynamism** of an **entity** over **time**	form/	**dynamic**[138] **static**[139]
completion[485]	The status of a **creation** in the course of the creative process	form/	**draft**[486] **finished**[487] etc

8.5 Creation-to-creation relation roles

The most important roles played by creations have been described in *creation types* (8.2) (as has been noted in 6.3.6, terms used as *types* or *roles* are interchangeable). Other principal roles which creations play in events and situations are:

Table 8.5 **Some creation-creation relation roles**

element[iid]	definition	role type

originalCreation[96]	A **creation** without a **source input**	output
compilation[99]	A **creation** made from two or more pre-existing **creations** of other **types**	output
excerpt[95]	A **creation** which is made by **extraction** from a pre-existing **creation**	output
modification[97]	A **creation** made by changing a pre-existing **creation** of the same **type** (aka **version**)	output
replica[448]	An **item** made by copying another **item**	output
sourceCreation[88]	A **creation** from which another **creation** is wholly or partly made; a **creation** which is the basis for another	input

9 Intellectual property

Intellectual property (ip) is a legal concept. Its terms are generally understood (amongst lawyers at least) and defined in a series of international conventions and treaties and under national law.

ip includes items protected by copyright, neighbouring (or related) rights and patent and trademark law, among others.

This legal view finds expression in three main classes of entity*: ipTypes, ipRights (ipr) and person,* each of which is defined in table 4.4. <in*d*ecs> recognises that legal concepts relevant to e-commerce must be defined within an IP legal *namespace* and does not try to re-define these. Here are examples of the kind of terms and definitions required from a legal namespace:

Table 9 **Examples of ip types**

element	*definition*
work	As defined by the Berne Convention for the Protection of Literary and Artistic Works, the WIPO Copyright Treaty and the TRIPS Agreement
performance	As defined by the International Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organisations (Rome Convention), the WIPO Performances and Phonograms Treaty and the TRIPS Agreement
phonogram	As defined by the International Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organisations (Rome Convention), the WIPO Performances and Phonograms Treaty and the TRIPS Agreement
broadcast	As defined by the International Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organisations (Rome Convention), the WIPO Performances and Phonograms Treaty and the TRIPS Agreement
criticalOr Scientific Publication	As defined by Article 5 of the European Directive harmonising the term of protection of copyright and certain related rights

Definitions of this kind, mediated as required by territorial and temporal constraints, are needed to support the vocabulary of IP types, rights and legal persons which is routinely used in IP-based metadata systems.

10 IPR Transactions

10.1 Overview

Transactions (specifically in this context, *iprTransactions*) cover the <in*d*ecs> approach to describing rights ownership and what are commonly called "business rules" for ipr. Ultimately they rely on the combination of ipr vocabulary with commerce vocabulary

An *intellectual property right* (ipr) is defined by <in*d*ecs> as *the authority granted by law or international convention to do or to authorise another person to do a defined act to intellectual property*. Rights transactions depend on a "chain" of grants of rights and of *permissions*: this chain is established initially by law or statute, in what may be viewed as the original binding agreement that confers rights to a person. Whether the laws are concerned with copyright, patent law or other forms of ip is unimportant for the operation of the framework

Rights normally flow from the original creator(s) of a piece of intellectual property through a series of ipr agreements, passing through an indefinite number of intermediaries to an indefinite number of end users. An *agreement* is defined as *an event in which a written or unwritten accord is made between two or more parties.* In *iprAgreements,* parties may agree to pass on ip Rights in an *iprTransfer*, or they may agree to some act being *permitted*, *prohibited* or *required* in relation to the exploitation of specific ipr. The details of these agreed acts form the "business rules".

In the <in*d*ecs> framework, the term *agreement* has a very broad meaning and is designed to encompasses all forms of agreement which relate to the protection and use of ipr, from international law at one extreme to licences for Internet downloads of individual files at the other.

Agreements may or may not require documentation, and this documentation may or may not need to be integrated at any point in the chain. However, in the e-commerce environment there is a growing need for an electronic system of documenting rights which

1. accommodates any type of right or creation;
2. allows for the integration of incomplete information at any point in the chain;
3. supports a high level of automated metadata generation;
4. is integrated with descriptive metadata systems; and
5. allows data to be transformed into and out of alternative structures, including accounting systems.

An events-based transaction structure appears able to support these requirements optimally.

10.2   Integrating rights and commerce metadata

Rights in a particular item of ip can be encapsulated in an *iprStatement* (see 10.3)**:** a *situation* which identifies the legal *person* owning or controlling a particular **ipr** (for example, the *copyright*) in a particular item or group of *ip* (known in this context as *controlledCreations*).

Rights are then passed on through *agreements* (see 10.4)**,** whereby parties may also agree on the uses to which creations may be put. This can be done using <in*d*ecs> commerce vocabulary within the relation model. Agreements also cover the transfer from one person to another of the right to grant further uses to other parties (an *iprTransfer*, see 10.4.2.3).

The outstanding requirement is to establish the appropriate mappings between *user roles* in the commerce view and *rights* as defined in a legal namespace, to allow iprStatements and agreements or usage reports to be correlated. *Contributor roles* (for example, *author, composer, performer* and *translator*) need to be mapped to rights for given creation types and jurisdictions so that provisional iprStatements may be generated by inference from descriptions of the creatingEvents themselves. For example, a creatingEvent in which *party A* is the *composer* of composition B may give rise to the iprStatement *person A* is the *copyright owner* of *work B* in a given jurisdiction.

Such inferences can only ever be provisional, and their reliability will depend on the authority with which the descriptive statements have been made, and the *assertions* which back them up (see 11). However, it is likely that the ability to produce iprStatements simultaneously with descriptive ones as part of an integrated process will become an e-commerce necessity, as will mechanisms for automatically exchanging and integrating details of diverse iprStatements and

agreements to support licensing and payment systems. This may be viewed as the ultimate challenge for e-commerce metadata interoperability.

10.3 iprStatement

An *iprStatement* is a *situation* (see Diagram 12 below) which describes the ownership of an ipr, or of some entitlement to agree to further exploitation of an IPR. iprStatements are based on "possessor" roles, such as *owner* or *rights administrator*:
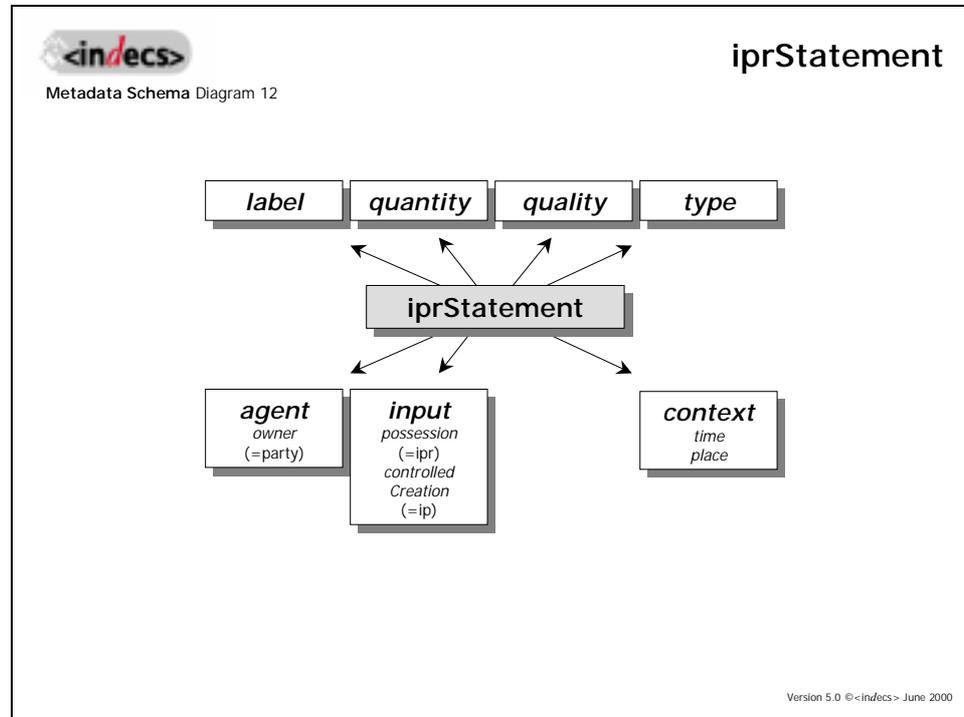
An iprStatement, when used as the patient of an *assertion* (see 11), can form part of an input to an agreement. It is by this device that the authority to enter into an agreement is established.

10.4 Agreement

iprAgreements record where, when and by whom a deal was concluded. A generic agreement following the event structure is given in Diagram 13:
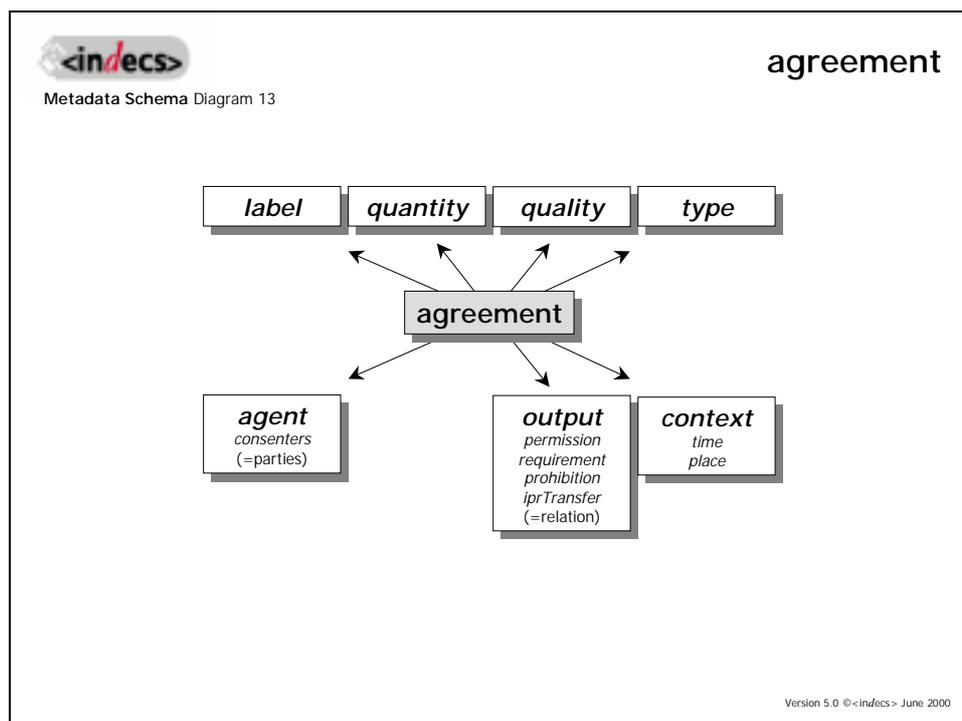
In popular usage the term *agreement* is often taken more narrowly to mean a document or contract signed by the parties, but it explicitly does not have this meaning in the <in*d*ecs> framework. Such a contract document may in reality encompass the terms of many agreements, in whole or in part: an appropriate data element for this, and the description of its relations with such agreements, remains to be identified.

10.4.1 Direct attributes of agreements

Agreements may have *labels* in the form of *identifiers* and *names.* Contract and licence numbers are common forms of agreement identifier. The development of more widely recognisable agreement identifiers is an essential prerequisite for widespread automated interoperability in e-commerce rights management, for use in both public and confidential party-to-party environments.

Quantities are not prominent features of an agreement itself, although they may record, for example, a count of its parties or other components.

Quality attributes may record, for example, whether an agreement is verbal or written, or exclusive or non-exclusive.

There are many *types* of ipr agreement, including (for example) those commonly called *publishing agreement*, *sub-publishing agreement* and *licence.* The original grant of a right by law is itself an agreement between a person or persons and a collective person in the form of a nation, government or other legal entity. The identification of standard agreement types, generically and by sector, is necessary for interoperability. An agreement type will often automatically determine which roles feature in its outputs: for example, a *public performance licence* may determine that the agent role in the permitted action is one of *performer* and that others may fulfil an *audience* agent role.

10.4.2 Agreement relations

An agreement has at least two *parties*. Normally these will be legal *persons,* but the <in*d*ecs> agreement structure is neutral as to whether an agreement is enforceable by law: it simply describes who has agreed what. According to the nature of the outputs, the roles of the parties

to an agreement may be more specific than simply "parties" (for example, *granter* and *grantee* of rights).

The *context* role of the agreement identifies where and when the agreement was made. Note that this refers only to the *making* of the agreement itself, *not* to the time or place of events or situations which are the subject of its terms: those are dealt with in the outputs.

The direct attributes of the agreement itself are normally quite simple: the complexity comes in the terms of the deal which are set out in the relations *permitted, required* or *prohibited* or in the rights *transferred* by the rights agreement, which are its *outputs*. The four generic outputs so far identified are defined in Table 9.3.2.

Table 9.3.2 **Rights agreement outputs**

element[iid]	*definition*	*genealogy*
permission[110]	A **relation** which is allowed by an **agreement**	permitted_relation/
requirement[113]	A **relation** which is necessitated by an **agreement**	required_relation/
prohibition[496]	A **relation** which is forbidden by an **agreement**	prohibited_relation/
iprTransfer[500]	A **situation** in which an **ipr** is transferred by an **agreement**	situation/

A properly constituted agreement will always contain at least one *permission, prohibition* or *iprTransfer*. It does not need to contain a *requirement.*

While the <in*d*ecs> schema is designed to allow for the complete documentation of the terms of agreements, including their financial and other terms, it assumes no obligation of disclosure of any specific terms in any particular circumstances. It is common in current practice for certain aspects of agreements – such as the details of the owners or agents representing rights owners in specific territories – to be made generally available, while the date of the expiry of the agreement, or the financial terms by which it was secured, remain confidential. Such partial recording or disclosure of agreements is the commercial norm and is not prejudiced by the <in*d*ecs> schema, but is rather enabled by it.

Agreements imply, but do not always assert, that the granter of ipr has the authority to do so. This can be made explicit within an agreement by the inclusion of an *assertion* (see 12) of which an *ipr statement* is the *output,* or by a chain of two or more agreements, at the head of which will be an *assertion*.

10.4.2.1 Permissions and prohibitions

These outputs come in the form of *events* or *situations*. *Transforming, disseminating* and other *using* events have been described above (6.4.1), and these are the normal kinds of *permitted* or *prohibited* outputs. This is the focal point for the integration of rights and descriptive metadata, because the reporting of an event which has taken place (descriptive metadata), or an event which may or may not take place (rights metadata) may take precisely the same form.

Where a difference occurs, it is typically that the scope of a *permitted* event is broader than that of an event which actually takes place. For example, a party may be permitted to make "up to ten copies" of any of a hundred different creations in a catalogue at any time during a three year period, but may in practise only make a few copies of ten of these creations at specific times. This leads to the frequent identification of *classes* of party, creation or context as having roles within permitted events. At times, these classes will themselves be defined by other agreements: for example, a party may allow another party to use all the creations for which he has acquired rights from a third party under another agreement or set of agreements. All these arrangements can be described as groups or chains of relations.

10.4.2.2 **Requirements***Requirements* are stipulated in many forms, including that of a *payment* or of approval for specific use being sought and given. In theory any event may be required as a condition an agreement, including a reciprocal agreement. The basic structure of a payment event may normally be straightforward enough, but the quantification of money (or any other entity) may be open to any degree of complex calculation. The event structure does not model numeric calculation, but may refer to any external method or source from which conditional or unconditional values or formulae may be derived.

10.4.2.3 iprTransfers

An *iprTransfer* is a *situation* which is the output of an agreement in which *ipr* in one or more *ips* is assigned or transferred from one party to another. This model applies irrespective of whether such assignment is limited by time, place or non-exclusivity. The iprTransfer structure is shown in Diagram 14:
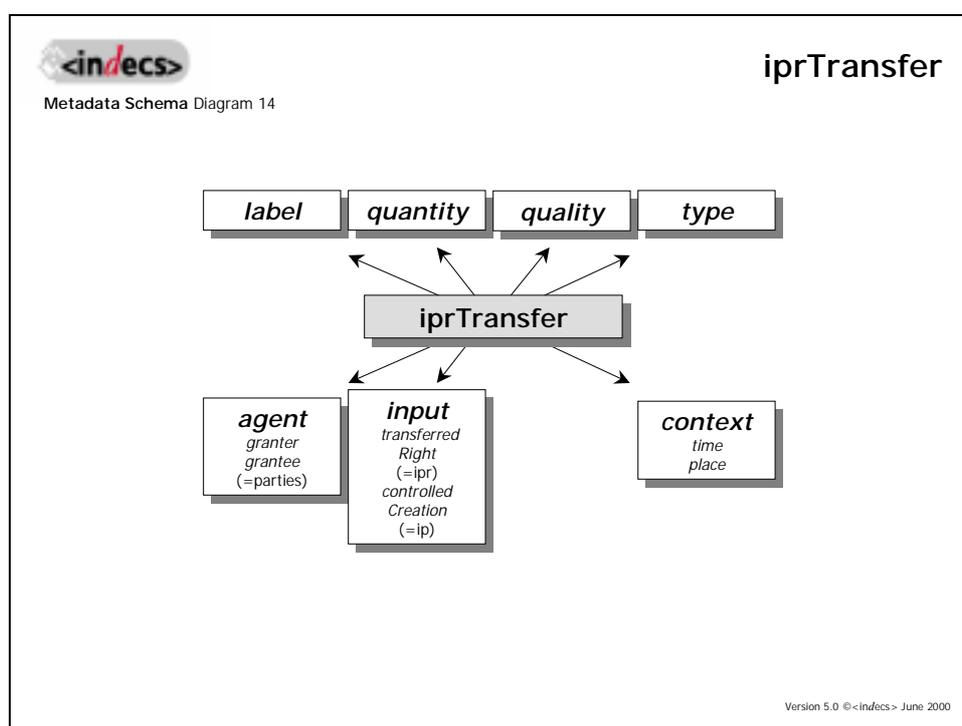
In many agreements (such as agency agreements), one party gives to another the right to grant further permissions to third parties, without actually assigning the ownership or control in the right itself. This doesnot need to be shown by an iprTransfer, but simply as another *permitted event* in the form of an agreement in which the party granted the right themselves appears as a granter of further permissions.

10.5 Offers

An **offer** is an event in which one or more parties sets out the terms of a possible agreement.

11 Assertions

An **assertion** is *an event in which a party makes a claim of veracity about something.* Assertions are the mechanisms in the <in**d**ecs> framework by which authority is established (see 2.3: *The principle of designated authority*).

It involves an agent role of **asserter** (or a more specific subtype such as a *warrantor)* and a patient role of the thing asserted, which may be anything from the statement of a simple attribution ("this book has 200 pages") to a complex set of ipr agreements or a tax return. The basic structure of an assertion is shown in Diagram 15:
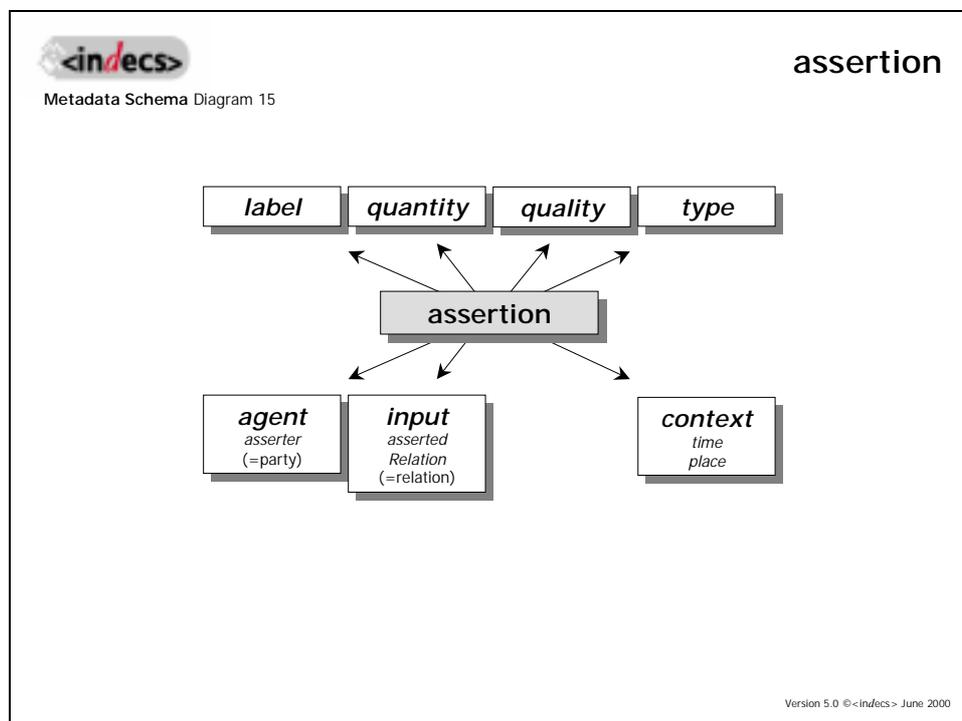
The *qualities* of an assertion may include degrees of **veracity***, the nature of the truthfulness of an assertion according to the asserter*, of which typical values may be **true, probable**, **possible** and **false**.

Any number of assertions may be made about a relation by any number of asserters.

12   Non-textual metadata

All the examples in this document have been taken from textual metadata. However, metadata may equally be comprised of non-textual creation types, such as diagrams, thumbnail images, audiovisual and audio clips, watermarks and so on. The principles and mechanisms of the framework apply equally to these.

13   Transformations

The document provides a reference model and does not specify mechanisms for the delivery, mapping or transformation of metadata, whether through parsers, metadata registries or other mechanisms. A technical paper on the further development of the event model to support metadata interoperability can be found at the abc project.[18]

14   Framework Metadata Dictionary

The *framework metadata dictionary* holds information on <in*d*ecs> metadata elements, their names, iids, definitions, relationships and mappings to elements in other schemas.

Here is an example of a basic dictionary entry for the element *modification*, followed by an explanation of particular components.

element name	description	genealogy	iid
modification	A **creation** made by changing a pre-existing **creation** of the same **type** *(aka* **version)**	modified_creation	97

14.1   Element names

English language element names are selected for convenience, clarity and precision. Where popular usage has rendered a term widely ambiguous (for example, *publisher)* or where it has a specific technical or legal meaning which is likely to confuse (for example, *object, work*) these are generally avoided in the <in*d*ecs> framework unless they are being used according to an established external definition. In some cases uncommon or unusual element names are selected precisely because they lack semantic baggage (for example, the terms *percept* and *infixion*). Within the metadata dictionary, an element name has some semantic value, but without its definition and generic identity (see below) this is limited. Elements may and will use different names in different <in*d*ecs>-based schemas, and of course in languages other than English.

14.1.1   Element name synonyms

A synonym within the dictionary is viewed as semantically indistinguishable from the main element name and iid. These are shown here in bold type as an *aka* in brackets after the definition.

14.2   Element definition

The purpose of an <in*d*ecs> definition is to support semantic identity between different views and therefore to allow for the mapping of elements in different schemas which need to recognise one another's data. This purpose is functional rather than philosophical. What matters for interoperability is that two parties or schemas use a term in the same way, not that the definition is any absolute or abstract sense "right" or "wrong". In the nature of language and reality, such identity is ultimately elusive: words are ambiguous and success in interoperability will always be approximate to some degree. The underlying purpose of the <in*d*ecs> framework is to reduce ambiguity and approximation so far as is possible, and where it is irreducible (for example, where an element in a schema is found to be inherently ambiguous in its definition or operation) to provide a user with choices for its resolution, whether by human or automated means. Like any dictionary, the <in*d*ecs> Framework Metadata Dictionary uses a number of devices to attain precision. <in*d*ecs> definitions include *primary* and *derived* components:

Where a definition includes a terms which is itself defined in the <in*d*ecs> dictionary, this is highlighted in bold type.

14.2.1   Primary definitions

Primary definitions are those that do not rely wholly on predefined terms, and are the points at which new semantic material is introduced into the schema[19]. With every primary definition comes the possibility of further ambiguity; the higher the elements are placed within the hierarchical levels of the Metadata Dictionary, the more problems any such ambiguity will cause.

For example, the element *quality[13]* is defined as *a characteristic of the structure of an entity*. In this definition only one term (*entity*) is pre-defined elsewhere in the dictionary (as *something which is identified*). The effectiveness of the definition therefore relies on a common understanding of what the terms "quality", "characteristic" and "structure" mean. This understanding is refined by the various subtypes of *quality* which the dictionary identifies (*mode, language, continuity, genre* etc); by the provision of further glosses and

descriptions (in this example, *an intrinsic classification*); by synonyms (*form*); by related terms (to be added in future editions of the metadata dictionary), which are the same notion rendered in different parts of speech (for example, *percept* and *perceiver*); and by identification of terms to which it is *opposed* (that is, a term which cannot be simultaneously attributed to an entity along with the term to which it contrasts). All of these devices are designed to provide the least room for ambiguity and support the accurate analysis and mapping of elements in other schemas.

14.2.2 Derived definitions

Derived definitions are those which are entirely determined by reliance on previously defined terms without introducing new primary material. These are indicated in the Metadata Dictionary by the term *(derived).*

For example, the element *being*[5] has a derived definition, which means it can be compiled from the components of its generic name *animate_percept* (generic names are described in 14.3.1). A *percept*[2] is defined as "*an entity which is perceived directly by one of the five senses*" and *animate*[136] is defined as "*of an entity with the characteristic attributes of life*", so a *being* can be generically defined as "*an entity with the characteristic attributes of life, perceived directly by one of the five senses*".

While simpler glosses may be provided (for example, in this case a *being* is also described as *something that lives and dies*), the more elaborate generic construction provides an analytical basis for the underlying mapping of elements between different schemas, becoming increasingly useful as more and more formal distinctions are added to create elements lower down in the hierarchies.

14.3 Genealogy and syntax

The genealogy of an element is a structured account of its relationships with other elements. Genealogies can be constructed in different ways according to the context of an element. Genealogies can be specified for any element both as a *subtype* and as an *event role*. In the published dictionary, the majority of genealogies are expressed as subtypes.

Genealogies are described with a specific syntax that has been developed for use within the abstract expression of the metadata dictionary for the purposes of logical precision, and may be translated into other syntactic forms as required for specific applications. Syntactic conventions used to relate elements are given in the table below:

Table 14.3 **Dictionary syntax**

relationship	convention	example and description
is attribute of	. (full stop)	*creation.identifier* The last term is an attribute of the first ("an identifier of a creation")
is constrained by	_ (underscore)	*dynamic_relation* The first term places a particular formal constraint the last ("a relation which is dynamic").
is subtype of	/ (forward slash)	*creation/manifestation* The last term is a specialised type of the first ("a manifestation is a type of creation") and inherits its characteristics
is value of	> (greater than)	*continuity>dynamic* The first term functions as an attribute, of which the last is a value ("dynamic is a value of continuity")
is not applicable to	~ (tilda)	*(creation_input)~original* The last term does not apply when the previous term does ("original is not a valid output role when the relation contains an input which is a creation").

is synonym of	= (equals)	*format=manifestation.form*
		The first term denotes the same entity as the last ("format and manifestation.form are the same thing")
may be synonym of	% (percentage)	*dc:publisher%[75]indecs:disseminator%[25]indecs:contributor*
		The first term may be a synonym of either the second or third ("dc:publisher may be the same as indecs:disseminator or indecs:contributor"). Bracketed figures may be used to indicate estimated probability.
is attribute of related entity	{} (special brackets)	*{is-component-of}journal.title, journal{has-component}.title*
		The entity following or preceding the special brackets has the specified relationship with the entity to which the attribute is assigned ("title of journal of which this entity is a component").
combines with	+ (plus)	*audio+visual=audiovisual*
		The terms combine together to make a new element which is an arbitrary supertype of the combined terms ("audiovisual is a supertype combining audio and visual")
	( ) (brackets)	The expression within the brackets is a complex element. This device is used as elsewhere to eliminate ambiguity where more than one logical interpretation of the syntax is possible without it.

The last term in a generic description always denotes the element being referred to. For example *description.identifier* refers to an identifier of a description, whereas *identifier.description* refers to a description of an identifier. The generic syntax is used in conjunction with element names to create generic names.

14.3.1 Generic names

The generic name shows the element's genealogy in relation to another element(s), normally a supertype, whether formally qualified by further elements or not. The generic name iid (not shown here) expresses the same thing using iids.

For example, *percept* (*iid=2*) is a subtype of *entity (iid=1)* with the constraint *perceived (iid=191),* so its full generic name is *perceived_entity.* This might also be expressed as a generic identifier of *iid=191_1.*

Generic names can give a complete account or genealogy of an element's relations, tracing it back by one or more routes to *entity,* or they can be summarised as short generic names or iids. For example, The full genealogy of *event* (*iid=7*) is *(entity/concept/attribute/quality/continuity>dynamic)_(entity/relation).* This has the short form *dynamic_relation.* As *relation* has *iid=4* and *dynamic* has *iid=138,* so the generic identity of *indecs:event* can be summarised as *iid=(138_4).* Its complete generic name iid would read *7=(1/3/9/13/39>138)_(1/4).*

14.3.2 Generic role

This shows the structure of an event through which the element is created or otherwise defined. For example,

(modifier_agent)_((source_creation)_input)_(creation_output)_output

shows that the element (modification) is an *output* of an event which has (at least) an agent in the form of a modifier, a source creation and a new output creation.

14.3.3 Hierarchies

Qualification and constraint mean that an element begins to belong to more than one hierarchy, as each qualifier adds one or more hierarchical routes into which it may be plotted. For example, a *physical_format* (or *carrier*) is a subtype of *format*. If it is further qualified as an *analogue_physical_carrier,* it becomes a subtype of both *physical_carrier* and

analogue_carrier. If it is further qualified by the genre *musical* it becomes a *musical_analogue_physical_carrier* with six possible parents; and so on.

14.3.4 Structure of generic labels

Short generic labels include only as much of the genealogy as is required to define the new term fully in terms of one or more already defined terms. A short generic label contains elements and syntax which indicate *either* the immediate supertype of an element *or* its immediate attributes or constraints. The latter approach, which is preferable, can only be used for a term which has a fully generic definition (see above). A short generic name such as *dynamic_relation* is sufficient for placing an element into the genealogy as the remaining elements in the chain can be derived from the genealogies of those two terms.

The order of elements in the generic short id of a *qualified* element is significant and must be preserved. For example, a *creation.description.identifier* has a generic short id of *94.30.26,* whereas a *creation.identifier.description* is a quite different entity with a generic short id of *94.26.30.*

The order of elements in a *constrained* element must also be preserved, although for a different reason. Re-ordering a string of adjectives which constrain the same noun does not affect the identity of the element (for example, a *large green ball* is the same as a *green large ball*), but as strings need to be matched it is helpful for them to follow a predictable order. The rule adopted is that the iids of constraints are listed in ascending numeric order. For example, the constrained element, a *musical_analogue_physical_carrier* has iid=132_134_282_102.

Of course, if the adjectives qualify one another rather than the noun, the precise order does matter: a *light green ball* has two quite different meanings. These will be constructed differently according to the schema syntax as *(light_green)_ball* and *light_green_ball*.

14.3.5 Principle genealogy

Every element has at least *one* generic name and at least *one* generic role. However, in most cases there are more or less common ways of managing them within metadata schemes. For example, an *identifier* is normally treated simply as a type of label, and not the output of an identifying event, whereas a *requirement* is most commonly treated as the output of an agreement.

14.3.6 Other relationships

Other genealogical relationships, such as *generic situations* and linguistic "families" which connect the various related parts of speech such as *Creator, Creation, Creating* and *Created* will require identification to support developing needs of interoperability. These are not specified in this document.

14.4 Complex element iids

Complex elements can be given simple identities for the purpose of interoperability: for example *creation.identifier* may be given an iid as a composite, as well being described as iid=94.26 as the composite of *creation*[94] and *identifier*[26].

14.5 Dictionary

This table includes all terms already defined or shown in bold type in the <indecs> *metadata framework: principles, model and basic dictionary* document. iids have been provisionally allocated to elements other than those listed here (accounting for the breaks in the numbering sequence). More extensive versions of the dictionary may be published in future.

Table 14.5 **Framework basic metadata dictionary**

element	description	genealogy	iid
abstract	Of an **entity** conceived in the mind only (aka	mode>	159

	conceived)		
abstraction	A **creation** which is a **concept**; an **abstract creation** whose existence and nature are inferred from one or more **expressions** or **manifestations**	concept/	106
agent	An **entity** acting in an **event** or sustaining a **situation**; a characteristic active **role** undertaken by an **entity**	role/	67
agreement	An **event** in which a written or unwritten accord is made between two or more **parties**	transaction/	23
alternative	Of a secondary or subsidiary **entity** in a class	priority>	152
analogue	Of a **manifestation** whose content is infixed by **physical** means	infixion>	134
animal	A living organism which feeds on organic matter, usually possessing specialised sense-organs and a nervous system [OED]	being/	16
animate	Of an **entity** with the characteristic **attributes** of life	vivacity>	136
artefact	A **creation** which is a **thing** [derived]	created_thing	406
assertedRelation	A relation about which an **assertion** is made	input/	735
asserter	An **agent** making an **assertion** about the **veracity** of something	agent/	444
assertion	An **event** in which a **party** makes a claim of veracity about something	event/	728
associate	A **party** in an **association**	patient/	660
association	A **situation** in which two or more **entities** are passively related; a **relation** based on the verb *to be*	situation/	124
attribute	A characteristic of an **entity** (adapted from ISO 11179); something which an **entity** has (aka **property**)	relation/	9
audience	A **being** or **group** of beings experiencing or enjoying a **percept** in one or more **modes**	user/	120
audio	Of an **entity** **perceived** through the sense of hearing	perceived/	160
audioAndVisual	Of an **entity** **perceived** simultaneously through the senses of sight and hearing	audio+visual	618
audiovisual	Of a **creation** whose **principal form** of **expression** is in synchronised sound and pictures	multimedia/	295
being	A **percept** which has the characteristics of **animate** life [derived]; anything which lives and dies	animate_percept	5
bici	Book Item and Component Identifier	creation.identifier/	172
bitEncoded	Of a **manifestation** whose content is infixed by **digital** means	infixion>	135
carrier	A **physical format**.	physical_format	102
catalogNo	An **identifier** given to an **entity** in a **disseminator's** catalog	identifier/	620
colour	A **visual attribute** of an **entity** resulting from the separation and combination of particular	visual_expression. form/	36

	wavelengths of light		
compilation	A **creation** made from two or more pre-existing **creations** of other **types**	compiled_creation	99
compiled	Of an **entity** made by a **compiler**	created/	212
compiler	A **party** contributing to the making of an **compilation**, in whole or in part	compilation.contributor; user/	73
complete	see **finished**		
completion	The status of a **creation** in the course of the creative process	form/	485
component	A **creation** which is part of another **creation**	input/	89
composition	An **abstraction** normally expressed in **musical** sounds, with or without words [derived]	musical_abstraction	309
conceived	see **abstract**	conceived_entity	3
concept	An **entity** which cannot be perceived directly through the **mode** of one of the five senses [derived]; an **abstract entity**, a notion or idea; an **abstract** noun; an unobservable proposition which exists independently of time and space	conceived_entity	3
consenter	A **party** to a concluded **agreement**	party/	732
context	An **entity** within which an **event** took place or a **situation** exists (typically, **time** or **place**)	role/	116
continuity	The nature of **dynamism** of an **entity** over **time**	form/	39
contributor	A **party** contributing to the making of something, in whole or in part	party/	69
controlledCreation	A **creation** in which **intellectualPropertyRights** exist	input/	733
count	A number measuring the **occurrence** of an **entity**	quantity/	61
created	Of an **entity** made by a **contributor**	originated>	210
creatingEvent	An **event** which results in the making of a **creation**	event/	19
creation	The **output** of creative activity	created_entity	94
creator	A **party** contributing to the making of an **original creation**, in whole or in part	(original_creation).contributor	70
description	A **string** giving a verbal representation or account of an **entity** or some aspect of an **entity**	text/	30
digital	Of a **percept** made of digital bits	substance>	133
dimension	A number measuring some **spatial** aspect of an **entity**	spatial_quantity	50
director	A **contributor** directing the activity of others in the making of a **creation**	contributor/	76
disseminatedEntity	An **entity** made available by a **disseminator**	patient/	196
disseminatingEvent	An **event** in which a result is the **dissemination** of an **entity**	event/	226
disseminator	A **party** making an **entity** available to potential **users**	user/	81
doi	Digital Object Identifier	creation.identifier/	174
draft	Of a **creation** disseminated in a not yet finalised form	completion>	486

duration	A number measuring the **time quantity** for which something extends.	temporal_quantity	57
dynamic	Of an **entity** whose **form** and/or content is **perceived** or **conceived** as changing in some way over **time**	continuity>	138
ean13	European Article Number	artefact.identifier/	175
element	An item of metadata (*aka* **metadataElement**)	entity/	491
encoding	see **infixion**		
ensemble	A **group** of **creators**	organization/	596
entity	Something which is identified	concept/	1
evaluation	A number measuring the worth of an **entity**	quantity/	64
event	A **dynamic relation** involving two or more **entities** [derived]; something that happens; a **relation** through which an **attribute** of an **entity** is changed, added or removed	dynamic_relation	7
excerpt	A **creation** which is made by taking a part from a pre-existing **creation**	excerpted_creation	95
excerpted	Of an **entity** made by an **excerpter**	created/	211
excerpter	A **party** contributing to the making of an **excerpt,** in whole or in part	excerpt.contributor; user/	72
expression	An **event** which is a **creation**	event/	105
facilitator	A **contributor** providing support services to other **contributors**	contributor/	80
false	Not **true**	veracity>	727
finished	Of a **creation** disseminated in a finalised form (aka **complete**)	completion>	487
forbidden	see **prohibited**		
force	A number measuring the power exerted on an **entity**	quantity/	59
form	see **quality**		
format	An **artefact** on which an **expression** may be **infixed** to create a **manifestation**	artefact/	32
genre	A style or manner of the **expression** of an **abstraction**, normally combining elements of both **quality** and subject	expression.form/	34
grantee	A **party** to whom rights are transferred to in an **iprTransfer**	party/	731
granter	A **party** tranferring rights to another in an **iprTransfer**	party/	730
gustatory	Of an **entity perceived** through the sense of taste	perceived/	161
humanBeing	A man or woman of the species homo sapiens [OED]	being/	17
identifier	A unique **label** allocated to an **entity** within a given **namespace**	unique_label	26
iid	A unique **identifier** allocated to an **element** of metadata within the <indecs> framework (*aka* **indecs-id**)	identifier/	227
inanimate	Of an **entity** without the characteristic **attributes**	vivacity>	137

	of life		
indecs-id	see **iid**		
infixion	The means of representation or fixing in which an **expression** of an **abstraction** is established in or on a **manifestation** (*aka* **encoding**)	manifestation.for m/	33
input	A pre-existing **entity** which participates in a relation in a passive, qualifying or supportive role	role/	87
intellectual Property	An **entity** defined by law or international convention to be intellectual property	legalConcept/	204
intellectual PropertyRight	The authority granted by law or international convention to do or to authorise another **person** to do a defined act to **intellectual property**	legalConcept/	208
iprStatement	A **situation** in which one or more **parties** possesses **ipr**	possessingSituatio n/	218
iprTransfer	A **event** in which an **ipr** is transferred by an **agreement**	transaction/	500
isan	International Standard Audiovisual Number; draft ISO standard **identifier** for **audiovisual abstractions**	abstraction.identif ier/	176
isbn	International Standard Book Number; ISO standard **identifier** for books	manifestation.iden tifier/	177
ismn	International Standard Music Number; ISO standard **identifier** for printed music	manifestation.iden tifier/	178
isrc	International Standard Recording Code; ISO standard **identifier** for **audio** and **video recordings**	expression.identifi er/	180
issn	International Standard Serial Number; ISO standard **identifier** for **serial** publications	serial.identifier/	179
iswc	International Standard Musical Work Code; draft ISO standard **identifier** for **compositions**	composition.ident ifier/	181
item	A single instance of an **artefact**	artefact/	98
label	A **string** whose function is to distinguish one **entity** from another	attribute/	11
language	A particular **form** of verbal or symbolic **expression** of an **abstraction**	verbal_expression .form/	35
legalConcept	A **concept** defined by law, statute or international convention	concept/	127
lexical	Of a **creation** whose **principal form** of **expression** is in words	genre>	288
mandatory	see **required**		
manifestation	An **artefact** containing an **infixion** of an **expression**	artefact/	101
material	An **unbounded thing used** directly by a **contributor**	input/	91
metadataElement	see **element**		491
mode	A sensory mode or modes through which an **entity** may be **perceived**	form/	46

modification	A **creation** made by changing a pre-existing **creation** of the same **type**	modified_creation	97
modified	Of an **entity** made by a **modifier**	created/	213
modifier	A **party** contributing to the making of a **modification**, in whole or in part	modification.contributor; user/	71
multimedia	Of a **creation** whose **principal form** of **expression** combines two or more other **genres**	genre>	294
multimodal	Of an **entity perceived** through two or more senses	perceived/	389
musical	Of a **creation** whose **principal form** of **expression** is in musical sounds or notation	genre>	282
name	A **string** by which an **entity** is known; what an **entity** is called; a **label** which is not necessarily unique within a given namespace	nonUnique_label	29
narrative	Of a **creation** containing elements of narrative plot and theme	genre>	504
natural	Of an **entity** occurring in the natural world without direct or indirect human intervention	originated>	216
nonUnique	Of an **entity** of which there can be more than one	singularity>	298
obligation	The extent to which an **entity** is required	form/	201
offer	An **event** in which a **party** makes known the terms on which an **agreement** may be made	transaction/	24
olfactory	Of an **entity perceived** through the sense of smell	perceived/	163
operator	A **contributor** operating equipment to create content in a **creation**	contributor/	78
optional	see **permitted**		
organization	A **group** of **human beings** (whether legally incorporated or not)	group_party	615
original	Of an **entity** made by an **originalCreator**	created/	214
originalCreation	A **creation** without a **source input**	original_creation	96
origination	The process by which a **creation** is made	form/	209
other	see **alternative**		
output	An **entity** created or changed through an **event**	patient/	93
party	An **agent** undertaking an activity or task in a creative or commercial **relation**	agent/	68
patient	An **entity** which is the object of the act in an **event,** or is possessed or associated in a **situation**;	input/	86
payment	An **event** in which a **party** gives money to another **party**	transaction/	25
perceived	Of an **entity** perceived through one or more of the five senses	mode>	191
percept	An **entity** which is **perceived** directly with at least one of the five senses [derived];	perceived_entity	2
performer	A **contributor** performing or interpreting an **abstraction** in an **expression**	contributor/	77
permission	A **relation** which is allowed by an **agreement**	permitted_relation/	110

permitted	Of an **entity** (typically an **event**) which is allowed; something that may happen (aka **optional**)	obligation>	202
person	An **entity** possessing the capacity in law to exercise or enjoy an **intellectual property right**	legalConcept/	205
physical	Of a **percept** made of a tangible **substance**	substance>	132
pictorial	Of a **creation** whose **principal form** of **expression** is in pictures or symbols	genre>	283
pii	Publisher Item Identifier; an **identifier** for **texts**	abstraction.identif ier/	183
place	A location in space in which a **relation** applies	context/	117
plane	The **dimension** or dimensions in which an **entity** is **perceived**	form/	47
plant	A living organism of the species Plantae, usually containing chlorophyll enabling it to live wholly on inorganic substances and lacking specialised sense organs and the power of voluntary movement [OED]	being/	18
plural	Of an **entity** of which there is more than one	singularity>	299
possessingSituation	A **situation** in which an **entity** is owned or kept by another entity; a relation based on the verb *to have*.	possessing_situati on	403
possession	An **entity** retained by a **possessor**	patient/	197
possessor	A **party** retaining possession of an **entity** in a **situation**	party/	84
possible	Possibly **true**	veracity>	724
primary	see **principal**		
principal	Of a dominant or prevailing **entity** in a class	priority>	151
priority	The position of an **entity** within a **class** or **group**	form/	44
probable	Likely to be **true**	veracity>	725
producer	A **contributor** responsible for the realisation of a **creation**	contributor/	75
prohibited	Of an **entity** (typically an **event**) which is forbidden; something that must not happen (aka **forbidden**)	obligation>	497
prohibition	A **relation** which is forbidden by an **agreement**	prohibited_relatio n/	496
property	see **attribute**		
quality	A characteristic of the structure or nature of an **entity**; an intrinsic characteristic (*aka* **form**)	attribute/	13
quantity	A number measuring some aspect of an **entity**	attribute/	12
rate	A number measuring the **quantity** of one **entity** in **relation** to a **quantity** of another (aka **ratio**)	quantity/	62
ratio	see **rate**		
recipient	A **party t**o whom an **entity** is disseminated	user/	512
recorder	A **contributor** recording an **event** in the making of a **creation**	contributor/	79
relation	The interaction of **percepts** and/or **concepts**; a connection between two or more **entities**	entity/	4
replica	An **item** made by copying another **item**	manifestation/	448

replicated	Of an **entity** made by a **replicator**	created/	215
replicator	A **party** contributing to the making of a **replica**, in whole or in part	replica.contributor ; user/	74
required	Of an **entity** (typically an **event)** which is demanded; something that must happen (aka **mandatory**)	obligation>	203
requirement	A **relation** which is necessitated by an **agreement**	required_relation/	113
role	A part played or function fulfilled by an **entity** in relation to another entity or entities; a classification of an **entity** in terms of its external **relations**; an extrinsic classification	attribute/	14
secondary	see **alternative**		
sequence	A position of an **entity** in **relation** to other similar entities within the same **relation**	context/	119
sici	Serial Item and Contribution Identifier; a NISO standard **identifier** for **components** of **serials**	creation.identifier/	185
singularity	The status of an **entity** in terms of its uniqueness or otherwise	form/	296
situation	A **static relation** involving two or more **entities** [derived]; something that continues to be the case; a **relation** in which the **attributes** of **entities** remain unchanged	static_relation	8
sourceCreation	A **creation** from which another **creation** is wholly or partly made; a **creation** which is the basis for another	input/	88
spatial	Of an **entity** that is **perceived** in space	plane>	192
static	Of an **entity** whose form and/or content is **perceived** or **conceived** as constant	continuity>	139
subject	An **entity** described or otherwise significantly covered by the contents of a **creation**; what a **creation** is about	input/	92
substance	The **form** of the material of which an **entity** is made	form/	37
tangible	Of an **entity perceived** through the sense of touch	perceived/	164
temporal	Of an **entity** that is **perceived** in time	plane>	200
text	An **abstraction** normally expressed in words [derived]	lexical_abstractio n	308
textual	Of a **creation** whose **principal form** of **expression** is in written words [derived]	visual_lexical	289
thing	A **percept** without the characteristics of **animate** life [derived]	inanimate_percept	6
time	A point or period in time during which a **relation** applies	context/	118
title	A name by which a **creation** is known [derived]	creation.name	303
tool	A **bounded thing used** directly by a **contributor**	input/	90
transaction	An **event** determining or recording the **use** or possible use of an **entity**	event/	22
transferredRight	A **right** which is the subject of an **iprTransfer**	input/	734
transforming	An **event** which results in the making of a new	event/	20

Event	**creation** including elements of at least one existing **creation**; an **event** in which creations are both used and made		
true	In accordance with fact or reality [OED]	veracity>	726
type	A categorisation of one or more characteristics of an **entity** through which it belongs to a **group** of entities	attribute/	15
umid	Universal Media Identifier; an SMPTE standard **identifier** for digital content	creation.identifier/	186
unique	Of an **entity** of which there is and can be only one	singularity>	297
upc	Universal Product Code	artefact.identifier/	187
uri	Uniform Resource Identifier	identifier/	190
url	Uniform Resource Locater	place.identifier/	188
usedEntity	An **entity** made use of by a **user**	patient/	195
user	A **party** making use of an **entity** for any **purpose**	party/	82
usingEvent	An **event** in which a result is the **use** of an **entity**	event/	21
value	An instance of an **attribute** [from ISO 11179-3]	concept/	10
veracity	The level of confidence placed in an **assertion** by the **asserter**	form/	723
verbal	Of a **creation** whose **principal form** of **expression** is in spoken words [derived]	audio_lexical	281
visual	Of an **entity perceived** through the sense of sight	perceived/	162
vivacity	The nature of an **entity** in terms of its being, or having been, alive	form/	38

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1 <in*d*ecs> project website: www.indecs.org

2 http://www.cs.cornell.edu/cdlrg/harmony/ABC/abc-results.htm

3 http://www.cidoc.icom.org/home

4 http://purl.org.dc

5 Information about DCMS has not yet been made public. For information about IFPI metadata initiative(s), contact Philippa Morrell, Metadata Executive, IFPI (International Federation of the Phonographic Industry). http://www.ifpi.org

6 http://purl.org/dc

7 http://www.editeur.org

8 http://www.ifla.org/VII/s13/frbr/frbr.pdf

9 http://www.imsproject.org/index.html

10 http://www.doi.org

11 http://ltsc.ieee.org/wg12

12 http://www.cselt.it/mpeg/standards/mpeg-7/mpeg-7.htm

13 http://www.cselt.it/mpeg/standards/mpeg-21/mpeg-21.htm

14 For information about the P/META initiative, contact Carol Owens, carol.owens@bbc.co.uk.

15 http://www.smpte.org/

16 http://www.indecs.org/results/persons.htm

17 http://www.indecs.org/results/persons.htm

[18] "An Event-Aware Model for Metadata Interoperability"
http:/www.cs.cornell.edu/lagoze/papers/harmonyecdl2000.ps

[19] There is of course no completely independent primary definition in the schema, as all definition is ultimately circular. This circularity is encapsulated at a single point in the <indecs> dictionary hierarchies by the appearance of the basic term *entity* both as a subtype of *concept* and as its supertype.