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**1. Introduction: now you see it, now you don't**

Since the days of Plato, there has been a general consensus that stuff can be divided into two kinds of thing. This dichotomy has been described in many ways – ideas/things, abstract/physical, concept/percept. The basic dualist approach is largely uncontested, but these different views lead to differences of application which are important.

In the digital age the importance of such distinctions has emerged once more. Stuff is proliferated, adapted, aggregated and fragmented in many copies, versions, compilations and parts. Stuff is increasingly of a changing nature (such as a website or streamed media). Classifying stuff in meaningful ways for this new dynamic and granular world becomes essential for purposes of discovery, collocation and/or exploitation, whether commercial or otherwise.

In the 1990s three frameworks emerged which have provided the analytical and practical basis for the main metadata developments for media and content which are being implemented in the 2000s. These three were the Functional Requirements for Bibliographic Records report (“FRBR”, usually pronounced “furber”) in the library world; the <indec> metadata framework (<indec>) among media/content providers; and the CIDOC Reference Model (“CRM”) for museums and archives.

The process of FRBRization is underway across the library world, promising greatly improved discovery and access to items and collections. The indecs framework underpins the emerging multimedia content standards of ONIX (from the text publishing domain), MI3P (from the music industry), the MPEG-21 Rights Data Dictionary (RDD) and the International DOI Foundation metadata framework. CRM is being introduced in its domain. All three are still at a relatively early stage of implementation.

Developed independently of one another, these three reached some strikingly similar conclusions. They are dualist in approach. All three start from an analysis of the *process* by which things come into being, rather than the things themselves (the “model of making”, in indecs terms). FRBR and indecs share core terms such as “expression” and

“manifestation”. CRM and indecs share a detailed modelling of events which, had they been exam papers, would have had one or both candidates disqualified for blatant copying, yet they were developed independently. Ontologically, all three agree on the priority of *relationships* as the basis for metadata.

However, these models also have some important differences, not least in the specific meaning attached to the names of terms they employ. Each was informed by different functional requirements, and so has evolved different mechanisms for dealing with the issues that seemed most important to them. Broadly, they are compatible, and effective integration of metadata from schemes based on them should be achievable, but they must be handled with care.

All three frameworks continue to be developed and refined through the process of implementation. They act as good checks and balances: each has something to offer the others, and that learning process is under way through a number of practical interactions.

This paper explains the indecs model of making, which is the most general of the three, with some reference to FRBR, as each of these have been referenced in the development of the MPEG-21 standard. The paper looks only at the parts of the models concerned with “creations”. Issues related to other important elements (which in indecs domains include agent, time, place, context, descriptor and category) are not dealt with except where they impact on creations.

The paper refers to both the indecs framework (“indecs”) and the MPEG-21 Rights Data Dictionary (“RDD”) which is a direct descendent of indecs. All definitions quoted are from RDD, as it both more extensive and more up to date than the indecs framework itself.

## 2. Making

In indecs and RDD, meaning is derived from verbs. Nouns, adjectives and other terms are related to verbs through families of terms in which each plays a definite semantic role. To Make in indecs means to bring something into existence which did not exist<sup>1</sup> before.

Make To bring a Resource into Existence.

So the verb Make, for example, is the progenitor of a family that includes the agent Maker, the resource Output<sup>2</sup> and the context of a MakingEvent. The meaning of the verb is therefore the key to the meanings of the family terms.

The indecs model of making is based on two main pairs of verbs which are subtypes of Make:

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<sup>1</sup> To avoid endless recursion, this paper does not address definitions of existence. It is though addressed contextually in *Ontology\_X*.

<sup>2</sup> In all indecs schemes a *Creation* is defined as a type of Output made (directly or indirectly) by a human being. This is not yet defined in RDD (which relies only on “Output” and generally assumes human agency) but the term *Creation* is used throughout this paper as representing more common usage.

Derive, Originate  
Express, Abstract

but first two other verbs must be considered: Perceive and Conceive.

### 3. Perceive and Conceive

indecs makes the dualist distinction in terms of perceiving (the verb Perceive) and conceiving (Conceive). Things may be PerceivedResources or Concepts.

Perceive To InteractWith a Resource with at least one of the five human senses.

Conceive To Make a Resource that exists only in the human mind.

Perceive involves the five senses, of which hearing (audio) and sight (visual) are dominant but not exclusive in the media world. PerceivedResources give us shared points of reference: two people as Perceivers can refer to the same entity with some hope of agreement on its identity and nature.

The act of perception is not primarily an act of making<sup>3</sup>: it is simply the interaction of two existing resources, and as such is a Use of a resource. But it defines an attribute – Perceivable – which is central to the model. Whether or not a resource is Perceivable or *capable of being perceived* is what defines duality in indecs. Anything created but not perceivable must be a Concept, the output of Conceive.

Perceive has a crop of children of which the five primaries are Hear, See, Touch, Smell and Taste. These verbs can support families of terms including many of those most commonly required in media metadata (such as Audio, Visual, Image, Sound, Audience, Viewer etc)<sup>4</sup>.

### 4. Originate and Derive

A Creation is either original (an Origination) and owes nothing formally to any existing creations, or it is derived (a Derivation) and in some way makes use of existing creations, in whole or in part.

Derive To Make a new Resource out of an existing Resource.

Originate To Make an Origination.

The latter depends on the definition of Origination:

Origination A Resource that has not been Derived.

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<sup>3</sup> Further development of the indecs work through Ontology\_X has led to the definition of a Percept as a PerceivedResource *according to* the Perceiver (for example, a sound *as heard by* a listener, or an object *as seen by* a viewer). Two people will have different Percepts of the same PerceivedResource according to their faculties, tools and point of view (for example, when Monet had the cataracts removed from his eyes he saw the flowers at Giverny as having quite different colours from those he had already painted extensively, and so he painted some of them over again). Perception therefore does involve the act of creation of the Percept, but as this exists by definition privately within the Perceiver's senses it is generally of no interest to public metadata systems such as MPEG-21.

<sup>4</sup> These Terms are not yet defined in RDD but are drawn from other indecs-based schemes.

Things can be Derived simply by “copying”: that is, making a new Manifestation which has the same attributes as its source. Logically, nothing can be “identical” to another thing, as some attribute (even if it is only its location) must vary, or else it would be the same thing, but the notion of “copying” is sustainable if (as in the MPEG REL and RDD) the unchanged attributes are explicitly named.

Derivations are also made by changing, adding or taking away elements of an existing Creation, or combining them into new things, or by any combination of these. This leads to the complex taxonomy of adaptations, arrangements, translations, compilations and their many children.

Two issues are worth noting here. The first is that the idea of any Creation being “original” is, of course, challengeable. All creativity exists within a culture, and almost inevitably a creation derives something from existing creations. However, in terms of the model of making the question is strictly functional: if something is not recognized as a Derivation of something else, then it is treated as an Origination. A creation is “original until proven derived” (ontologically, origination is defined as the complement of derivation). This approach is the same whether the criteria for derivation are cultural or commercial, although the specific results may differ from context to context. This meaning of the word “original” is therefore quite distinct from the more qualitative use of the term in critical circles (“*that is a true original!*”). In practice most creations in the major content sectors of text, music, images and audiovisual are treated as originations in both bibliographic and commercial databases. While there are plenty of borderline cases to keep academics and lawyers happily engaged, the functional distinction is not a practical metadata problem.

The second notable issue is the distinction between a derivation and a modification. In the indecs/RDD terminology, modify means that a change is made in an *existing* creation: paint is added to the portrait, a page is torn from the book. But change by derivation (an adaptation) brings into being a *new* creation which leaves its source creation unaffected. For example, a translation, a recording sample or remix, a new draft of a paper or a new release of software are based in some way on existing creations, but they have new identities, and their sources remain unchanged by their existence.

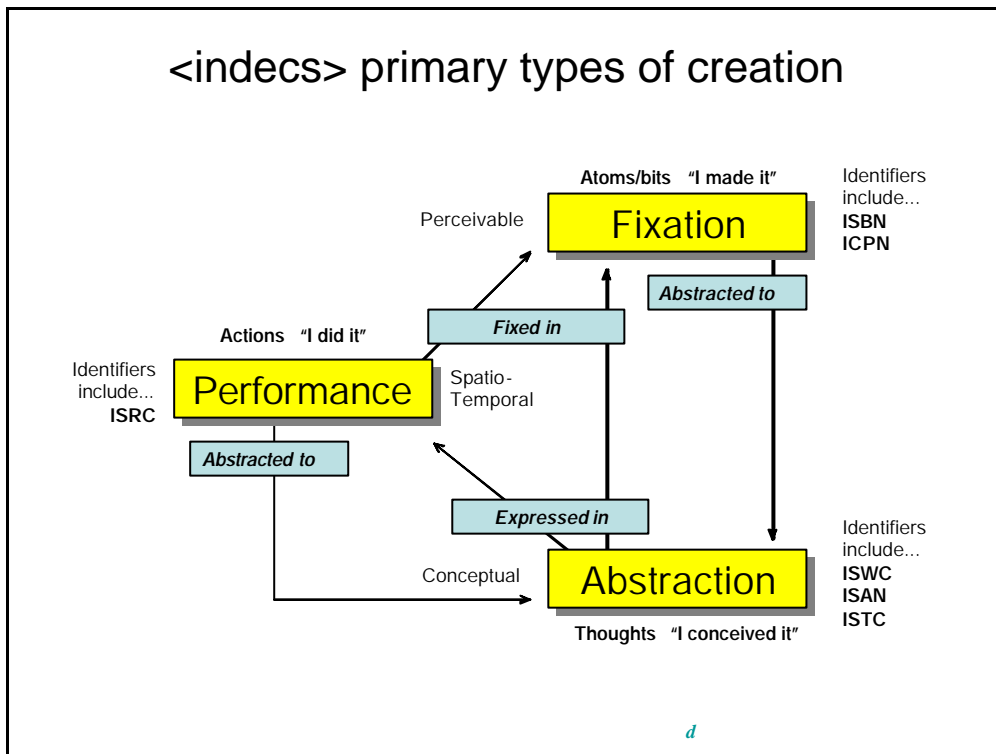
The process by which derivation occurs (see section 7) is made clearer by the analysis of the Express/Abstract dichotomy which follows.

## **5. Express and Abstract**

The model of making is centred on two verbs: Express and Abstract, and on two subtypes of Express (Fix and Perform):

Express	To make a Perceivable Resource (a Manifestation).
+Fix	To Express a Persistent Manifestation.
+Perform	To Express a Transient Manifestation
Abstract	To Derive a new Conceptual Resource from a Manifestation.

The families of these verbs include the key nouns Manifestation, Expression, Performance, Fixation and Abstraction. Figure 1 shows the model of making, with term names as used in RDD and subsequent standards<sup>5</sup>.



**Figure 1: the model of making**

This is the model in tabular form:

	<b>Manifestation</b>		
	<b>A</b>	<b>B</b>	<b>C</b>
	<b>Abstraction</b>	<b>Performance</b>	<b>Fixation</b>
Mode	Conceptual	Perceivable	Perceivable
Temporality	Timeless	Transient	Persistent
Structure	Thoughts "I conceived it"	Actions "I did it"	Atoms/bits "I made it"
Possible	IsAbstractedFrom	IsAbstractedTo A	IsAbstractedTo A

<sup>5</sup> There has been one change in the naming of this model since its original production in 2000. The term "Manifestation" was originally used only for persistent "fixed" Manifestations. This has now been replaced by the term "Fixation", and "Manifestation" used to covers both Performances and Fixations. This is the nomenclature used in RDD and subsequently adopted by DOI and MI3P. It also incidentally brings the indecs/RDD model closer to FRBR.

Relationships	B IsExpressedIn B IsAbstractedFrom C IsFixedIn C	IsExpressionOf A IsFixedIn C	IsFixationOf A IsFixationOf C
Exemplary Identifiers	ISWC (Musical work) ISTC (Textual work) ISAN (Audiovisual work)	ISRC (Recorded audio performance)	ISBN (Printed Book) ICPN (Product)
Example of Expression, Abstraction and re-Expression	(3) Song abstracted from score.	(1) Original score of a song written down...	(2) ...so song is fixed in written notation.
	(4) Song...	(5) ...performed...	(6) ...fixed in a CD.

The numbers (1) to (6) in the Example in the final two rows of the table show the sequence in which a typical chain of Expression occurs.

### 5.1 Where is the “work”?

Neither indecs nor RDD defines a term “Work”. This is not because “works” are unimportant – quite the opposite. It is because the term is loaded with different connotations: in particular there are three different common uses of the term “work” in metadata systems which are often confused and are in reality quite different things:

- (a) A “legal” work, of which there are different definitions according to different jurisdictions;
- (b) The “preconceived” work, as imagined in the mind of the creator - “what the author intends” in a creation;
- (c) The “abstracted” work, according to any party who has reason to identify a conceptual “work” underlying a particular manifestation.

Although there are occasions on which these three would all apply to the same thing, they are orthogonal to one another. indecs and RDD defines the third of these, and calls it an “Abstraction” for the purpose of clarity (although in some implementations of indecs it is also called an “AbstractWork” or a “Work”).

indecs and RDD do not rely on a “legal” definition of the term Work because jurisdictions are national and at times are subtly at variance with one another. RDD is able to map different legal concepts of “work” into its terminology, but does not embrace a world-view in which one such meaning is implicit. In particular, the legal term “work” often embraces creations which may be either conceptual or perceivable, and as such is insufficiently granular a term to function as a high-level concept in the indecs and RDD ontologies. The RDD approach allows a legally-defined work to be identified as either a Manifestation or an Abstraction as required.

Similarly indecs and RDD do not depend on the concept of the “preconceived” work. The first reason (that it is inaccessible and inherently unknowable) is explained in 5.2 below; but the other reason is that it has inadequate coverage. Many things that are subsequently referred to as “works” may never have been preconceived in the mind of the creator (especially if the work is the composite effort of many people over time, such as a periodical, brand or dynamic website). So while any “preconceived work” may be treated as a type of Abstraction, not all Abstractions are preconceived works.

Only the Abstraction provides an adequate account of the role of conceptual “works” in the process of making and using content, and so is used in indecs and RDD. The indecs approach means, for example, that a community like that of CISAC which manages rights in a wide variety of types of content is able to identify works accurately according to their functional attributes. Such a community, for example, may identify musical works as Abstractions (as it done by the ISWC standard) and visual works as Manifestations, while maintaining its overall concept of “work” where required.

The FRBR methodology, although it uses the term “work”, also uses it in the sense of Abstraction, treating “preconceived works” as a subset of these.

## **5.2 The search for the preconceived “work”**

There is no question that most creative acts begin with some kind of conception. The creator has the idea, and then (for example) the book is written. J K Rowling, for example, conceived the characters and plots of the Harry Potter series long before she wrote the first Harry Potter book – and at the time of writing the seventh is still unwritten, yet we know it is conceived and already talked about. It is this “conceptual creation” which FRBR calls “the work”.

But there is a critical problem. How do we know what this “work” inside the creator’s head is like? No-one but the creator has access to it. It only becomes known first-hand to anyone else when it is Expressed – that is, when the concept is made Perceivable: when the book is written, the picture is painted, the song is sung, the chair is made. Once an act of Expression happens, a Manifestation of the concept exists, and it is from this Manifestation, and from this alone, that the “work” can be Abstracted and recognized.

This understanding is common to both the bibliographic and the legal domains. In FRBR “works” are recognized because they appear in catalogued Manifestations. In copyright law, an idea cannot be protected, only its expression can. *Expression*, not conception, is therefore the definitive first act of creation in any network of identification. The model of making begins with Expressing, then goes to Abstracting; and from there to Re-Expressing.

## **5.3 The process of Abstracting**

The process of Abstracting, as its named suggests, is one in which something is taken out of something else. It is a familiar process in data modelling and taxonomy. A class (often

called an *abstract class*) is a concept which contains one or more attributes of a group of individuals. So, for example, the class of things called "deciduous tree" may be the class of thing that (a) is a tree and (b) sheds its leaves every year. A specific beech tree is an *instance* of this class.

In indecs and RDD, Abstracting refers to a more limited case of this general process, in which the classified individuals are Creations. An Abstraction is therefore a Class of one or more Manifestations with specific attributes. The musical work "Bohemian Rhapsody", for example, may be described as an Abstraction which is the class of all Manifestations which combine a particular melody and lyrics; or the lexical work Expressed in this paper, for example, may be described as the Class of all versions of this paper.

#### 5.4 Re-Expressing an Abstraction

What is the point of Abstracting? It is done because the same Abstraction may be recognized in multiple Manifestations. For example, Lennon and McCartney's "Yesterday" has been performed and recorded many thousands of times, yet in each one the same Abstraction is recognized. Systems can enable such different Manifestations of the same conceptual work to be gathered together, for purposes such as resource discovery or for royalty payment. The major thrust of the FRBR initiative ("FRBRization") is to implement such a collocation mechanism in library collections by linking different Manifestations to their underlying Abstractions ("works" in FRBR terminology).

It is this process of **re-Expressing** which makes the Abstraction important. If every Abstraction occurred in only one Manifestation, the process of Abstracting would be redundant. Every work has an *original* Manifestation<sup>6</sup> from which it is first Abstracted, but thereafter the Abstraction may be re-Expressed any number of times.

However, re-Expression is an inexact process. For example, the melody and lyrics do not need to be identical for the Abstraction of "Bohemian Rhapsody" to be Re-Expressed (indeed there are nearly always variations of one kind or another in any non-digital re-Expression). Similarly, any number of changes may be made to different drafts and versions of this paper, yet they may all be considered to be another Manifestation of the same original Abstraction. At some point a Manifestation becomes sufficiently distinct for a perceiver to identify a new Abstraction, but the question of where this point lies (how different a Manifestation needs to be before it represents a new Abstraction) is a matter of judgment, whether cultural, technical or legal. The nature of these judgements is not the subject of this paper: what matters here is only that they are routinely made.

#### 5.5 Levels of Abstraction

Abstracting may occur to any level. At the "purest" limit, for example, we may identify an Abstraction which represents the class of all Manifestations of the textual work "Candide" (the famous novel by Voltaire) in any language or form. It has no more

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<sup>6</sup> In some cases (for example in live networked presentations) there will be multiple simultaneous original Manifestations; and in many cases the original is irretrievably lost, but the principle remains universal.

attributes than the underlying story and the fact that it is Expressed in words and not (for example) images. At a more specific level, we may identify an Abstraction of “Candide in English”, which is the class of all Manifestations of the story in the English language. More specifically still, “an eBook of Candide in English”; and so on. Each of these is an Abstraction representing a class of individuals, but they become steadily more “concrete” as more specific attributes are added to the class.

These three examples of “Candide”, in fact, represent the three abstract creation types in the FRBR report: what FRBR calls “work”, “expression” and “manifestation”. FRBR provides a practical guide to creating consistent habits of Abstracting across the bibliographic community. For example, FRBR guidelines are that a “work” has no inherent language, whereas an “expression” may have. This is arbitrary but useful. There are no right or wrong answers for “types” of abstractions: what matters is clarity of definition when arbitrary lines are being drawn.

Different communities operate different guidelines for abstraction. For example, the copyright society network through its ISWC<sup>7</sup> identifier standard recognizes different language versions of songs as different “works”, in contrast to FRBR which views them as different “expressions” of the same “work”. ISWC therefore conflates “work” and “expression” into one. Provided that distinguishing metadata exists, mapping between these is straightforward enough.

The absolute distinction is always between an Abstraction and its Manifestation. FRBR also makes this distinction quite clear through it uses the term “Item” (not Manifestation) for the individual Perceivable Resource. The mapping between FRBR and indecs creation terminology is like this:

	<b>indec/RDD</b>	<b>FRBR</b>
Conceptual creations (classes)	Abstraction	Work Expression Manifestation
Perceivable creations (individuals)	Expression Manifestation	Item

The criteria for distinguishing between the different types within the FRBR “conceptual” set and the indecs “perceivable” set are clear enough<sup>8</sup>, but the mapping illustrates the potential confusion that arises from the use of different names. While indecs and FRBR have compatible models, the only term names that they have in common (“Expression” and “Manifestation”) have opposed meanings!

## 5.6 The Abstraction and the preconceived “work”

<sup>7</sup> International Standard Musical Work Code

<sup>8</sup> There is ongoing discussion in the FRBR community about the precise dividing lines but consistency is likely to emerge as the initiative moves towards the establishment of a formal ontology. The indecs distinction of Expression and Manifestation is based on the simpler Transient/Persistent disjunction as explained later in this paper.

This analysis makes it clear that there is no reason for the Abstraction to be considered to be “identical” with what was in the creator’s mind. In all likelihood, the finished Manifestation was not exactly what the creator had in mind; or the creator had only a partial or vague idea of the eventual Manifestation; or in many cases had no pre-conception at all. In improvised theatre or speech, for example, the concept and the Manifestation may occur simultaneously; and in some forms of creativity there is intentional randomness or automation in which there is by definition no meaningful “preconception”.

The Abstraction, in fact, need having *nothing at all* to do with what was conceived or intended by a creator: it has everything to do with the attributes of the actual Manifestation and the concepts of its Perceiver. This is not to deny the existence of the “preconceived work” in many cases, of course; but it is saying that it is of little or no significance for the formal model of making except where knowledge of the creator’s intention may help in the process of understanding, and therefore Abstracting from, the resulting Manifestation.

## **6. Perform and Fix**

Manifestations are Perceivable creations and come in two types: the *transient* (Performance) and the persistent (a Fixation).

A Performance is a transient Manifestation: that is, one which does not survive beyond the act of Expression itself. It *is* the act Expression: the singing of the song, the speaking of the words, the movement of the dance. It is an Expression whose purpose is to be Perceived.

A Fixation is a persistent Manifestation: that is, one which survives beyond the act of Expression itself. It is the *output* of the act of Expression: the page written, the recording made, the file copied.

Sometimes an event may encompass both kinds of Expression: for example, a Performance which is recorded results in a Fixation, but the two remain distinct Manifestations. For example, the Beatle’s recorded performance of “Yesterday”, and a CD on which it is a track, are quite distinct Manifestations of the Abstraction “Yesterday”. It is possible but unusual for the act of Expression of a Fixation to be in itself interesting enough to be a Performance. For example, the act of writing a paper is not, of itself, something which would typically take place as a public Performance for the benefit of an audience; but it may.

## **7. The chain of Derivation**

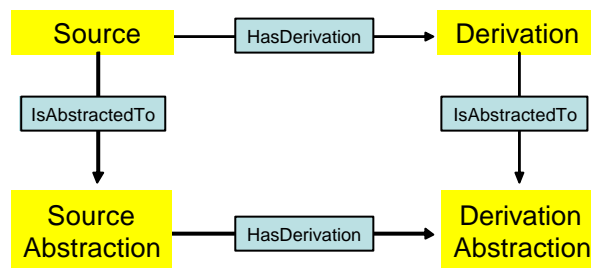
The model of making described above enables us better to understand the nature of Derivation and the chain of creation relationships which it establishes. When a Derivation involves explicit change then a new Manifestation *and* a new Abstraction will result.

The process of Derivation itself is not what matters, but the result. For example, a

a translation of a text may either be made in an automated way (by translation software) or by the interaction of a human being perceiving the source (reading the text) and creating a derivation based on that perception. The nature of interaction with the source is not definitive: it is the attributes of the resulting Manifestation which determines its relationship to the source from which it was Derived.<sup>9</sup>

When a Derivation includes change, it gives rise to a new Abstraction, creating a set of relationships as illustrated in Figure 2:

### Derivations and their Abstractions



**Figure 2: Derivation chain relationships**

This new “Derived” Abstraction may now itself be re-Expressed any number of times, and the chain go on *ad infinitum*. So, for example, a text may be translated, and new copies of the translation made; and a re-translation of the translation made; and so on. In each step the Abstractions provide the simplest chain of inheritance as they can continue to be referenced so long as at least one Manifestation continues to exist, while the specific “audit trail” of Manifestations used to make new Manifestations may be fragmentary. Abstractions may be likened to the “DNA” of a chain of Derivations, passed

<sup>9</sup> Note that RDD, being concerned primarily with digital resources, focuses on a particular kind of Derivation: *Adapt*, in which something is made by changing a copy of the source. However this does not preclude the definition of other types of Derivation processes in future.

on through copies and variants of Manifestations, so that, for example, Shakespeare's plays are preserved even though most of the Manifestations in which they were Expressed have long since perished.