

Managing Meaning

How can standards help?

Virtual Goods 2004

Niels Rump
28th May 2004

Agenda

- ▶ Where are we today with “virtual goods”?
- ▶ Why are we there?
- ▶ How can we move on?

Where are we today?

Some recent headlines from Rightscom's free daily news bulletin

- ▶ [CNET] ...ent network
- ▶ of iTunes Service
- ▶ iTunes ...ncon.co
- ▶ Record In ... Want
- ▶ iTunes 'could
- ▶ Sony plays in
- ▶ EU wary of groups

*So:
The promised land is
still not here!*

*Some call it the
"Digital Stalemate"*

What's the problem?

- ▶ Baseline technologies are there
 - ▶ Content compression methods
 - ▶ Content distribution methods
 - ▶ Digital Policy Management methods
 - ▶ Digital Policy Enforcement methods
 - ▶ Payment methods

- ▶ But:
 - ▶ Offerings technically incompatible
 - ▶ No “cool” services that offer something to everybody
 - ▶ Uncertainty and fear in the marketplace

Changes over the last few years

Technical Legal environment

Business Models

100s tried – but were they “good”?
Well...

Treaties

MCA

Directives

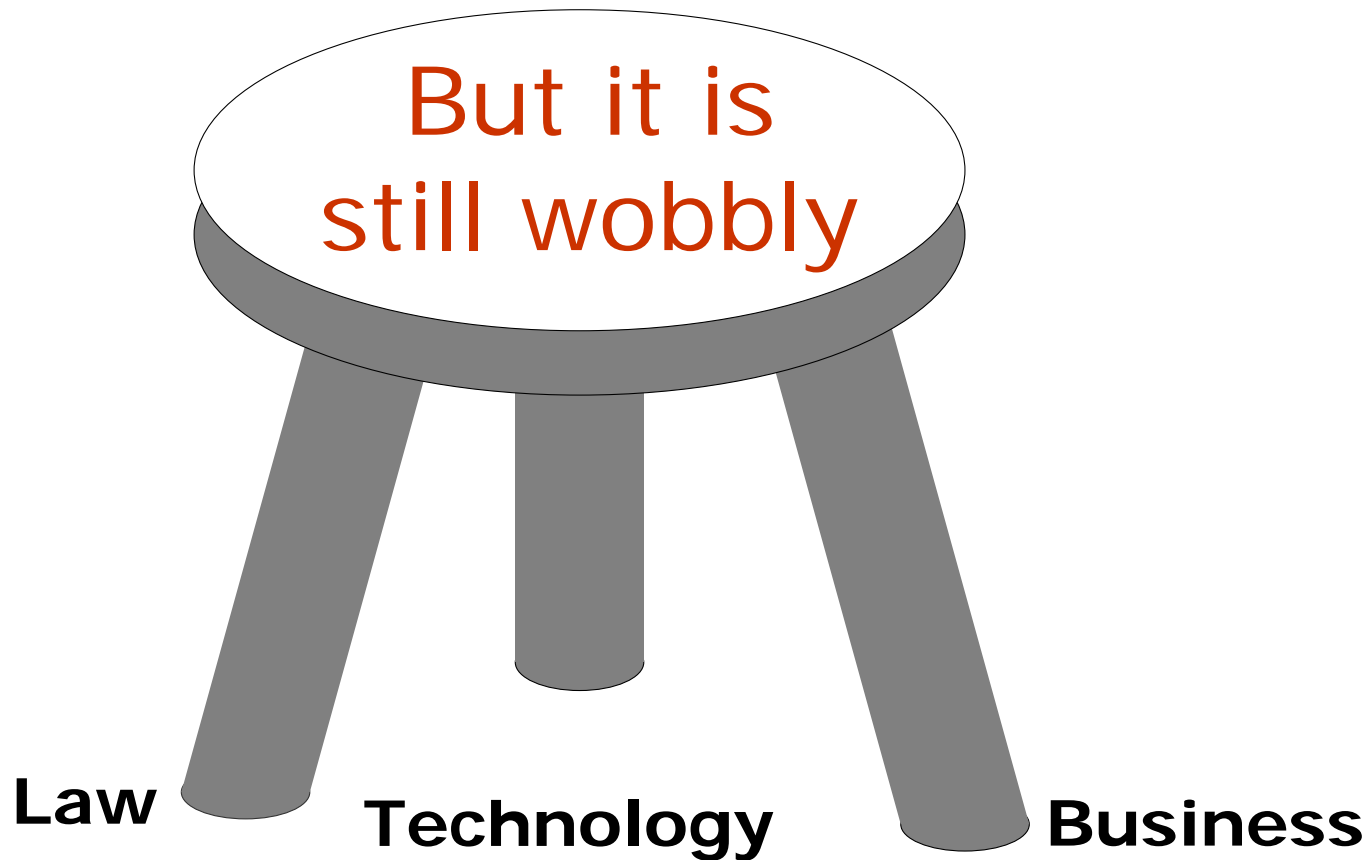
▶ Copyright

▶ e-commerce

- ▶ In the digital world, access is no longer so simple
 - ▶ “Making things”
 - ▶ “(Re-)publica

We used to speak about *protection* – today it's all about *metadata*

The “Three Legged Stool” of DRM



What is DRM?

Two building blocks



Digital Policy
Management



Digital Policy
Enforcement

Two building blocks



Challenge

- ▶ How to manage digital objects & associated policies
 - ▶ Rights
 - ▶ Permissions
 - ▶ Conditions

Tools

- ▶ Authorative Identification
- ▶ Description
- ▶ Rights description
- ▶ Rights administration
- ▶ Communication protocols

Two building blocks

Challenge

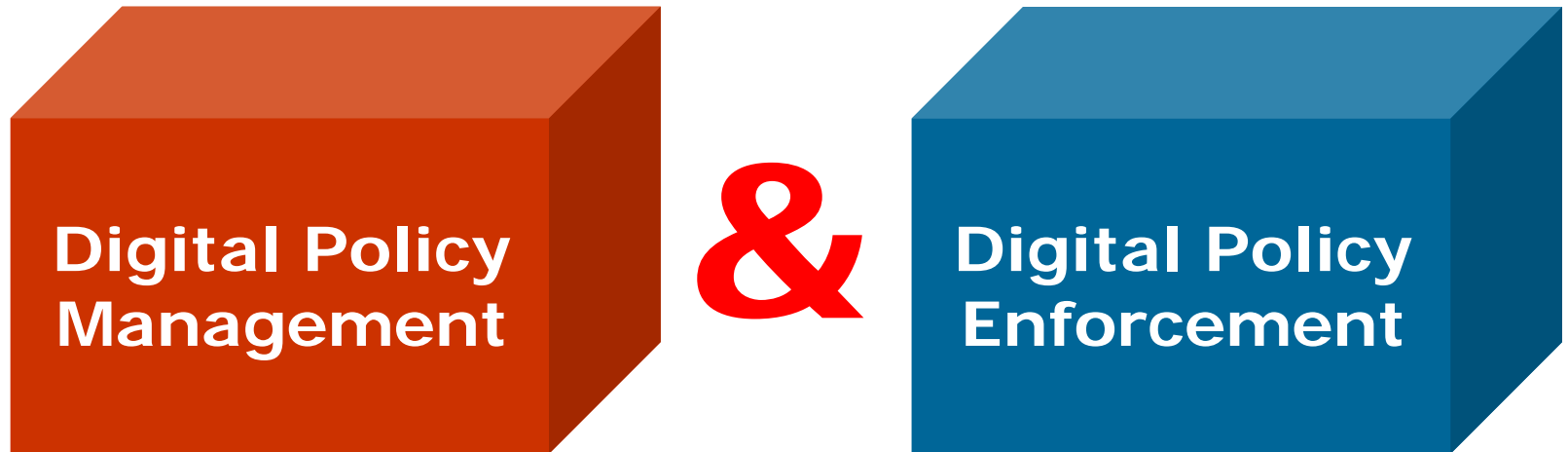
- ▶ How to execute, enforce, monitor the application of such policies

Tools

- ▶ Access and usage control
- ▶ Persistent Association
- ▶ Encryption
 - ▶ Key Management
- ▶ Monitoring
 - ▶ Forensic DRM
 - > Watermarking
 - > Fingerprinting
- ▶ ...

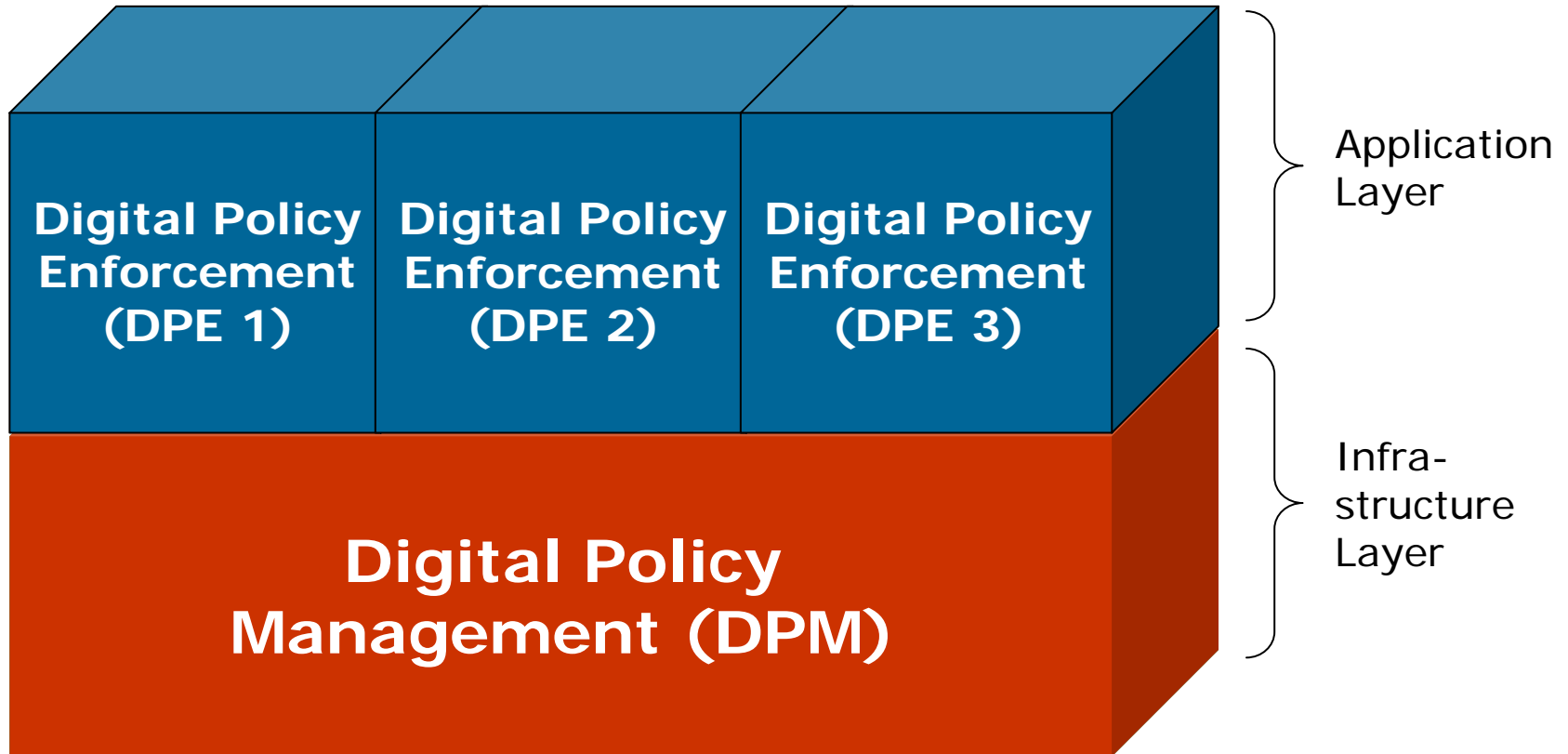


Both are essential to effective Digital Policy Enforcement

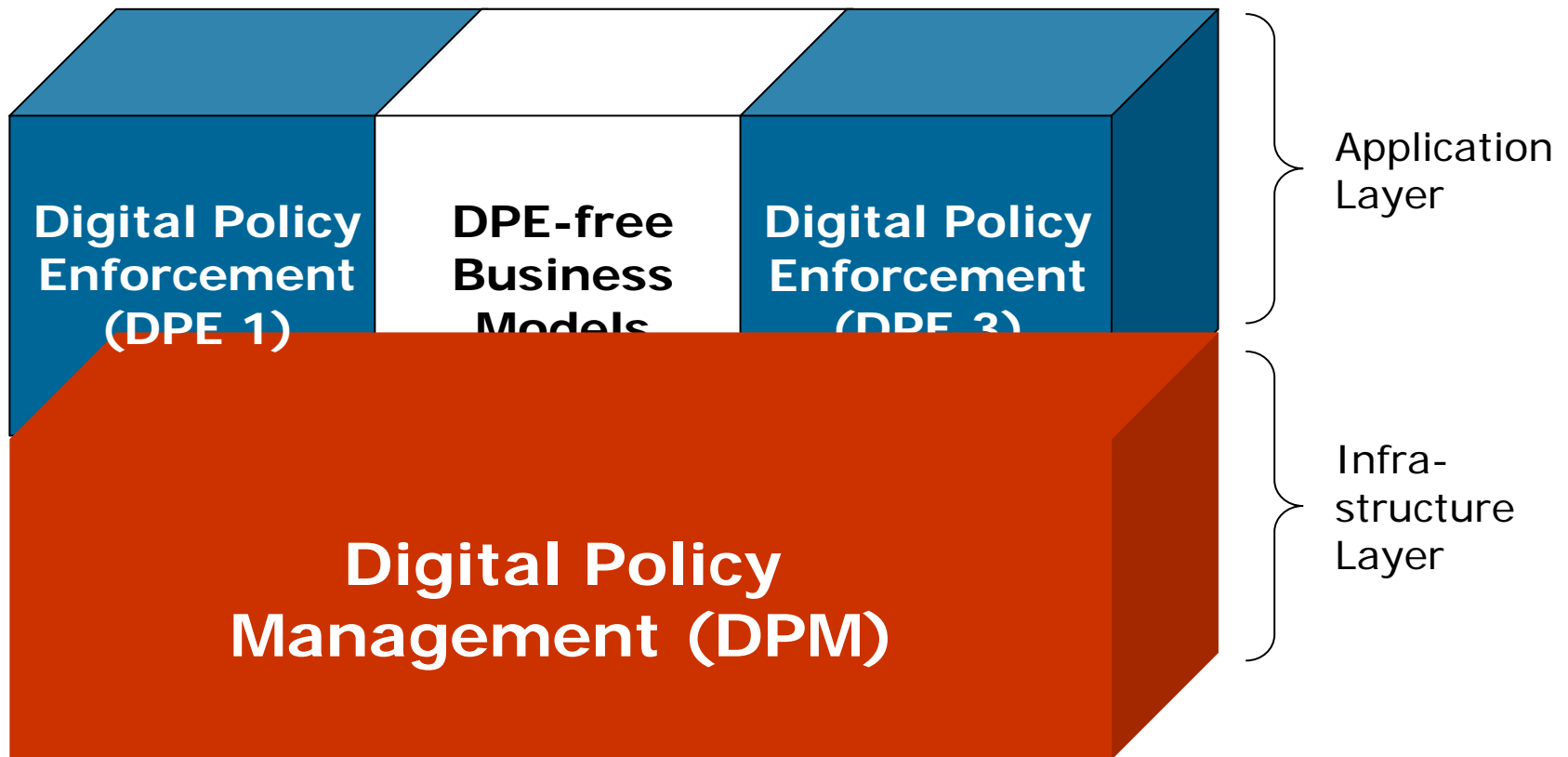


**Digital Policy Enforcement
depends on effective
Digital Policy Management**

Both are essential to effective Digital Policy Enforcement



But Digital Policy Enforcement is not always necessary



DPE vs. DPE-free Models

▶ DPE-free

- ▶ How much does the content provider trust its customer?
- ▶ Example: STM publishers

▶ DPE

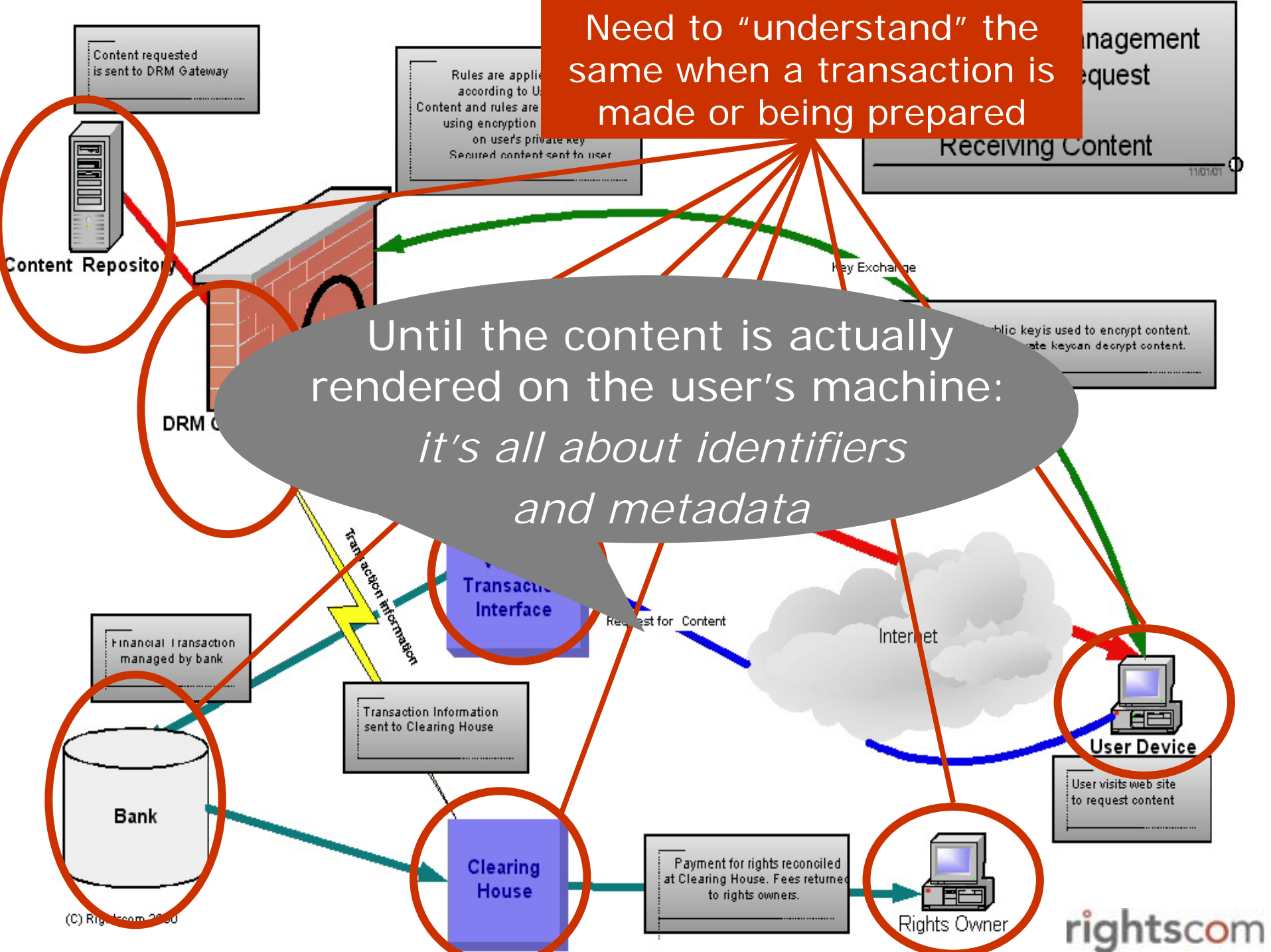
- ▶ How much does the content provider trust its customer's machine?
- ▶ CD Copy Protection Schemes

Issues for Managing Rights

- ▶ Complexity of machine description
- ▶ Complexity of machine reconciliation
- ▶ Complexity of machine communication
 - ▶ Permissions
- ▶ Complexity of machine reconciliation
- ▶ Machines require consistent, unambiguous standardised meaning as well as standardised syntactical structures

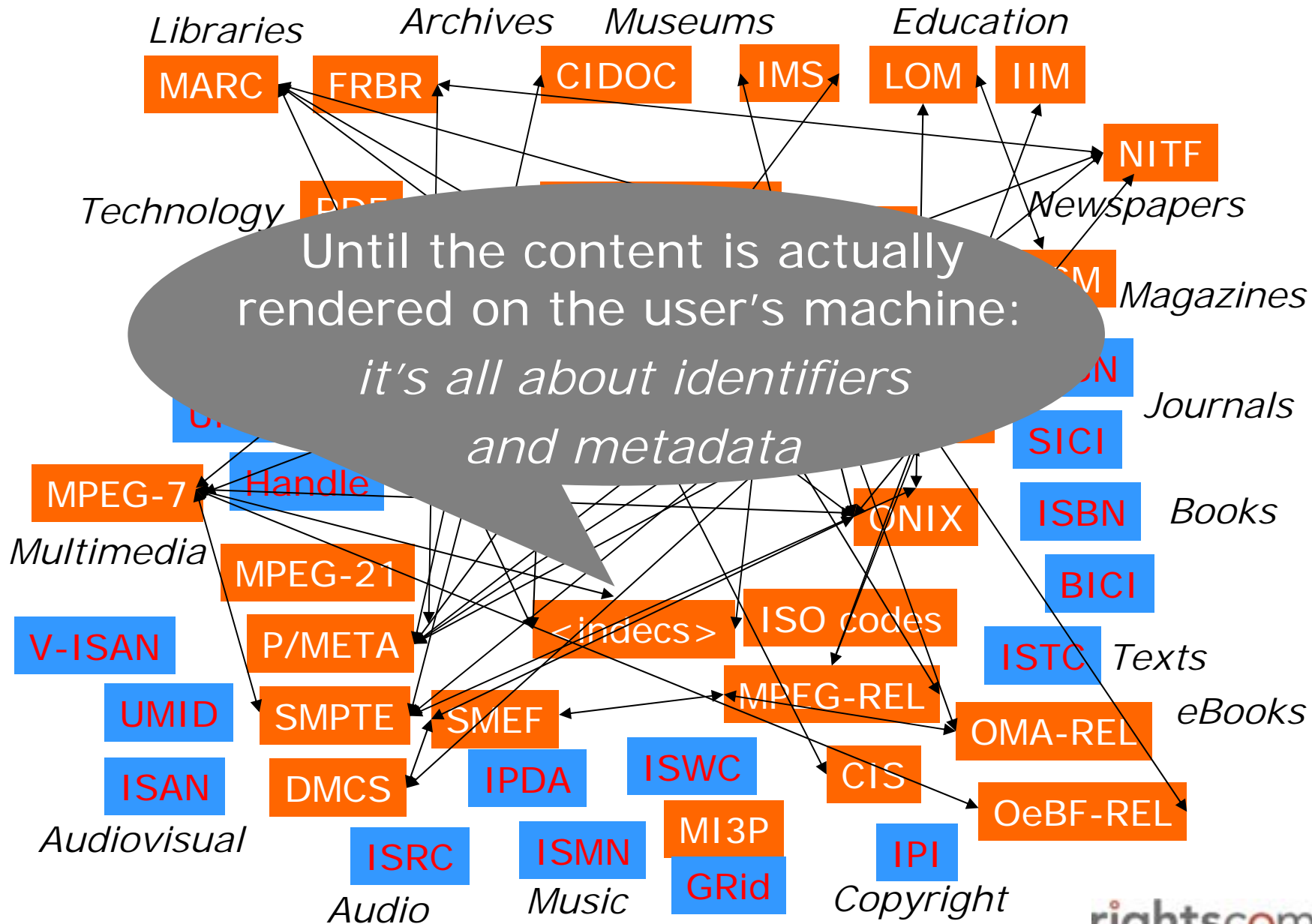
Managing rights boils down to managing *machine-to-machine* communication

Need to "understand" the same when a transaction is made or being prepared



Until the content is actually rendered on the user's machine:
it's all about identifiers and metadata

Some Identifier and Metadata Systems



In other words...

- ▶ Having metadata supporting **consistent, unambiguous standardised meaning** available to all devices is a prerequisite to successful commercial offers
- ▶ But – “translating” terms between machines is not enough
 - ▶ You and I can distinguish things from their context
 - ▶ Computers can't

For Example



“Cat on Mat”

For Example – “Cat on Mat”



?

We need to somehow
standardise meaning



?

MPEG Rights Data Dictionary

- ▶ ISO/IEC 21000-6
 - ▶ Contains ~2,000 terms
 - ▶ Event based data model – known from <indec>
 - ▶ Methodology for continuing extensibility
 - ▶ Management by ISO Registration Authority

- ▶ The RDD supports interoperable management of meaning for the MPEG community

Semantic Interoperability – Not just for DRM (or MPEG)

- ▶ Increasing syntactic interoperability is the trend
 - ▶ Java/XML/Web services
- ▶ Object-oriented services and systems
- ▶ Multi-lingual
- ▶ Processes recognised as the way forward for receiving investment
 - ▶ E.g. Adobe XMP, Alena, Network Inference, IBM Snobase etc
 - ▶ Semantic Web

Only technologies such as
underlying the RDD promise
real automation

ISO/IEC 21000-6 – History

- ▶ MPEG-4 Intellectual Property Management & Protection
 - ▶ Discussed DRM-related metadata
 - ▶ Including necessity of Rights Expressions
- ▶ MPEG conducted exhaustive requirements building exercise
 - ▶ Rights Expression Language and
 - ▶ Underling Rights Data Dictionary
- ▶ Requirements led to a CfP and two Standards
 - ▶ ISO/IEC 21000-5 – Rights Expression Language
 - ▶ ISO/IEC 21000-6 – Rights Data Dictionary

A look under the Hood of ISO/IEC 21000-6

- ▶ Comprises
 - ▶ Dictionary
 - > Structural Terms
 - > Rights Terms
 - ▶ Methodology for extending Dictionary
 - ▶ Set of requirements for Registration Authority
- ▶ Based on Verbs
 - ▶ ~2000 Terms
 - ▶ Structural Terms
 - ▶ Rights Terms
 - ▶ 14 ActTypes
 - ▶ Rights Verbs, e.g. Play
 - ▶ Extensible using the RDD Methodology

The RDD ActTypes

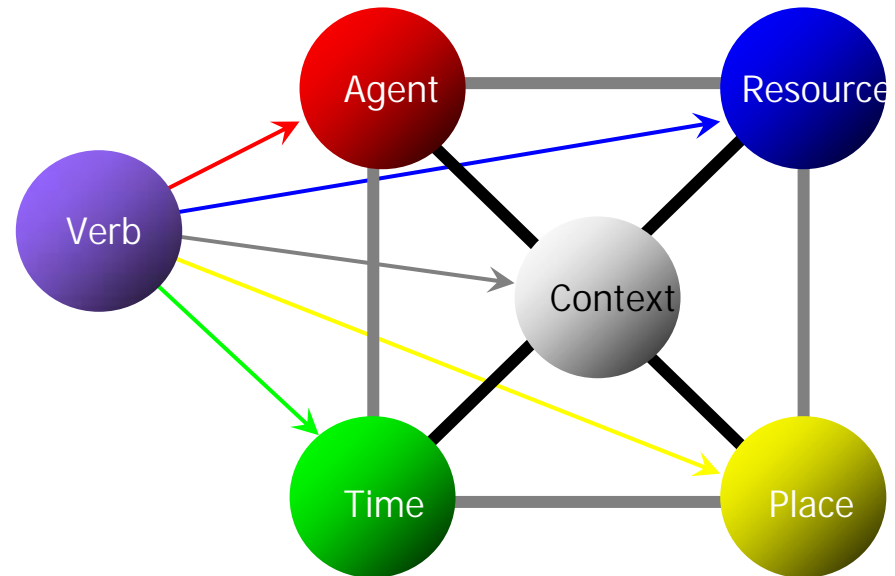
▶ The Basic Verbs to describe Permissions

- ▶ Adapt
- ▶ Delete
- ▶ Diminish
- ▶ Embed
- ▶ Enhance
- ▶ Enlarge
- ▶ Execute
- ▶ Install
- ▶ Modify
- ▶ Move
- ▶ Play
- ▶ Print
- ▶ Reduce
- ▶ Uninstall

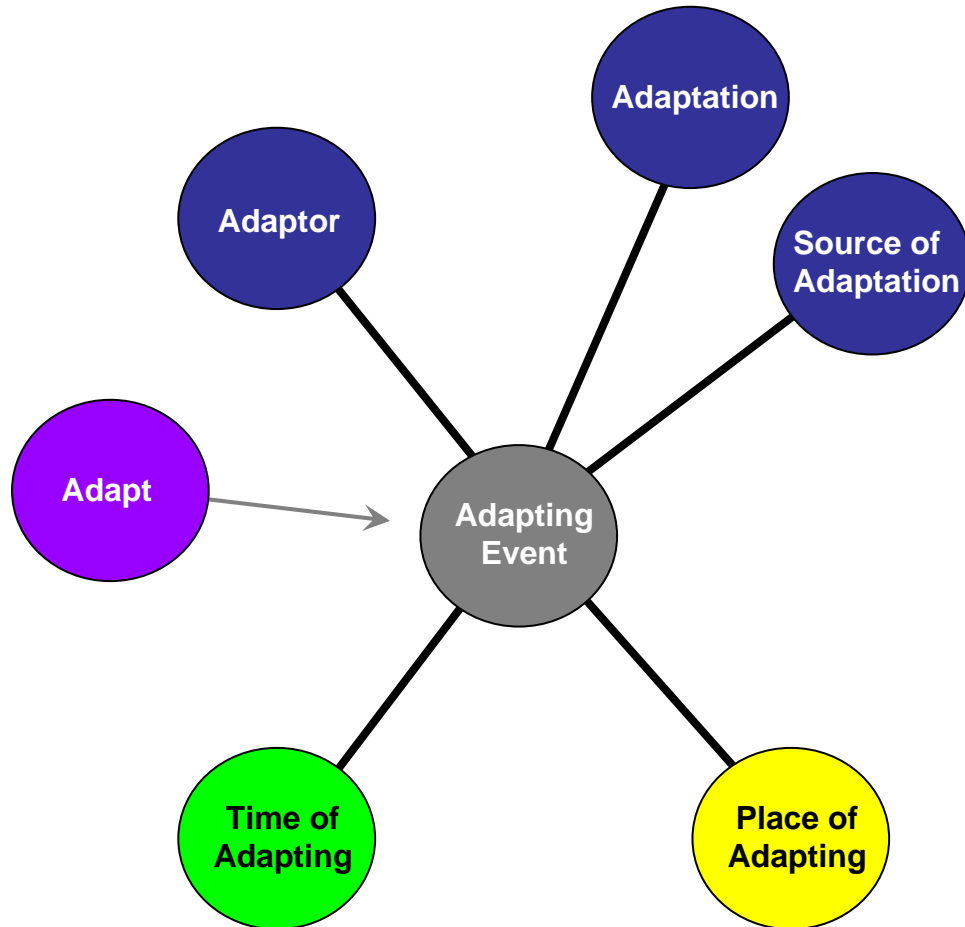
▶ These verbs can be specialised to describe specific Permissions

The Methodology

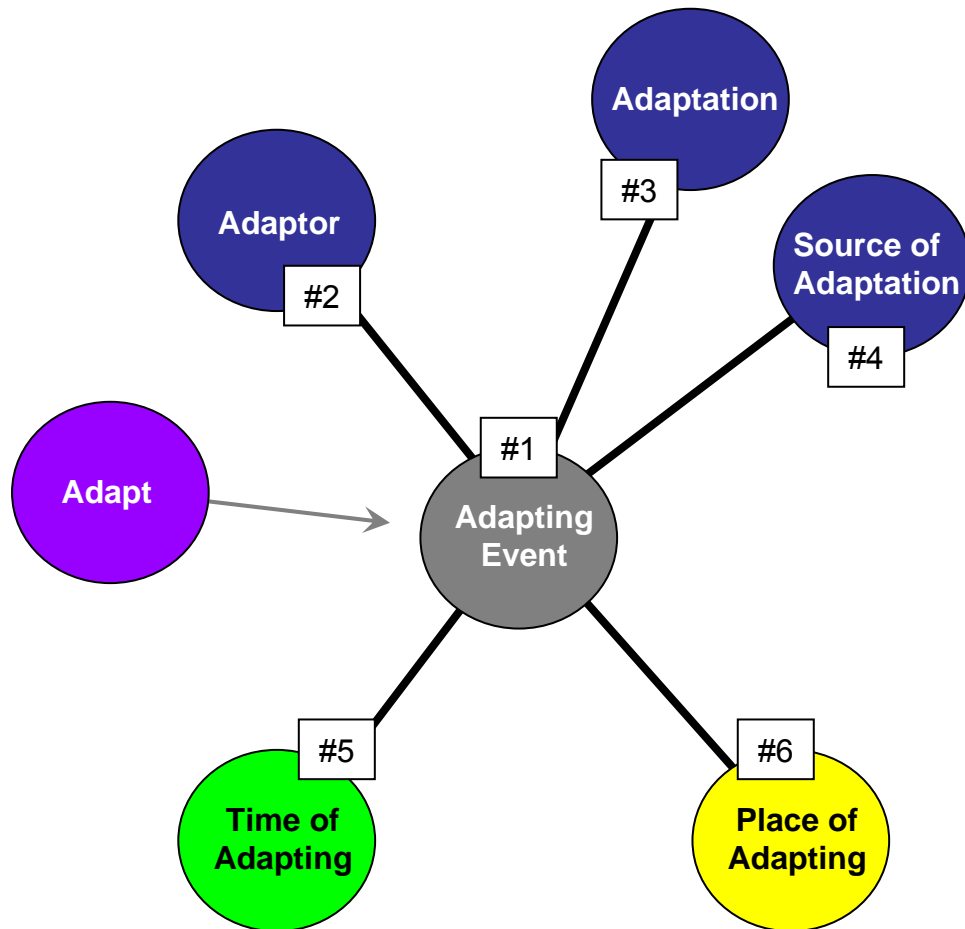
- ▶ The RDD is based on a logical data model
 - ▶ The Context Model provides an analytic tool to ensure semantic consistency
 - ▶ The analysis is predicated on "events"
 - ▶ All Terms are derived from Verbs



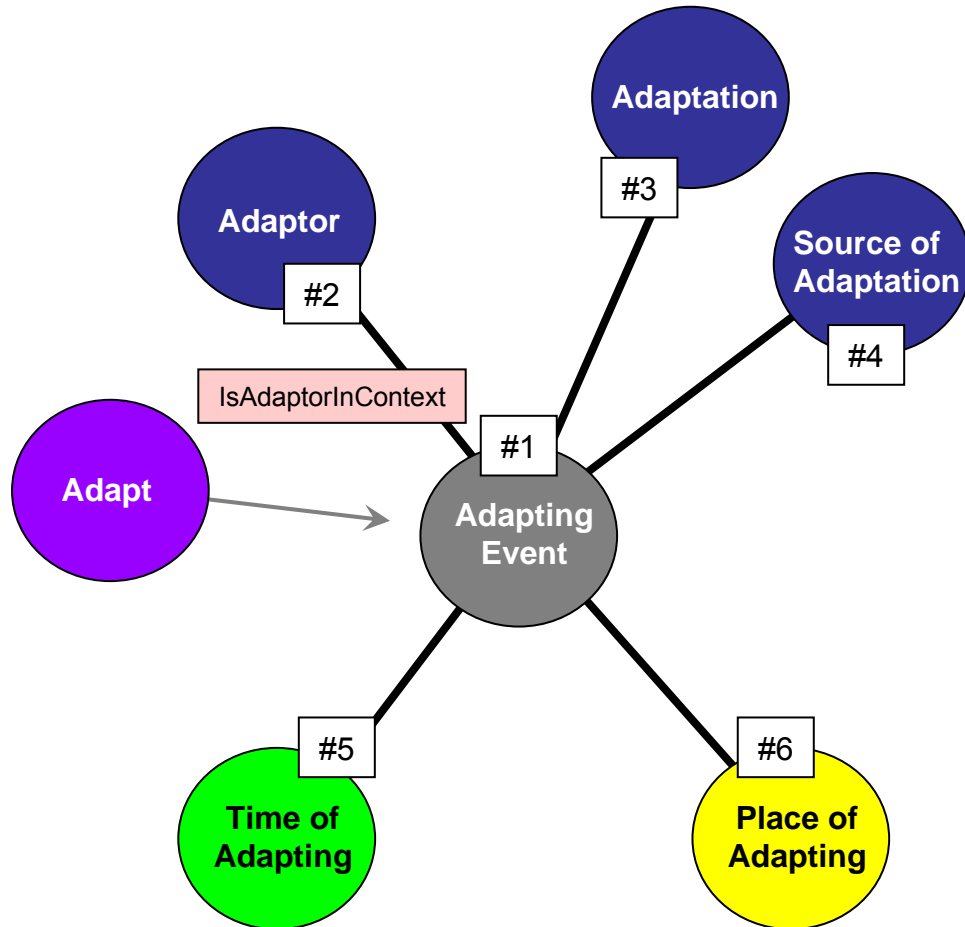
An Adaptation event



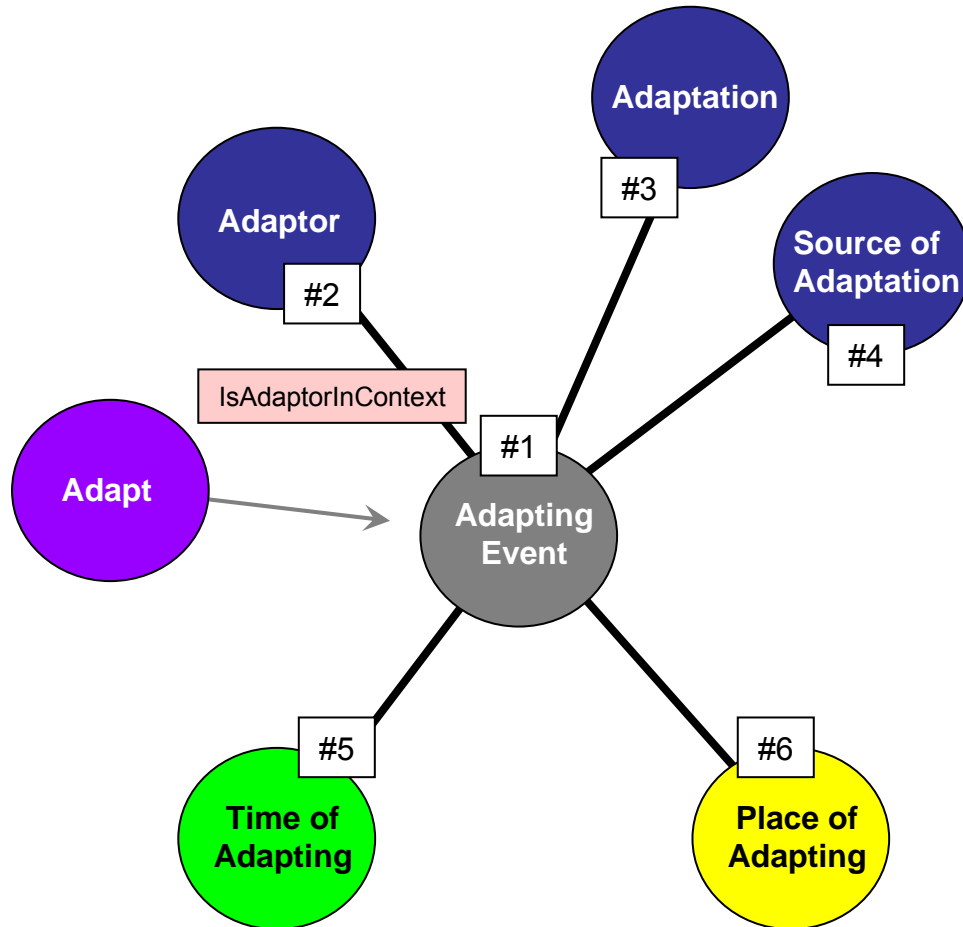
An Adaptation event



An Adaptation event

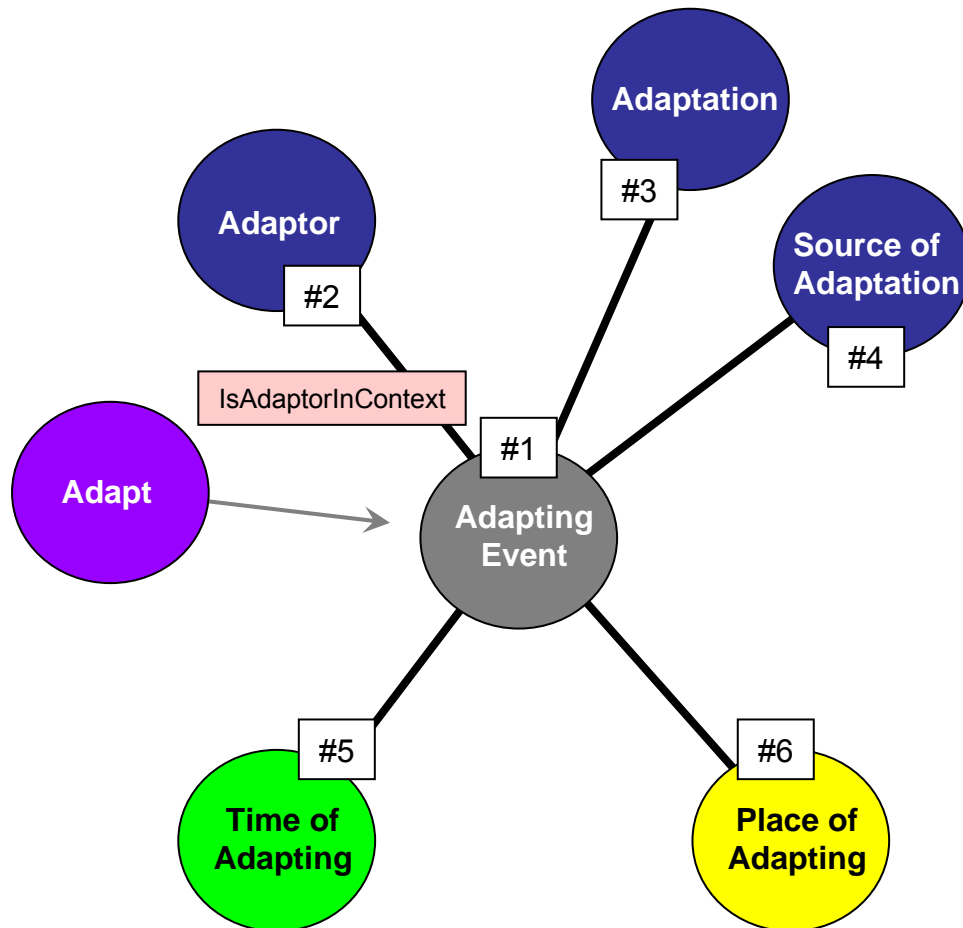


An Adaptation event



[#2 IsAdaptorInContext #1](#)

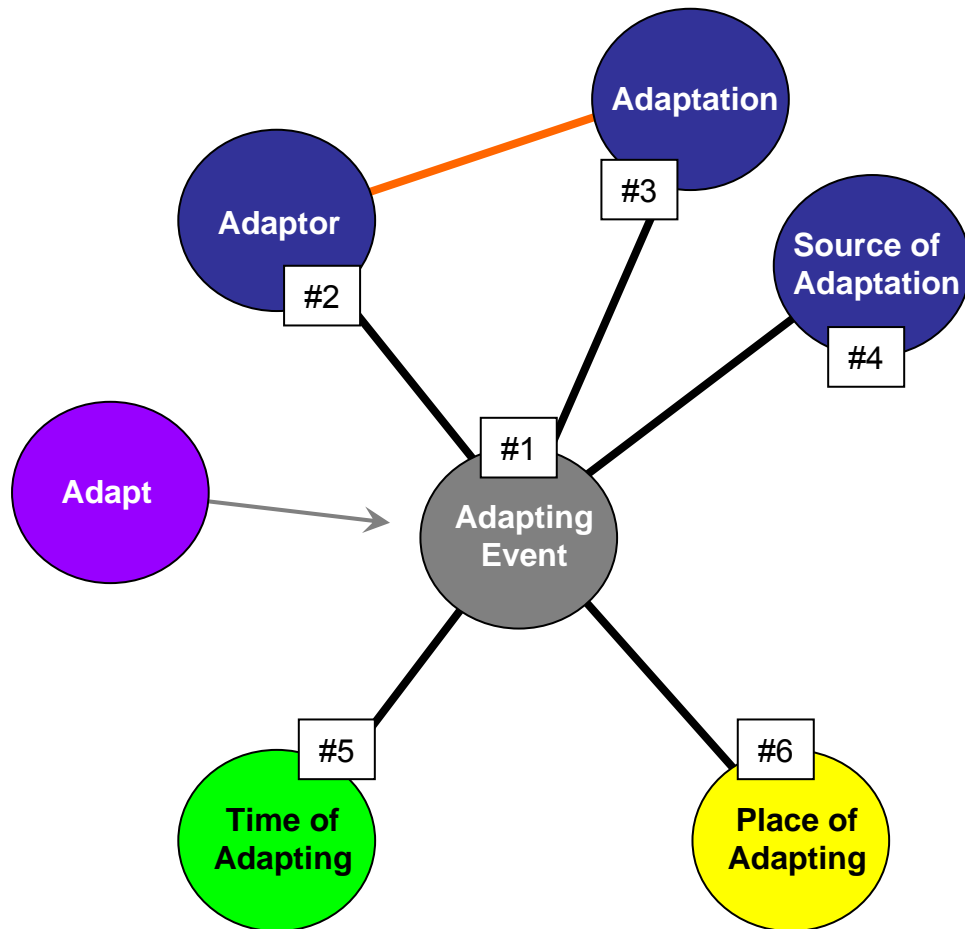
An Adaptation event



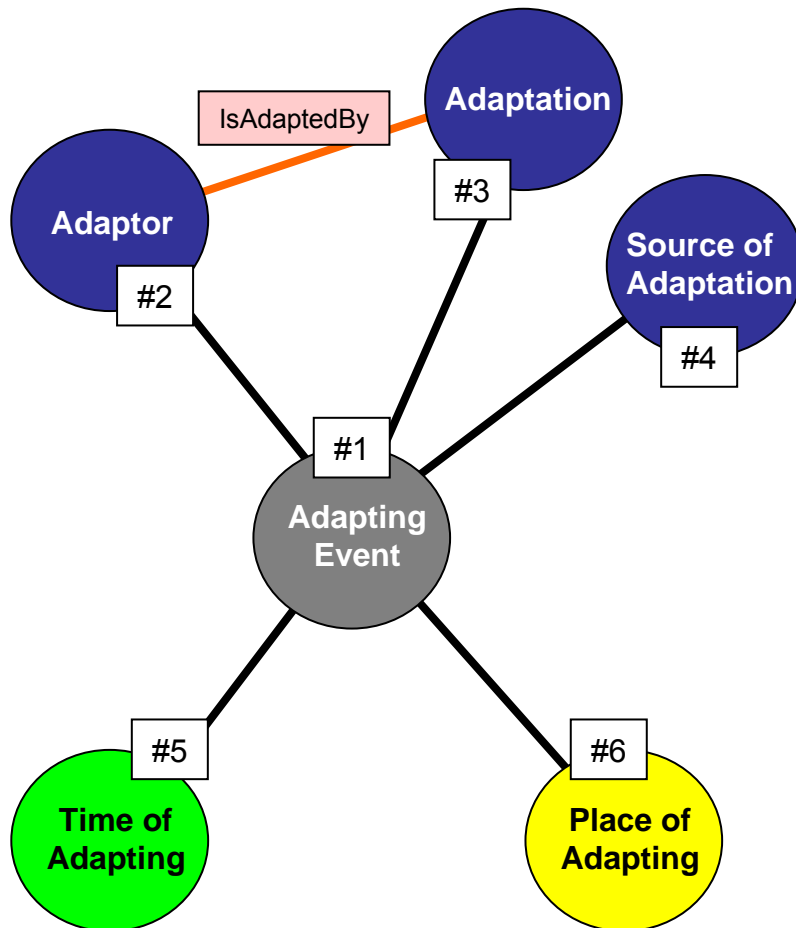
#2 IsAdaptorInContext #1

#1 IsContextOfAdaptor #2

An Adaptation event

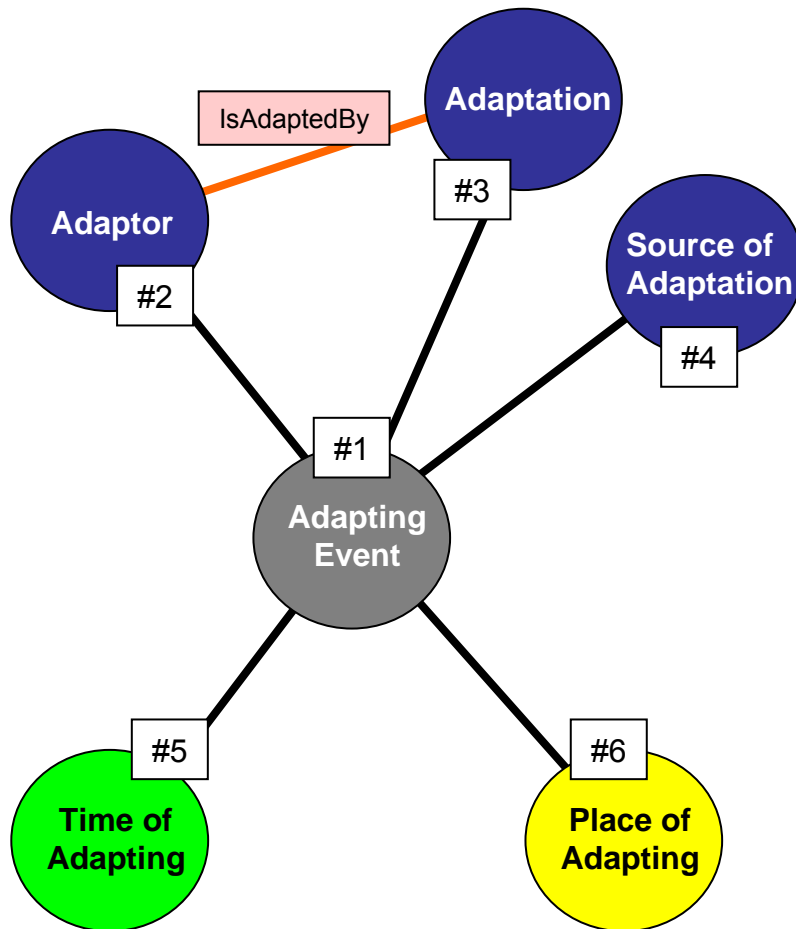


An Adaptation event



#3 IsAdaptedBy #2

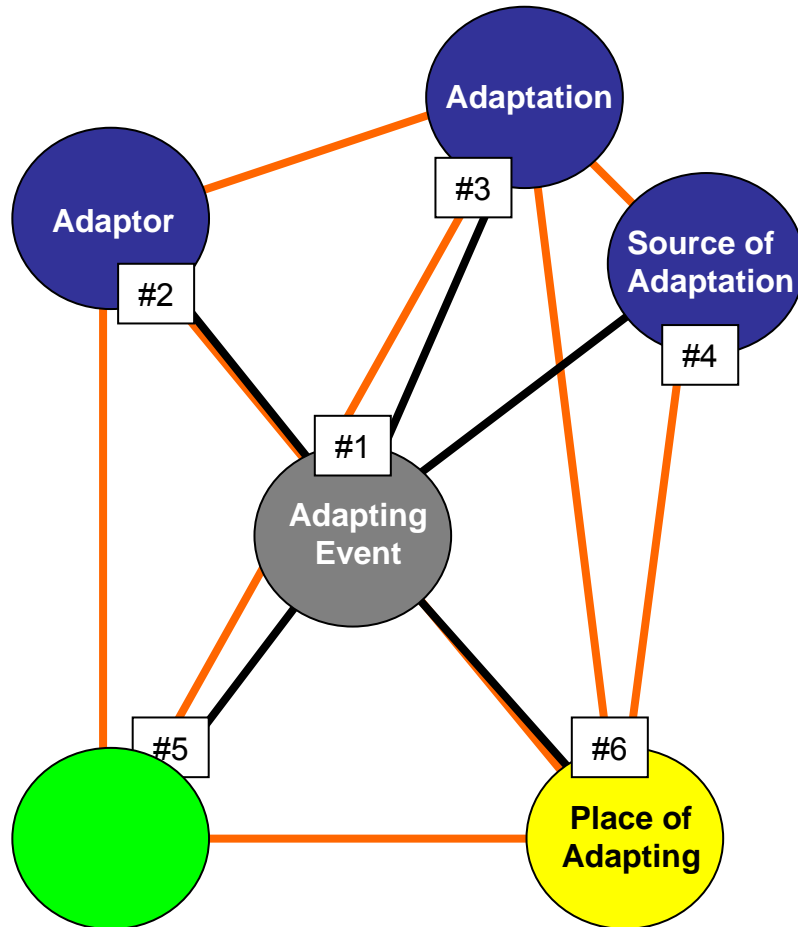
An Adaptation event



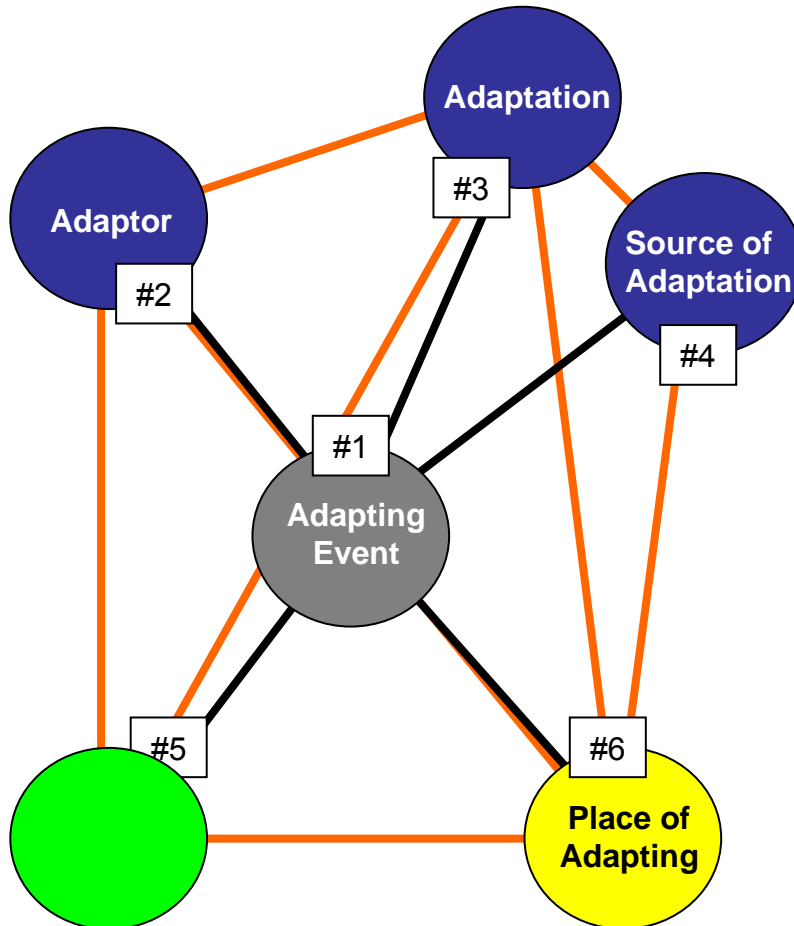
#3 IsAdaptedBy #2

#2 IsAdaptorOf #3

An Adaptation event

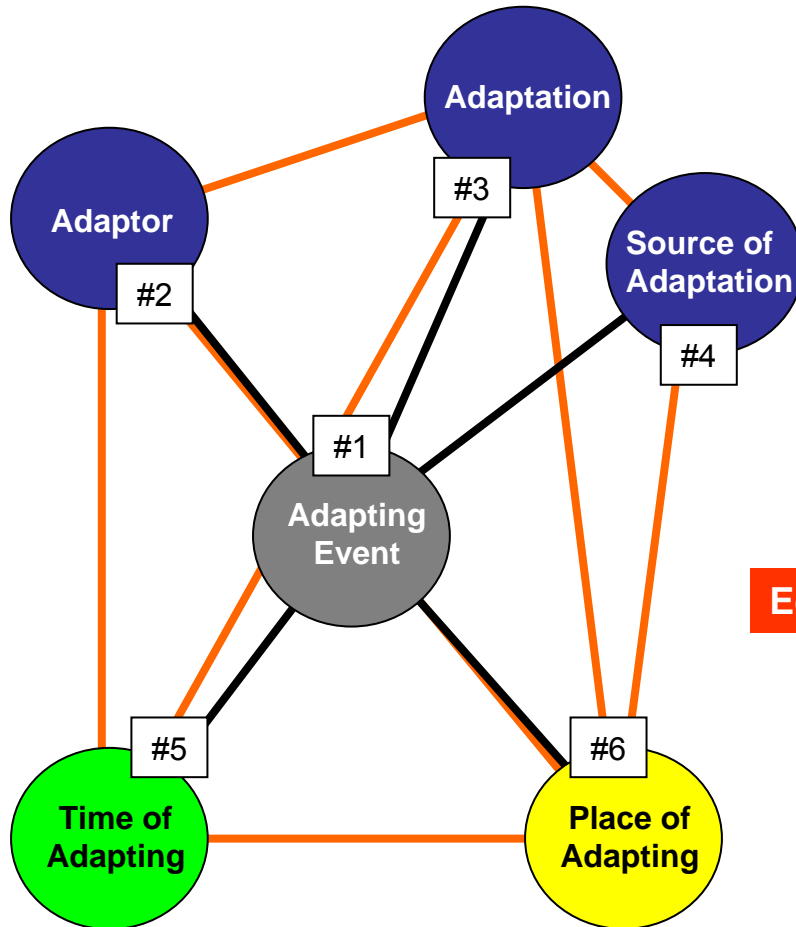


All possible statements about the simplest Adaptation event...



- [#1 icoAdaptor #2](#)
- [#1 icoAdaptation #3](#)
- [#1 icoSourceOfAdaptation #4](#)
- [#1 icoTimeOfAdapting #5](#)
- [#1 icoPlaceOfAdapting #6](#)
- [#2 IsAdaptorInContext #1](#)
- [#3 IsAdaptationInContext #1](#)
- [#4 IsSourceOfAdaptationInContext #1](#)
- [#5 IsTimeOfAdaptingInContext #1](#)
- [#6 IsPlaceOfAdaptingInContext #1](#)
- [#2 IsAdaptorOf #3](#)
- [#3 IsAdaptedBy #2](#)
- [#2 IsAdaptorFrom #4](#)
- [#4 IsSourceOfAdaptationUsedBy #2](#)
- [#2 IsAdaptorAtTime #5](#)
- [#5 IsTimeOfAdaptingBy #2](#)
- [#2 IsAdaptorInPlace #6](#)
- [#6 IsPlaceOfAdaptor #2](#)
- [#3 IsAdaptedFrom #4](#)
- [#4 IsSourceOfAdaptationOf #3](#)
- [#3 IsAdaptationAtTime #5](#)
- [#5 IsTimeOfAdaptation #3](#)
- [#3 IsAdaptationInContextWithPlaceOfAdaptor #6](#)
- [#6 IsPlaceOfAdaptation #3](#)
- [#4 IsSourceOfAdaptationAtTime #5](#)
- [#5 IsTimeOfAdaptingFromSource #4](#)
- [#4 IsSourceOfAdaptationInPlace #6](#)
- [#6 IsPlaceOfAdaptingFromSource #4](#)
- [#5 IsTimeOfAdaptingInPlace #6](#)
- [#6 IsPlaceOfAdaptingAtTime #5](#)

... and how one would actually *use* these Elements ("Specialisation")



- [#1 icoAdaptor #2](#)
- [#1 icoAdaptation #3](#)
- [#1 icoSourceOfAdaptation #4](#)
- [#1 icoTimeOfAdapting #5](#)
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- [#5 IsTimeOfAdaptingInPlace #6](#)
- [#6 IsPlaceOfAdaptingAtTime #5](#)

LastChanged

TerritoryOfUse

EditedBy

IsVersionOf

Modified

RDD Semantics – Ontologies

- ▶ RDD is constructed using an Ontology
 - ▶ “An explicit definition of concepts and their relationships to each other”
- ▶ It can exist in any domain
 - ▶ Content Description
 - ▶ Intellectual Property
 - ▶ Bengal Tigers
 - ▶ ...
- ▶ The “smarts” are in the data
 - ▶ And in the links between entities

Ontologies and Events

Ontologies

- ▶ Usually give a “static” view of information
- ▶ Actually:
 - ▶ So do most relational data models

RDD context model

- ▶ It is like a state machine
- ▶ Describes sets of possibilities that different types of events give rise to

Events Model

- ▶ Inherent representation of the real life of things
- ▶ Different, “contextual” views of the same information
 - ▶ Support of business process models
 - ▶ Support of message-based IT systems
 - ▶ Web Service architectures and ebXML
- ▶ Consistent analytical model
 - ▶ Based on historical events and patterns
- ▶ Supports legacy data through contextual mapping

NR1 allows
[data underlying bus model à OntX can help use this data to change BusMod / use it for Msg...
Niels Rump, 17/05/2004

Computing RDD Semantics

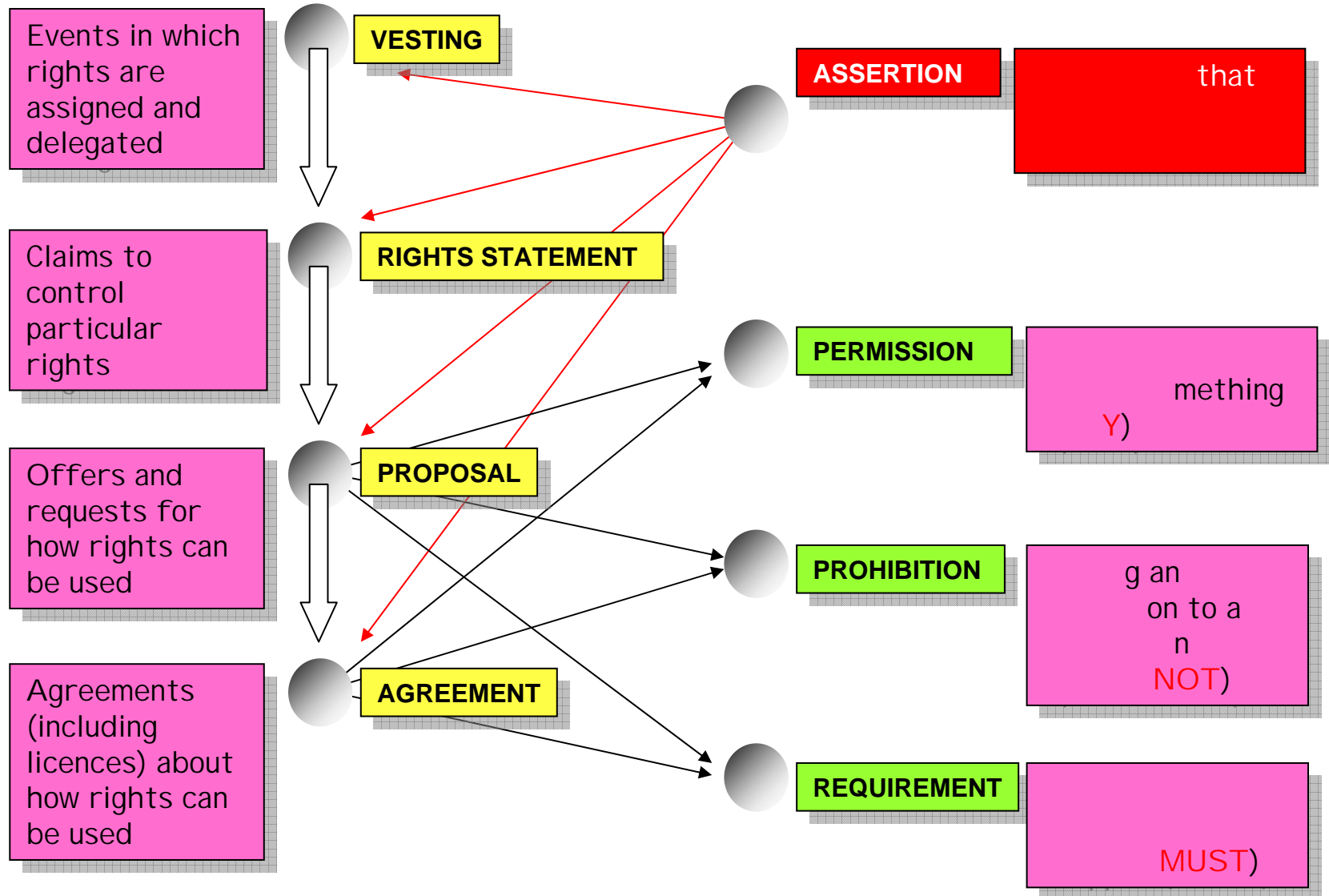
- ▶ Automated checking
 - ▶ Does this data correspond to its intended meaning?
 - ▶ Especially important when data is imported
- ▶ Facilitates unambiguous agreement through mapping
 - ▶ The process of discovering and declaring equivalence to RDD terms
 - ▶ May require new terms to be declared and registered

Efficient trading virtual goods

- ▶ For increasing automation of rights and permission management
- ▶ One needs:
 - ▶ An identification matrix
 - ▶ A complex system of machine-processible metadata
 - ▶ Automated agents
 - ▶ Audit trails
- ▶ The processes will be partly enabled by processes supported by the RDD

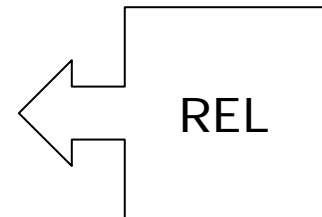
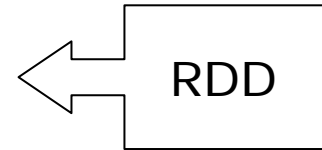
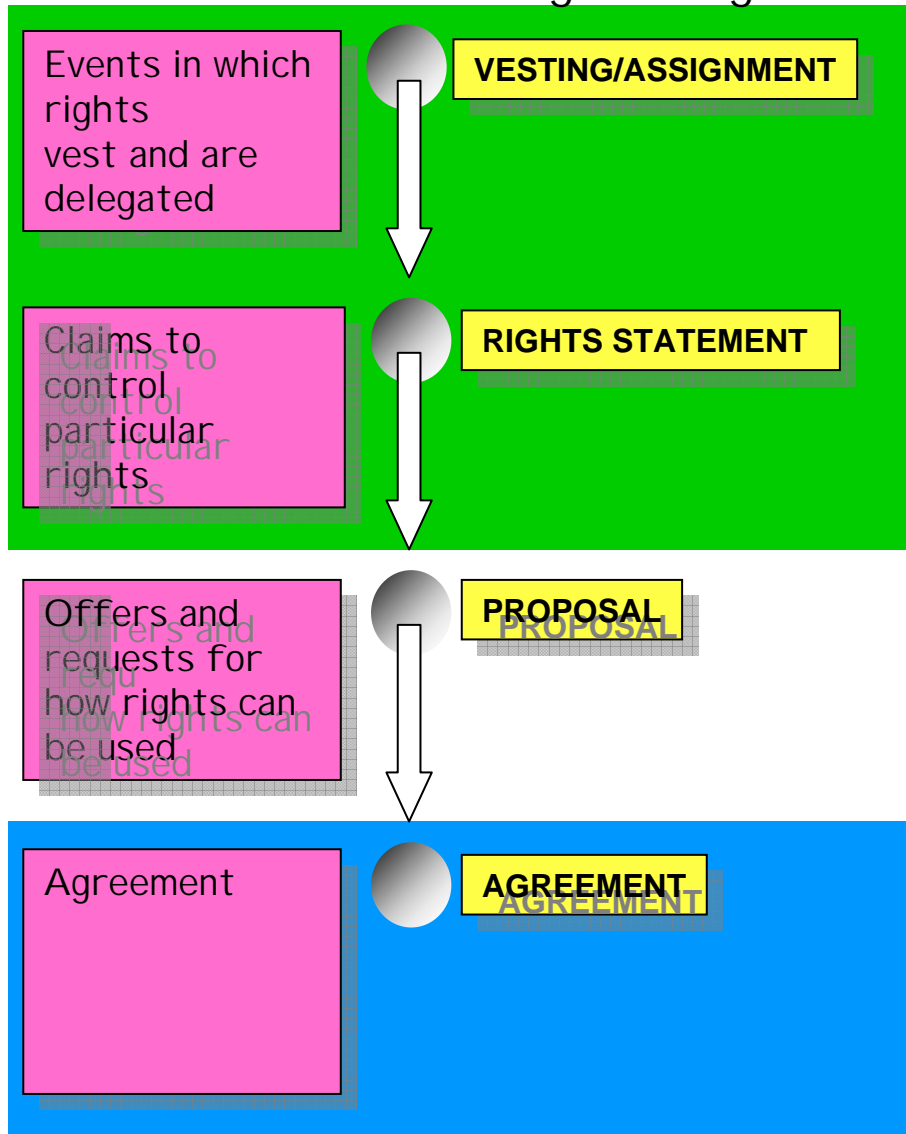
The Ontologyx Rights Model

A contextual basis for integrated rights management



The Ontologyx Rights Model

A contextual basis for integrated rights management



How does this bring us forward?

Quoting myself...

- ▶ “Having...
un...
all...
com...
“de-wobble” the three-legged stool
- ▶ “Only technology... such as underlying the RDD
promise real automation”

Managing Meaning

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