68 Lombard Street
London EC3R 9LJ
Tel: +44 20 7397 3330

Financial Information eXchange (FIX) Protocol

Financial Product Classifications Review

Version: 1.01 Initial Report, Date: 24-Dec-2012
Version: 1.02 Revisited, Date: 21-Feb-2016

© 2012-2016 London Market Systems Limited, 68 Lombard Street, London EC3R 9LJ.
No portion to be reproduced without permission.
www.londonmarketsystems.com

References

1. Financial Product Classifications by Martin Sexton, 2012 - 2016.
2. Various Authors (2011) Interim report to ISO TC68 and ISO TC68/SC4 on the TC68 Identifier Study Group activities and draft resolution to be adopted by ISO TC68/SC4 membership (ISO-TC68-SC4-WG6_N0006_TC68_SG1_Interim_Report).
3. How to report transactions on OTC derivative instruments, by CESR (now ESMA), dated October 8, 2010
4. Joint Study of the Feasibility of Mandating Algorithmic Descriptions for Derivatives, by the Staff of the SEC and CFTC, dated April 7, 2011
5. Product Representation for Standardized Derivatives, by ISDA, dated April 14, 2011
6. CFI usage ANNA Members, results of questionnaire of CFI usage at national level, dated June 2011
7. Report on OTC derivatives data reporting and aggregation requirements, by OICV-IOSCO, dated August 2011
8. Classification of Financial Instruments, by David Nowell, FSA, dated September 5, 2011
9. Martin Sexton (2012) Financial Product Classifications, London Market Systems, ISBN: 978-1-4717-6405-9
10. Commodity Futures Trading Commission - 17 CFR Part 43 Real-Time Public Reporting of Swap Transaction Data - 2012
11. Classification proposal (BillNichols.xlsx) by William Nichols[1] - April 2011
12. ISDA Implementation Plan for Unique Product Identifiers June 2011
13. ISDA OTC Taxonomies Rules of Operations December 2011
14. ISITC Classification Code List - 2011
15. ISO 10962 - Securities and related financial instruments — Classification of Financial Instruments - CFI code - 2001
16. Financial Product Classifications, by Martin Sexton - 2012 ISBN: 978-1-4717-6405-9.
17. ISO TC68/SC4/WG6 External Code lists by Martin Sexton - 9th October 2012.

[1] Mr. Nichols proposal was created prior to joining the U.S Treasury Office of Financial Research (OFR)

Contents

Introduction

The aim of the report is to obtain a better understanding of the use of industry classifications and assist the stakeholders in identifying an appropriate classification scheme and technologies to meet the current and known future requirements. This includes an assessment of the appropriate structure the standard should take and where possible making effective use of industry standards and initiatives. The output from this report could ultimately result the creation of a proposal that replaces the ISO 10962 – The Classification of Financial Instruments.

The document is part one of a two part series and focuses on assessing the current state of play regarding the use of instrument classifications and is structured under a number of key headings within which specific observations are documented.

The report contains the following headings:

1. Classification Requirements (ISO 10962:2001, FIX, ISITC classifications, ISDA Taxonomies, ISO 10962 / SG1 recommendations.
2. Structure Analysis.
3. Terms Matrix, assessing the classifications, breaking down code-lists entries into their appropriate semantic equivalent.
4. Design rules, Governance, Delivery and Funding Considerations.
5. Representation (SKOS, SDMX, OASIS Genericode, DOI/VMF and others).

1. Classification Requirements

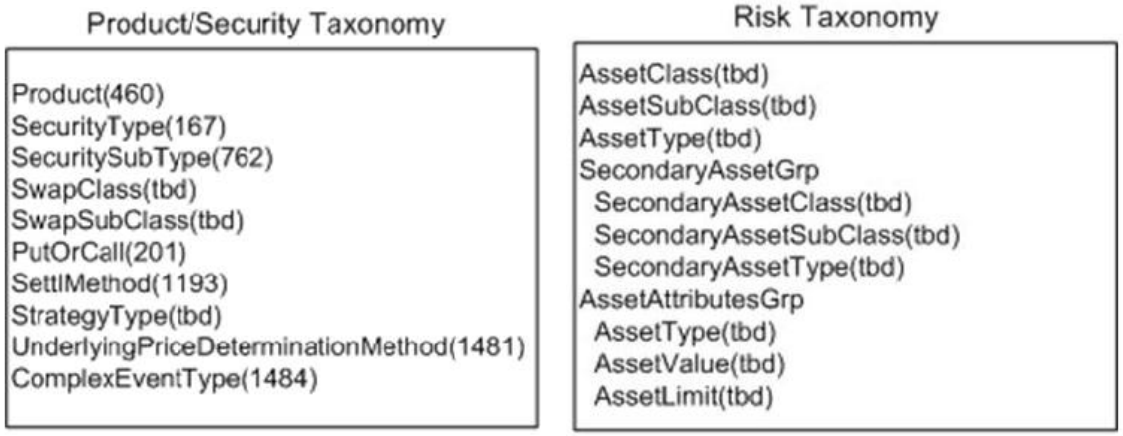
A number of classification schemes are used by in the industry and this section identifies the reasoning for their existence and the business context in which they are deployed.

1.1 ISO 10962:2001[2]

	Requirements
1.1.01	Used to identify the appropriate ISIN allocation rule.
1.1.02	For regulatory reporting, primarily for classifying cash instruments (Equities & Debt) - European Securities and Markets Authority (ESMA).
1.1.03	National Depository Center (NDC), regulators of the Russian Federation use the ISO CFI to identify the foreign instruments that can be held/traded by residents of the Russian Federation. Only instruments identified under the categories of Equities or Debt can be traded.
1.1.04	The standard is in an alpha codified form, up to 6 characters in length, first character is mandatory when used by the regulators. Broken down by category/group, each can have up to 4 attributes. 'E', 'ES', 'D', 'DB' representing 'Equity', 'Equity/Common Shares', 'Debt instruments' and 'Debt/Bonds' respectively.
1.1.05	Structure products are normally classified based on how they are traded in the market. For example, either Equity or Debt.

[2] Consideration has been given to the new version of the standard (ISO 10962:2015), however as the structure itself remains unchanged, it has been deemed unnecessary to revise this report.

1.2 FIX Classifications

	Requirements
1.2.01	Trading Lifecycle Taxonomy: A number of terms are used to support the requirements of the trading lifecycle. At the highest level tag 460 (or Product), equivalent to the Bloomberg, or broad groupings (Government, Corporate, Equity …), this takes the form of an numeric code list (between 1 to 13). This can be broken down further by tag 167 (SecurityType) and supplemented with a freeform text tag 762 (SecuritySubType) to narrow down to specific types of products.
1.2.02	Generally all the terms listed will be in a codified form. Product (460) numeric up to the value of 12. SecurityType (167) alpha up to 9 characters (e.g. SECPLEDGE).
1.2.03	A proposal is under development to meet the regulatory reporting requirements. It is made up of two taxonomies a Product/Security taxonomy[3] and a Risk Taxonomy. It caters for both the reporting of securitized, exchange-traded and OTC derivative products. The aim is to support the requirements of Dodd-Frank and EMIR. 

[3] Limited material available to assess this, also not within scope of the engagement.

1.3 ISITC Reconciliation and Settlement

	Requirements
1.3.01	Used to support Settlement Instructions, Statement of Holdings, transactions and pending transactions.
1.3.02	Needed to identify the product type and the type of issuer.
1.3.03	All terms are codified and up to 4 characters in length. The only exception is “IOETTE” (Mortgage IO-ette) in the US Security MP template column.
1.3.04	A simple hierarchy can be applied comprising of major product groups (Equity, Listed Derivatives, Fixed Income and Debt,…), under which financial products are allocated a ISITC Classification Code (product type), as well as PSET List Asset Type Code which contains the Market sector breakdown of products (CORP, EQ, MM, …).
1.3.05	Clarification required as to the reasoning why the entries in code lists were agreed upon, particularly PSET List Asset Type Code and ISITC Classification Code. Perhaps there is different settlement and downstream processing required, hence the allocation of the appropriate codes.

1.4 ISDA Taxonomies

	Requirements
1.4.01	Used to support the reporting requirements of Dodd-Frank and EMIR in relation to OTC Derivative products, only.
1.4.02	Comprises a set of human readable code lists that are concatenated together to form a strict hierarchical structure (known as the Product Taxonomy code list in FpML), comprising: Asset Class, Base Product, Sub-Product and Transaction Type. This is supplemented also with the Settlement Type for commodity based products.
1.4.03	To adhere to CFTC Rule, one expects that the code list entry, (e.g. “Commodity:Metals:Precious:SpotFwd:Physical”) would be converted to the 2 alpha codified equivalents, populating four terms: Asset class, sub-Asset class, Contract type and Contract sub-type.`

1.5 ISO Study Group (TG 1)

	Requirements
1.5.01	In relation to the ISO CFI the group identified the following points: 1. Effect on legacy assignment of existing classification code 2. Extensibility 3. Determination whether the standard should address the requirements of multiple and different communities of users / business processes 4. Examine a mechanism able to support relationships and other standards LEI/ISIN/MIC/FISN 5. Identify the level of granularity 6. Particular focus on OTC derivatives given the priority tied to regulation 7. Consideration of different classification schemes per asset class [4]under one standard - could this meet the requirements?

[4] Equities span multiple base products, therefore one suspects that TG1 is refering to product groups, i.e. a scheme for securitized products and another for OTC derivative instruments.

1.6 Process Coverage Summary

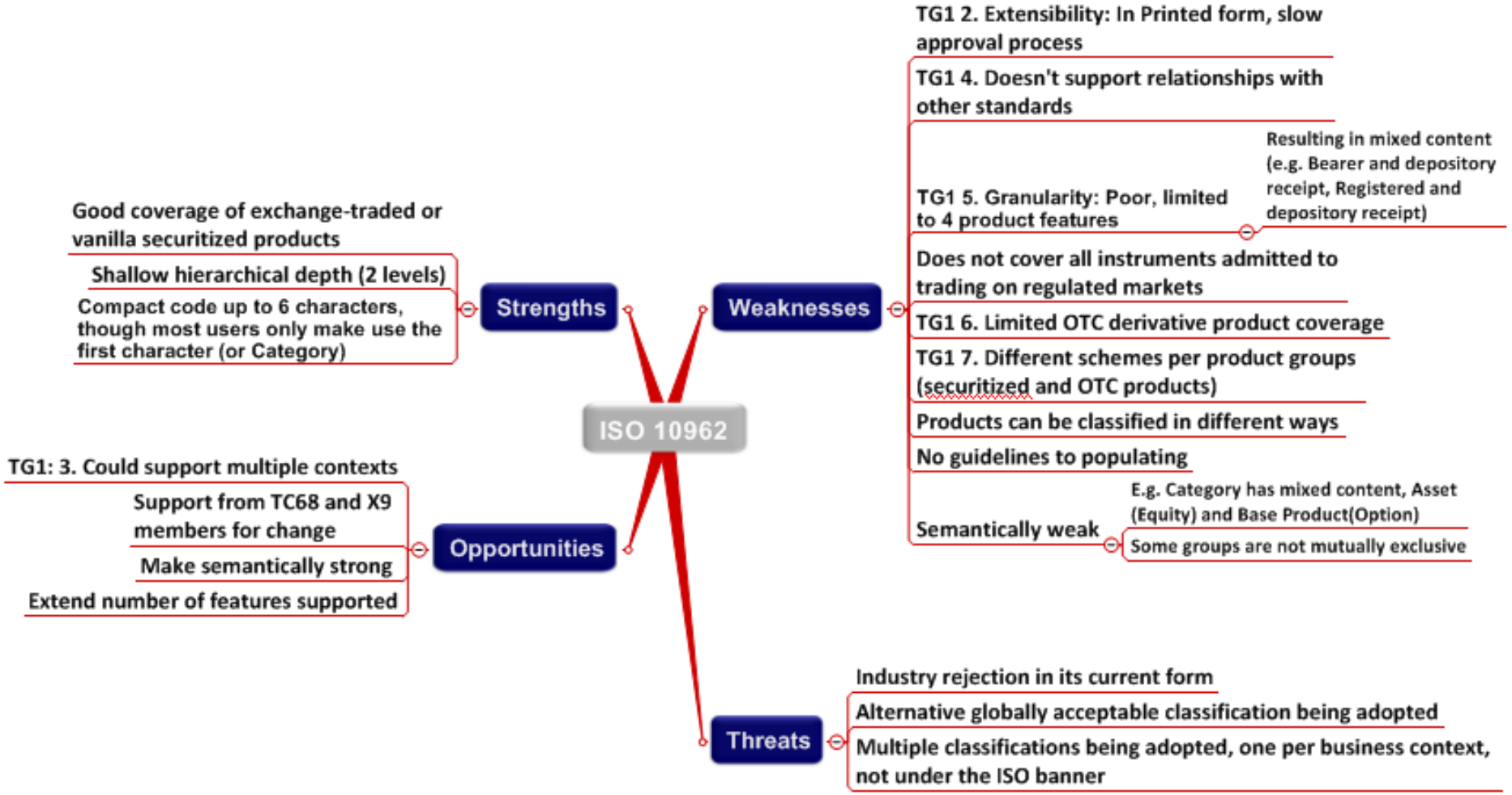
Classification	Scheme	Process	Asset Class	Products
ISO CFI	10962:2001	Regulatory reporting	Equity & debt	Securitized products
ISO CFI	10962:2001	Resident holdings constraints	Equity & debt	Securitized products
FIX	Trade Lifecycle	Order routing	All asset classes	All products
FIX	Product & Risk	Regulatory reporting	All asset classes	All products
ISDA	Asset class taxonomies	Regulatory reporting	All asset classes	All OTC derivative products
ISITC	Classification code (plus multiple terms loosely related, namely SSI Security type, Asset type and US Security MP).	Reconciliation and Settlement	All asset classes	Securitized and exchange traded products

2. Structure Analysis

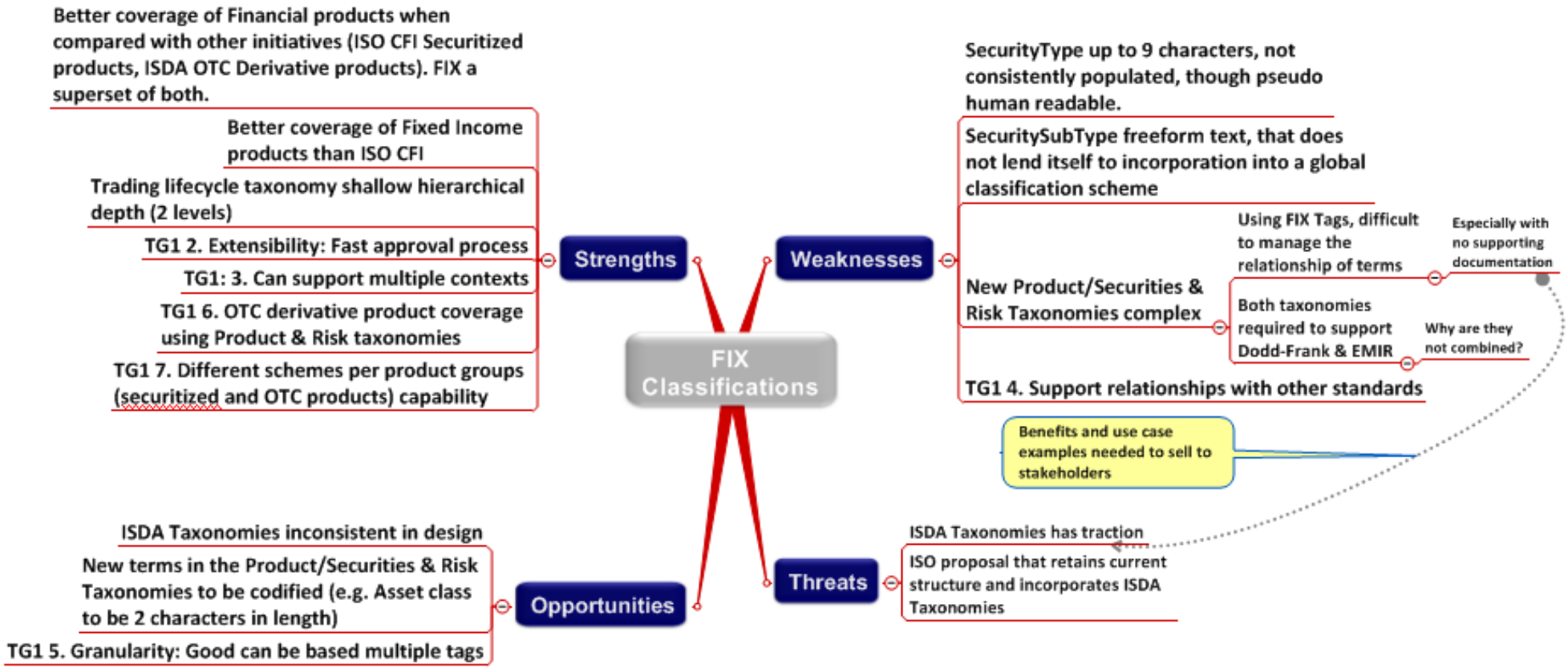
This section provides a SWOT analysis on each of the classifications, with the aim of identifying the strengths and weakness of each and assist in the decision making and planning processes associated with the designing a new classification scheme.

2.1 ISO 10962 SWOT Analysis

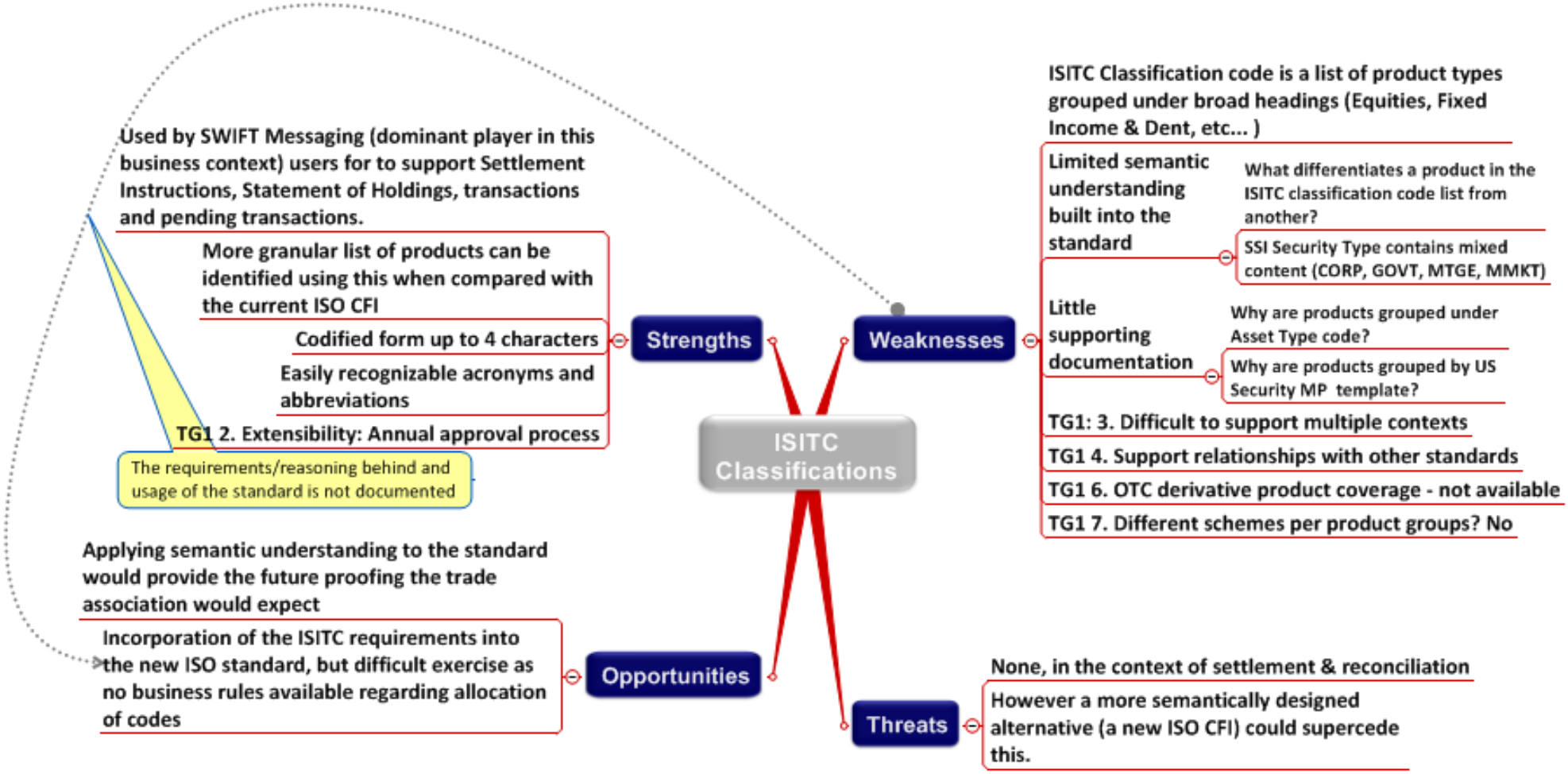
The following SWOT (Strengths, Weaknesses, Opportunities and Threats) diagram examines the latest version of ISO 10962:2001:



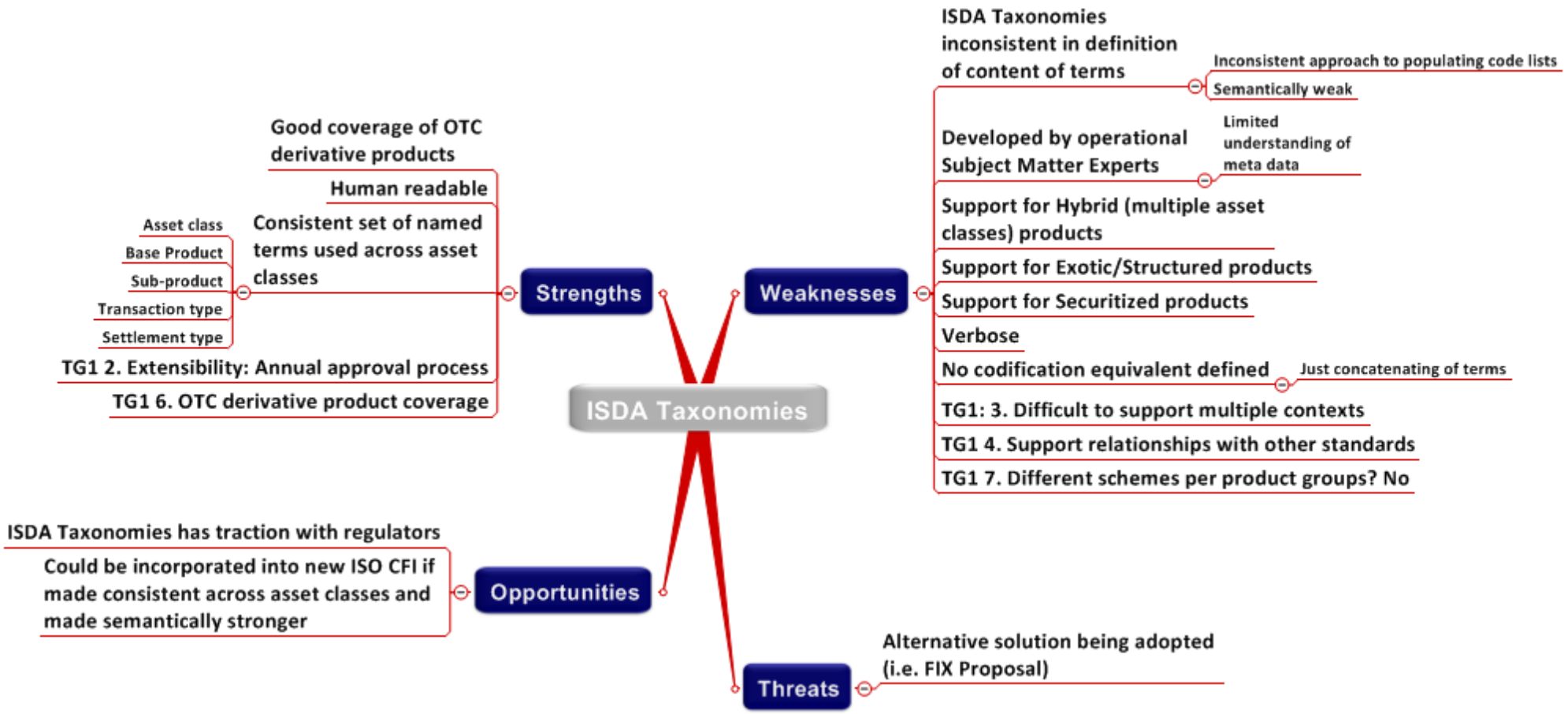
2.2 FIX Classifications



2.3 ISITC Reconciliation and Settlement



2.4 ISDA Taxonomies

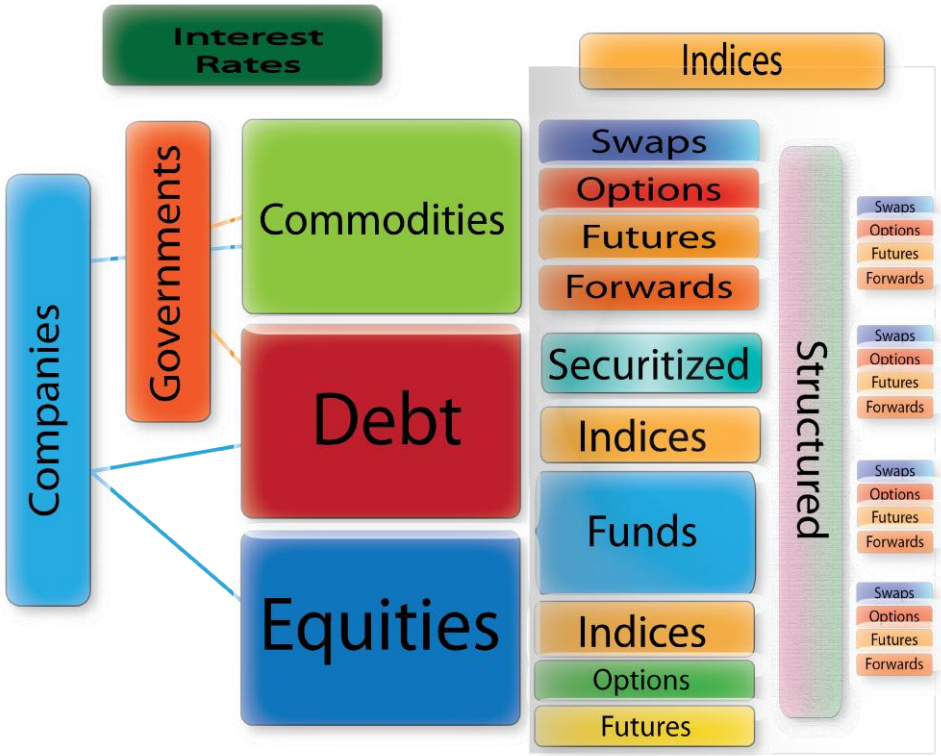


2.5 William Nichols Proposal

The aim of this recommendation was to identify a scheme capable of supporting the industry's needs and focuses on US securitized instruments. The proposal is broken down into two artefacts, a logical instrument stack which is semantically based and a set of Categories/sub-categories code lists which are less so. Given that this proposal is not in the public domain a more detailed explanation is provided in this section along with the SWOT diagram.

2.5.1 Logical Instrument Stack

The logical instrument stack comprises of 3 key concepts, namely Issuer type, Asset class and Base product or contract type. Structured products are considered another concept which comprises one to many Base products. The Base product list is incomplete, along with the Assets classes (Interest Rates should be at the same level as Commodities and Credit and FX products). One would suspect this is based on a securitized product perspective, this would explain the missing asset classes and base products from the material.



2.5.2 FINAL Numbered List Inside Core

The FINAL Numbered list Inside Core does not have a consistent approach to the Categories/sub-categories. The scheme proposed is based on a codification of Core Categories (a single alpha identifying the Asset class followed by a sub-category, which may be asset sub-class, issuer type or product type (no rules defining when which applies). Finally 3 digits are used to identify specific product types. E.g. Debt (D): Corporate (DC): Convertible (DC001). Other code lists exist including derivative and index flags.

Core Category	Code
Commodities	C
Agriculture	CA
Energy	CE
Metals	CM
Real Estate	CR
Weather	CW
ForEx	CFX
Financial	
Interest Rates	CFI

Debt	D
Corporate	DC
Convertible	DC001
Trust	DC002
Private Placement/144	DC003
Variable Rate Demand Note	DC004
Sovereign	DS
Brady Bond	DS001
Treasury Notes	DS002
Treasury Bills	DS003
Provincial Bonds	DS004

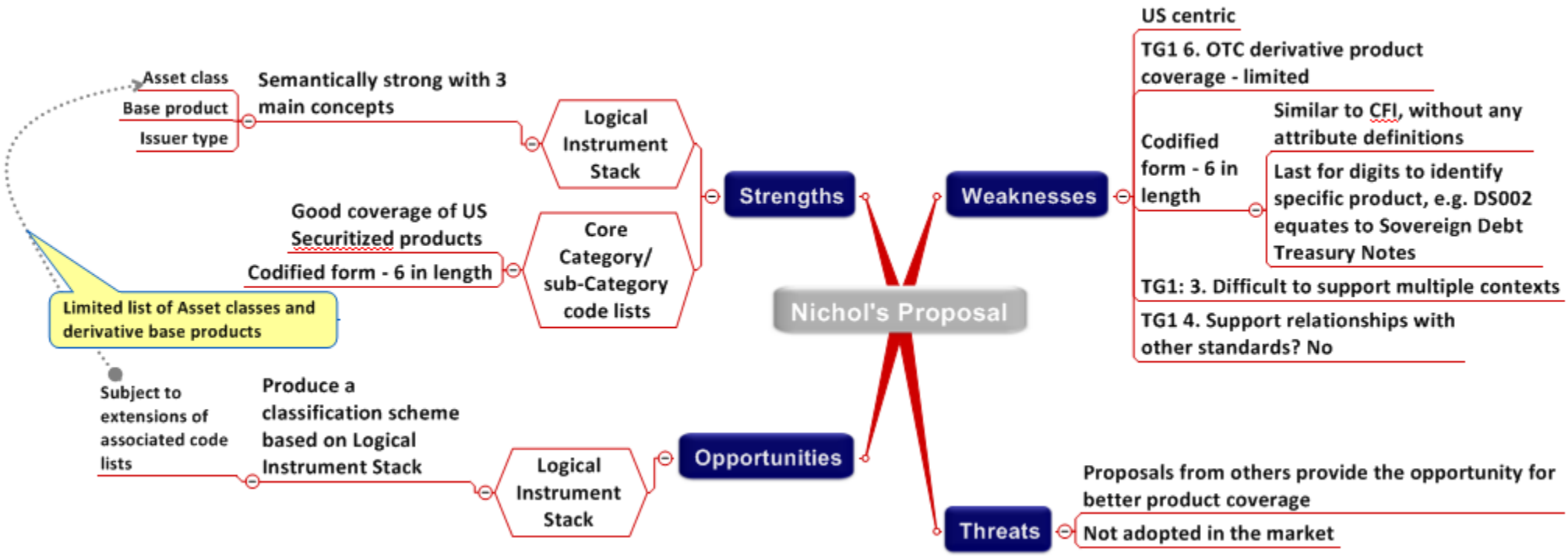
Derivative Flags [appended to each Core Code?]

Type	Code
Option	O
Warrant	W
Future	F
Forwar**D**	D
Swap	S

Index Flag(s)

Type	Code
Index	I
ETF	E

2.5.3 SWOT


Nichol's Proposal
Strengths
Logical Instrument Stack
Asset class
Base product
Issuer type
Semantically strong with 3 main concepts
Core Category/ sub-Category code lists
Good coverage of US Securitized products
Codified form - 6 in length
Limited list of Asset classes and derivative base products
Subject to extensions of associated code lists
Opportunities
Logical Instrument Stack
Produce a classification scheme based on Logical Instrument Stack
Weaknesses
US centric
TG1 6. OTC derivative product coverage - limited
Codified form - 6 in length
Similar to CFI, without any attribute definitions
Last for digits to identify specific product, e.g. DS002 equates to Sovereign Debt Treasury Notes
TG1: 3. Difficult to support multiple contexts
TG1 4. Support relationships with other standards? No
Threats
Proposals from others provide the opportunity for better product coverage
Not adopted in the market

3. Terms Matrix

There are a number of key terms that fall out of the classification analysis. From a product typology perspective, systems either group instrument by Asset class (the thing the contract is based on, Equity, Interest rate, etc…) or Contract (Base product) type (Security, Option, Forward, etc...) or both. In addition to these facets there is a requirement to identify the type of issuer (e.g. Corporate and Government). Colours are used to identify each facet (**Green – Asset class**, **Blue – Base product or contract type** and **Red – Issuer type**.

These three dimensions are documented and the in the Logical Instrument Stack, though the only source of a comprehensive list of entries can be found in the response to the EMIR Regulation on OTC Derivatives, CCPs and Trade Repositories Discussion Paper, Ref: ESMA/2012/95. (https://www.esma.europa.eu/sites/default/files/lms-response-esma-2012-95_0.pdf).

3.1 Logical Instrument Stack

The assessment of the Logical Instrument Stack has been brought to the front of this section as this model forms a good founding for the creation of a standard, nonetheless it requires more depth in the code lists to cover more complex products and Issuer types. The Structured product entry on the logical instrument stack diagram highlights the need to enhance any classification scheme, potentially adding a new dimension that could result in the need for cardinality to be added to the Base Product code list.

Key Term Analysis			**Logical Instrument Stack**			
Asset Class	**Base Product**	**Issuer Type**	**Asset class**	**Base Product**	**Structured**	**Issuer Type**
Cash	Cap/Floor	Asset Manager/ Fund Provider				
Credit	Exotic (multiple Base products)	Bank			Exotic (multiple Base products)	
Commodity	FRA	Charity	Commodity			Corporate
Debt	Forward	Corporate	Debt	Forward		
Equity	Future	Depositary Bank	Equity	Future		Government
Foreign Exchange	Loan	Government				
Hybrid (multiple Assets)	Option	Investment Trust		Option		
Rates	Security	Municipal	Interest Rates	Security		
	Spot	Partnership		Funds [Securities?]		
	Swap			Swap		
	Swaption			Indices [Rate products?]		
	Warrant					

3.2 ISO 10962 CFI:2001

Unlike the Instrument Logical Stack, the ISO standard's approach is more complex, Category and Group contain both Asset class and base contract (product) types. In some instances one needs to drill down into attributes to identify the contract type. It is not possible to identify the type of issuer, apart from Government using this standard.

Key Term Analysis			**ISO 10962**			
Asset Class	**Base Product**	**Issuer Type**	**Category**	**Group**	**Attribute 1**	**Attribute 2**
Cash	Cap/Floor	Asset Manager/ Fund Provider	E = Equities	U = Units (a Security and Investment Trust implied?)		
Credit	Exotic (multiple Base products)	Bank	D = Debt Instruments			
Commodity	FRA	Charity	R = Entitlements	W = Warrants S = Subscription rights (a security?)		
Debt	Forward	Corporate	O = Options		F = Forward	T = Government/ Treasury guarantee
Equity	Future	Depositary Bank	F = Futures			
Foreign Exchange	Loan	Government	T = Referential Instruments	C = Currencies *(Foreign Exchange)*		
Hybrid (multiple Assets)	Option	Investment Trust				
Rate	Security	Municipal Partnership		T = Commodities	S = Spot rate	
	Spot			R = Interest rates [Rate]		
	Swap			I = Indices [Rate]		
	Swaption			S = Credit Default Swaps		
	Warrant			M = Others (Miscellaneous)		
			M = Others			

3.3 FIX Classifications

The terms matrix analysis only focuses on the Trading Lifecycle as there is insufficient material available to examine the FIX aggregation taxonomies aimed at fulfilling the requirements of Dodd-Frank and EMIR. In addition, the ISDA Taxonomies provides a similar set of terms which will ensure that these requirements are catered for in this assessment.

The analysis of this classification shows that Product (460) contains Issuer type, Asset class and product type entries, similarly SecurityType(167) contains both Asset and Base Product entries.

It also identifies the need to drill down on the Contract (Base product) type to a sub-product level. For example Product (Tag 460) identifies that the product is a "Loan" whilst SecurityType (Tag 167) identifies the specific product type (Term Loan, Time Deposit).

Key Term Analysis			**FIX Trade Lifecycle**	
Asset Class	**Base Product**	**Issuer Type**	**Product(Tag 460)**	**SecurityType (Tag 167)**
Cash	Cap/Floor	Asset Manager/ Fund Provider	Agency *(need to add to Issuer Type?)*	CASH
Credit	Exotic (multiple Base products)	Bank	Corporate	CDS (Credit)
Commodity	FRA	Charity	Currency	IRS (Rates)
Debt	Forward	Corporate	Equity	FUT (Future)
Equity	Future	Depositary Bank	Government	FXFWD
Foreign Exchange	Loan	Government	Index	OPT (Option)
Hybrid (multiple Assets)	Option	Investment Trust	Loan	TERM, TD, etc… (Loan)
Rates	Security	Municipal	Mortgage (Debt, evidence for the need of sub-Asset)	WAR (Warrant)
	Spot	Partnership	Other	
	Swap		Financing (see SecurityType…)	
	Swaption		Financing (see SecurityType…)	
	Warrant			REPO (Loan)
				Forward

3.4 ISITC Reconciliation and Settlement

As with the FIX classification analysis the need to create sub classes under Asset class and base product is a must to be able to identify specific product type groups.

A couple of observations need to be considered, an FRN is identified as a corporate issuer, Governments issue FRNs. A MUNI (Municipal bond) is identified as being issued by a corporation (CORP) and not a city or other local government.

Key Term Analysis			ISITC Reconciliation and Settlement		
Asset Class	**Base Product**	**Issuer Type**	**SSI Security Type Code**	**Asset type**	**ISITC Classification code**
Cash	Cap/Floor	Asset Manager/ Fund Provider	CORP (Corporate)	GOVT	CS (Security)
Credit	Exotic (multiple Base products)	Bank	EQTY (Equity)		ETF (Security)
Commodity	FRA	Charity	GOVT (Government)	GOVT	MF (Security)
Debt	Forward	Corporate			WAR (Warrant)
Equity	Future	Depositary Bank		EQ (Equity)	FUT (Future)
Foreign Exchange	Loan	Government	Index		OPT (Option)
Hybrid (multiple Assets)	Option	Investment Trust	CORP (Corporate)	CORP (Corporate)	FRN (Security)
Rates	Security	Municipal	MTGE (Mortgage - Debt, evidence for the need of sub-Asset)	CORP (Corporate)	PP (Security)
	Spot	Partnership			BKL (Loan)
	Swap		CORP (Corporate)	CORP (Corporate)	MUNI (Municipal/Debt/Security)
	Swaption				
	Warrant				

3.5 ISDA Taxonomies

The ISDA taxonomies are based on Asset class as the top concept, this is broken down further, up to 3 in depth (via the use of the terms Base Product, sub-Product and transaction type. In the case of commodities it has been identified that this taxonomy requires the inclusion of the Settlement Type Feature to meet specific regulatory reporting requirements.

Key Term Analysis			ISDA Taxonomies				
Asset Class	**Base Product**	**Issuer Type**	**Asset Class**	**Base Product**	**sub-Product**	**Transaction Type**	**Settlement Type**
Cash	Cap/Floor	Asset Manager/ Fund Provider	Credit	Single Name (Swap) Swaptions	ABS, Corporate, Loans, Muni, Recovery CDS, Sovereign CDX, Corporate, iTraxx, Muni, Sovereign, Bespoke	CDS on CDO, AsiaCorporate, etc...	
Credit	Exotic (multiple Base products)	Bank	Commodities	*Metals* *Metals* *Energy*	*Precious* *Precious* *Oil*	Option Loan/Lease Swap	Cash Physical Cash
Commodity	FRA	Charity	Foreign Exchange	Spot, Forward, Vanilla Options, Simple Exotic, ...	Barrier or Binary/Digitals		
Debt	Forward	Corporate	Equity	Swap, CFD, Forward, Option	Single-name, Single Index or Basket		
Equity	Future	Depositary Bank	Interest Rate	FRA, Cap/Floor, Cross Currency, IR Swap, Option	Fixed - Float, Fixed - Fixed, Basis, Inflation, OIS Debt Options, Swaption		
Foreign Exchange	Loan	Government					
Hybrid	Option	Investment Trust					
Rates	Security	Municipal					
	Spot	Partnership					
	Swap						
	Swaption						
	Warrant						

4. Design rules, Governance, Delivery and Funding Considerations

This section assumes that a paperless option is to be adopted for the maintenance of a classification scheme and considerations are broken down under the following key headings:

- Design Rules
- Governance
- Delivery and Funding

4.1 Design Rules

Consideration needs to be given to the following:

- What external code list mechanism is appropriate to meet the requirements for the standard? This is examined, in the following section titled, “5. Representation”.
- Are the three dimensions (Asset class, Contract type and Issuer type) appropriate? Should and can a strict order of hierarchy be applied to these key concepts?
- What are the appropriate entries for each of these dimensions?
- Are sub class code lists required under each of the dimensions? Please refer to “Appendix B Key Facets” for proposed code-lists.
- With complex (Hybrid or Exotic products) and structured products comprising multiple assets or base products, should the underlyers be identified by the standard?
- Efforts should be made to ensure hierarchical depth of each dimension is no greater than two (Asset class, Asset sub-Class).
- All entries Facets (or terms in the hierarchy) should be mutually exclusive.
- Features (or code lists not in the hierarchical path) should not contain mixed content, more than one piece of information.
- What are the appropriate Features to be of use?
- Should there be a maximum number of Features per product groups/types?
- Should code list entries have hierarchical capabilities. Though not ideal, is there a need for a Feature (code list) to be subset of another?
- Can Facets also be a Features code list? For example, a structured product comprises of one or more base products and/or assets?
- All entries should contain an acronym, short name and a definition?
- Should cross referencing capabilities with other classifications be built into the scheme? The more synonyms and references to support, the more complex the development and maintenance becomes.
- Versioning (Major, minor and micro) to be provided on all terms? What are the criteria needed to support such versioning?

Answering the above questions can form the basis of the design rules guidelines.

4.2 Governance

In this instance a simple centralised model would be appropriate, jurisdiction specific requirements could result in a classification becoming a list of geopolitical product type. One on the failings of the last version of the CFI was the inclusion of US specific terminology.

Upon creation of the initial classification scheme the aim would be to provide a facility that would allow the users to challenge the data in the classification repository.

Guidelines will need to be defined that identifies what constitutes a major, minor or micro change and in the case of a major release this can be aligned with the frequency of industry participants. It would make sense, to make this annually and possibly aligned with the ISITC maintenance cycle. The creation of a Standards Evaluation Group (SEG) along the lines of that adopted by ISO 20022 may be appropriate. With roles clearly defined for the key industry participants (ANNA, FIX and ISITC) in the associated process.

The final component of the governance should be a notification mechanism of updates and releases. Consideration will be given to what form this should take.

4.3 Delivery and Funding

An online portal based on web technologies, where possible ISO standards and W3C recommendations should take precedence of any proprietary based solution.

Interactive functions should include Search, Challenge, full download and delta updates. Users should also be provided with interactive subscription for electronic transfer to load directly into applications, either delta or full download.

A cost recovery funding model should be appropriate, however users should be charged a premium for a Ad-hoc classification identification service.

Packaging the classification with unique instrument identifiers would also fall outside any cost recovery funding model.

5. Representation

A number of potential "external code list " standards that could be deployed to support the requirements of ISO 10962 (the CFI) are examined, these include:

5.1 Simple Knowledge Organization System (SKOS)	A Resource Description Framework (RDF) vocabulary for Thesauri, taxonomies, classification schemes. RDF is a general-purpose language for representing information on the world-wide web.
5.2 Statistical Data and Metadata Exchange (SDMX)	This standard, used for dissemination of statistical data, it has a set of constructs (namely HierarchicalCodelist & CodeList) which provides the capability to support hierarchical relationships, structured code lists and code lists.
5.3 OASIS Genericode	A standard for defining code lists (also known as enumerations or controlled vocabularies). Used by FpML for representing all external code lists, this includes the ISDA taxonomies.
5.4 The Digital Object Identifier/ Vocabulary Mapping Framework (DOI/VMF)	VMF is an extension of DOI® providing the capability to map between multiple classifications and identifiers, supports resource categories, versioning and party role concepts. An alternative to SKOS.
5.5 ISO 25964	A standard for supporting thesauri, similar to SKOS, though limited classification capabilities.
5.6 Spreadsheet Representation	Using a spreadsheet provides the user with the ability to present a classification in tabular form.
5.7 Dublin Core (ISO 15836)	Is a set of metadata terms from which is it possible to construct vocabularies which can be used to describe resources for the purposes of discovery.
5.8 Other Initiatives	EDM Council and XBRL initiatives.

Aspects considered include:

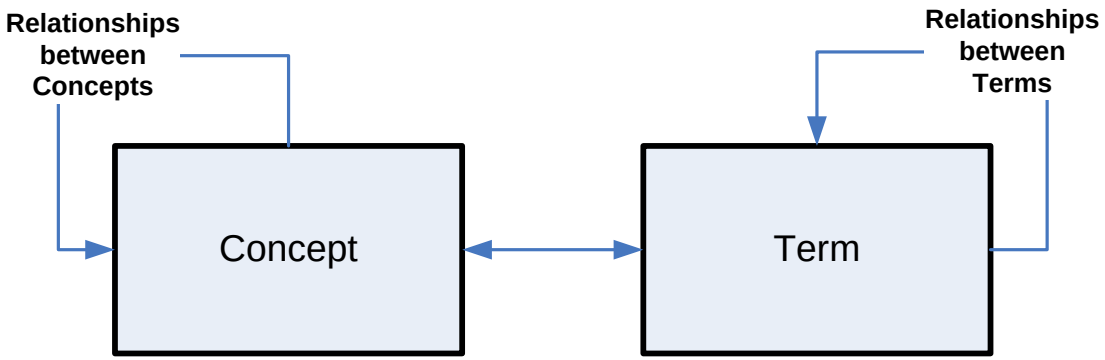
1. Incorporation pre-existing standards
2. Extensibility
3. Multiple business contexts
4. Support relationships and other standards LEI/ISIN/MIC/FISN
5. Level of granularity
6. OTC derivative products to meet regulatory requirements
7. Different schemes per asset class/Product groups (OTC derivative products)
8. Ease of use
9. Based on global standards (ISO, W3C etc...)
10. Multiple hierarchies capabilities

11. Supports codification
12. Versioning capabilities

5.1 Simple Knowledge Organization System (SKOS)

SKOS is an XML based standard that provides a flexible framework for representing hierarchical structures, code lists and relationship of terms. It is *Resource Description Framework (*RDF) vocabulary specifically for Thesauri, taxonomies, classifications. It provides the opportunity to develop a classification based on semantic web technologies. Please refer to Appendix A for visual and XML snippets of SKOS documents (see section 7.1 and 7.2 respectively).

Its poly hierarchical capabilities and extensibility means that it lends itself to supporting multiple business contexts and the depth of features that a classification standard would need. It can be used to incorporate pre-existing standards, though this comes with a word of warning, as it will highlight any flaws in them. In addition, it can be deployed to support other standards, to emphasise the capabilities of SKOS, a snippet of the ISO MIC in SKOS is provided (see section 7.3).



SKOS provides the ability identify term level relationships and even more granular and to reference specific entries within a code list.

It is capable of supporting multiple pieces of information such as codifications, short name, synonyms and term definitions.

Given that ISO 20022 messages are based on W3C XML Schema, there is precedence for the use of W3C recommendations forming the basis of ISO standards. SKOS XML is a W3C recommendation, therefore its adoption for forming the basis of an electronic version of the ISO 10962 is an acceptable option.

The SKOS comes with a versioning recommendation that supports major and minor changes to the individual concept code list level (i.e. Asset sub-class).

5.1.1 SKOS Traffic Light Assessment

SKOS Assessment	Rating (3 Good to 1 Poor)
1. Incorporation pre-existing standards	3
2. Extensibility	3
3. Multiple business contexts	3
4. Support relationships and other standards LEI/ISIN/MIC/FISN	3
5. Level of granularity	3
6. OTC derivative products to meet regulatory requirements	3
7. Different schemes per asset class/ product groups (OTC OTC derivative products)	3
8. Ease of use	3
9. Global Standard (ISO, W3C etc...)	3
10. Multiple hierarchies capabilities	3
11. Supports codification	3
12. Versioning capabilities	3
13. Tools supporting	2
Total	**38**

All in all, SKOS is a strong contender for filling the role of supporting a globally acceptable classification scheme. At present, the only weakness is the lack of competent visualisation tools. Given that it is a W3C XML based standard it should be easily incorporated into a web based portal.

5.2 Statistical Data and Metadata Exchange (SDMX)

SDMX is an ISO standard that has obtained global world-wide acceptance and is used for the dissemination of statistical data. The standard is being assessed as it contains a couple of standalone constructs (hierarchicalCodelist and codeList) capable of supporting classification schemes. Samples of SDMX documents have been supplied in Appendix A (RE: section 7.4 and 7.5).

Like SKOS, SDMX classification component can be used for representing hierarchical structures, code lists and relationship of terms, though unlike SKOS it has limited semantic modelling capabilities.

It has poly hierarchical capabilities that can support multiple business contexts, though it is not so flexible and extensible when compared SKOS.

It maybe possible to model other standards, such as the ISO MIC and FISN though its structure is more verbose than SKOS and it would be difficult to achieve this.

SDMX cannot be used to support a classification management system as code lists can only have one parent, which could result in the need to support multiple variants of the same code list to achieve the same capabilities as SKOS.

The standard provides the ability to add version control at the construct level (major and minor changes) as well as the facility to add valid from/to dates.

The SDMX standard also comes with a registry in which users can publish and maintain statistical models. However in its current form it is not possible to just register classifications or taxonomies by themselves. The registry upload mechanism assumes that they are part of a statistical model and to adhere to insertion criteria of a time measurement constraint[5] is required.

A final consideration is that there is a greater learning curve when compared to SKOS.

[5] The SDMX Schemata validation requires this.

5.2.1 SDMX Traffic Light Assessment

SDMX Assessment	Rating
1. Incorporation pre-existing standards	2
2. Extensibility	2
3. Multiple business contexts	2
4. Support relationships and other standards LEI/ISIN/MIC/FISN	2
5. Level of granularity	2
6. OTC derivative products to meet regulatory requirements	3
7. Different schemes per asset class/ product groups (OTC OTC derivative products)	3
8. Ease of use	2
9. Global Standard (ISO, W3C etc...)	3
10. Multiple hierarchies capabilities	3
11. Supports codification	3
12. Versioning capabilities	3
13. Tools supporting	2
Total	**32**

5.3 OASIS Genericode

Genericode is an OASIS standard that allows users to represent tabular data, such as those found in spreadsheets in an XML form. It is specifically designed for representing non-structured (non-hierarchical) code-lists. Each document is effectively a simple code list, nonetheless there are examples available where taxonomies, such as the ISDA OTC derivative products can be represented in a concatenated form. The FpML Product taxonomy code list is an example of this.

It is possible to support hierarchical code lists using a parent reference as a column reference, however a major consideration is that version control is only available at the document/code list level, which makes it not so granular as both SKOS and SDMX.

This analysis also examined the OASIS Context/Value Association (CVA) resources extension, used for associating particular/multiple Genericode code lists within XML documents (using XPath) and it can be confirmed that this recommendation is not designed to be applied to Genericode code lists themselves.

5.3.1 OASIS Traffic Light Assessment

OASIS Genericode Assessment	Rating
1. Incorporation pre-existing standards	1
2. Extensibility	2
3. Multiple business contexts	1
4. Support relationships and other standards LEI/ISIN/MIC/FISN	1
5. Level of granularity	2
6. OTC derivative products to meet regulatory requirements	3
7. Different schemes per asset class/ product groups (OTC OTC derivative products)	1
8. Ease of use	3
9. Global Standard (ISO, W3C etc...)	3
10. Multiple hierarchies capabilities	1
11. Supports codification	3
12. Versioning capabilities	2
13. Tools supporting	2
Total	**25**

5.4 Spreadsheet Representation

This has been considered as part of this assessment given that spreadsheets can provide the ability to represent information in an easy to understand visual and tabular form. A spreadsheet is used for the dissemination and maintenance of the ISO/MIC (http://www.iso15022.org/MIC/homepageMIC.htm). Nonetheless, one of the key requirements is the ability to support multiple business contexts, which potentially requires the ability to drill down multiple paths (Poly hierarchical) is difficult to achieve in a spreadsheet. There are other aspects to consider that are examined in the following comparisons table.

Spreadsheet	XML equivalent
Difficult to integrate with messaging architecture, applications and other initiatives.	Easy of integration with other standards initiative and messaging architecture. XML code binding tools are mature.
Easy to use and to visual the data in tabular form, though difficult to examine the relationships between information in a graphical form.	XML design tools are mature, though visual/graphical tools are not so.
Version control at the document level, not easy to implement within the document	Version control at construct/concept level
Limited relationships/association capabilities.	Capacity to identify relationships/association between terms beyond tabular (rows) capabilities.
Difficult to support poly hierarchical relationships	Possible to support multiple poly hierarchical relationships

5.4.1 Spreadsheet Traffic Light Assessment

Spreadsheet Assessment	Rating
1. Incorporation pre-existing standards	1
2. Extensibility	1
3. Multiple business contexts	1
4. Support relationships and other standards LEI/ISIN/MIC/FISN	2
5. Level of granularity	2
6. OTC derivative products to meet regulatory requirements	3
7. Different schemes per asset class/ product groups (OTC OTC derivative products)	1
8. Ease of use	3
9. Global Standard (ISO, W3C etc...)	1
10. Multiple hierarchies capabilities	1
11. Supports codification	3
12. Versioning capabilities	1
13. Tools supporting	3
Total	**23**

5.5 The Digital Object Identifier/Vocabulary Mapping Framework (DOI/VMF)

The Vocabulary Mapping Framework (VMF) is an alternative to SKOS, it seems to provide all the facilities that SKOS offers, though one needs to become an expert in the VMF and semantic concepts/modelling, a learning curve that is not present with SKOS. This is an important consideration given that this could affect the time to market, especially given that developers in the DOI/VMF space tend not to be open with providing assistance.

An open source registry application is also available, however it is designed for a fully fledged federated model to support the like of the Digital Object Identifier for registration of Books, authors, contributors and the management of ISBN. The DOI is an ISO standard (ISO 26324), however the VMF would be required to support classifications is not, therefore given that SKOS is a viable alternative, no samples nor quantitative assessment has been undertaken into this offering.

5.6 ISO 25964

ISO 25964 was examined as ISO expects "Best Endeavours" to incorporate ISO standards in other ISO standards. Like SKOS it can be used to define thesauri, though it does not support classifications. It lacks the capability to drill down or up the relationships between terms that SKOS provides. The standard does not have the capability to link entries in code lists with other terms or entries in code lists. Exact, near and close match is not available in ISO 25964, though it does provide "equivalence" as one would expect for a standard designed for supporting Thesauri. Also there is the suspicion that this standard also has limited traction given that its submitter has put effort into publishing a SKOS mapping recommendation.

To summarize, ISO 25964 is a standard for the representation of thesauri and provides only a sub-set of the functionality required to support classification schemes, therefore no samples nor a traffic light assessment has not been provided.

5.7 Dublin Core (ISO 15836)

Dublin Core (DC) is an ISO standard (15836) and is considered within this report from an ISO purity perspective. It is a registration of metadata terms comprising a selection of properties which can be used to construct vocabularies. The focus of Dublin Core is cataloguing published material such as books, videos, etc… There is no evidence of it being deployed outside this context and no equivalent vocabulary to SKOS exists in the registry, meaning that one would have to be constructed.

Given the tight deadline for the working group to identify the appropriate solution by Q2 2013, any ventures into extending a standard beyond its original scope is extremely risky, especially when SKOS meets the requirements and is constructed by a consortium of industry experts.

SKOS is a widely accepted horizontal technology standard from the W3C that, similar to our use of W3C XML Schema for ISO 20022 and a myriad of other ISO standards, provides TC68 with the premier industry standard for knowledge representation. SKOS will provide an optimal solution for managing disparate vocabularies and taxonomies.

5.8 Other considerations

Like the DOI/VMF and ISO 25964, XBRL was originally on the list of potential options for being used to support a global classification scheme. It has ability to create basic meaningful relationships between terms (semantics) but not at the code list entry level. It does not support poly-hierarchical structures and versioning of code list content. Finally its geo-political governance doesn't lend itself to supporting a global standard.

From an ontology perspective the EDM Council and its members has put a lot of effort into the creation of semantic based conceptual and operational models. Information in these models could be useful it defining the content of code lists and relationships between terms, none of the models can be used directly to construct a scheme. Nonetheless, the EDM Council is working with the Object Management Group(OMG) to assist in "aligning all the moving parts[6]" The OMG's area of expertise is in the domain of model driven architecture and in particular solutions based around Unified Modelling Language (UML). Efforts by the EDM Council and OMG is focusing on how UML could be deployed to manage semantics, this includes creating UML2 Profiles for the likes of SKOS to assist in the visualization of ontological based information and thus migrate this into a model driven environment. Beyond fulfilling the gap in the market of otology visualisation tools, one has to question what are the advantages of adding an additional layer on top of RDF vocabularies, especially when UML is not design to manage relationship at the attribute level, let alone relationships between entries within code lists.

[6] EDM Council quote.

6. Recommendations and conclusions

This report has identified the scope and requirements of the various classification schemes and document their strengths, weaknesses, opportunities and threats.

Most of the classifications are simply a list of product types lacking any real understanding semantic. In most instances there are limited use/understanding of the specific Features for each product type that could result in the creation of a classification scheme. It is not uncommon to find Asset class and contract type information in a single code list. The ISO CFI Category, for example, contains an abbreviation for Equities (which the industry would recognise as being an asset class), in the same list that contains entries for Options and Futures (Base product or contract types). With an Equity Future the user cannot select both, so a decision has to be made regarding which bucket to put the instrument in, and without any clear defined rules, financial products can easily be misclassified. Where products are not adequately supported by the classification its not uncommon the classify them based on how they are traded in market.

What did become obvious was that most classifications required the capability to identify one or more of the three distinct facets, two relating to the financial product itself and another contextual to identify the type of issuer. These dimensions, Asset class, Contract type and Issuer type were clearly shown in the Logical Instrument Stack.

All classification schemes have been designed to support one specific requirement and lack granularity (in the form of sufficient Features) to support risk processes. Ideally, any classification scheme should endeavour to provide to ability for users to drill down specific product type as well as support broad product groups required for regulatory reporting.

To retain the status quo and to be able to replicate the requirements of existing popular classification (such as the ISITC, FIX and ISDA schemes, a pool of Features (attributes) will need used in conjunction with the three facets to be drill down to specific products of interest. The classification should be built on a repeatable structure, comprising an abbreviated form (codification), short name, definition and the ability to multiple relationships (parent, child, synonyms, etc…)

From a governance perspective, to avoid jurisdiction specific flavours appearing and given the relatively low volume of requests, when compared to the LEI, a centralised operating model would be appropriate. This could be achieved using web based and semantic web technologies.

Of all the standards capable of representing code lists, Simple Knowledge Organization System (SKOS) came out on top from a quantitative assessment perspective, with there being a precedence for using of W3C standards forming the basis of ISO standards and given the simplicity of which it can be used to create the replacement of the current ISO standard it is the frontrunner.

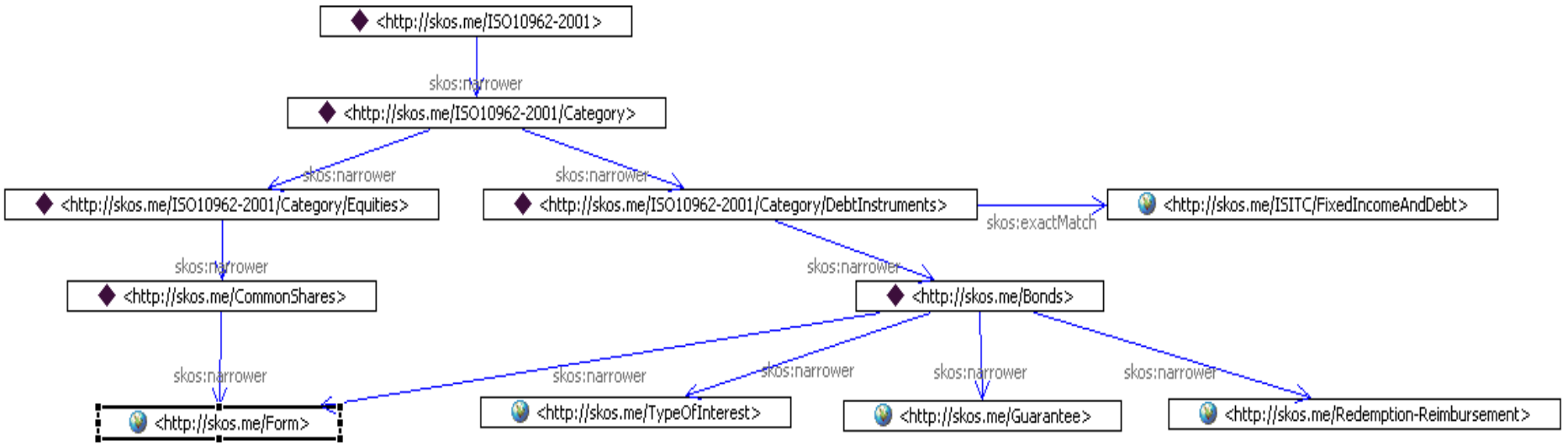
6.1 Next steps

6.1.1: A meeting of interested parties should be arranged to examine the material in this report, with the aim of agreeing on a definitive set of recommendations and requirements.

6.1.2: Simultaneously, the creation of a portal prototype, as discussed at the ISO CFI Working Group, should be initiated.

7. Appendix – A. Document Samples

7.1 SKOS Visual Representation



7.2 SKOS XML Snippet

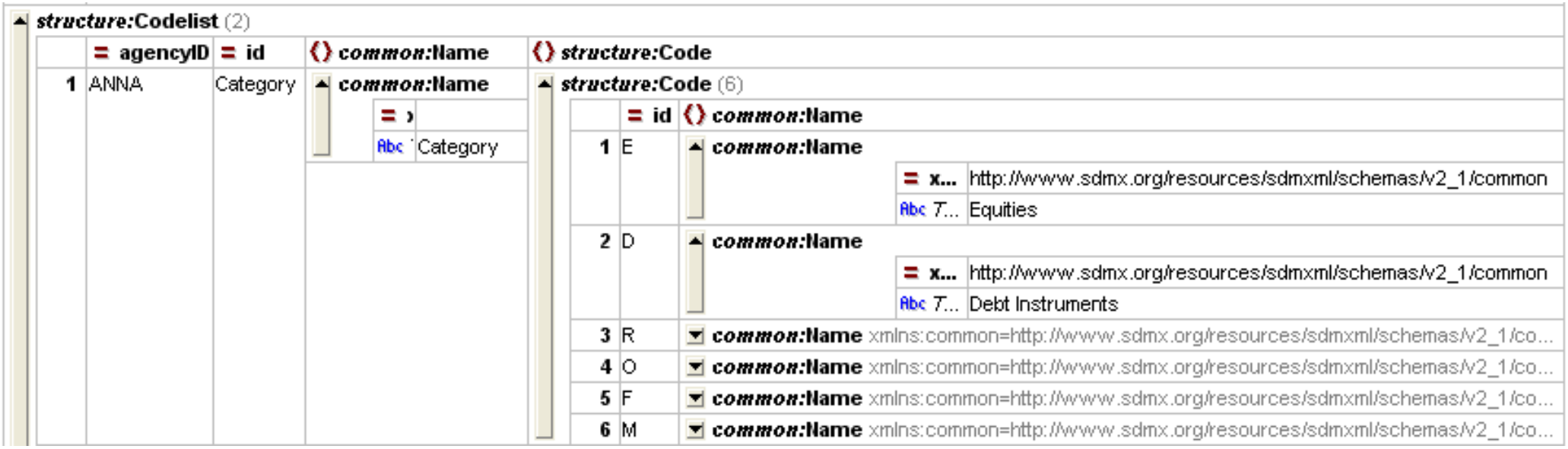
```
<skos:Concept rdf:about="http://skos.me/ISO10962-2001/Category">
<skos:narrower rdf:resource="http://skos.me/ISO10962-2001/Category/Equities"/>
<skos:narrower rdf:resource="http://skos.me/ISO10962-2001/Category/DebtInstruments"/>
<skos:narrower rdf:resource="http://skos.me/ISO10962-2001/Category/Entitlements-Rights"/>
<skos:narrower rdf:resource="http://skos.me/ISO10962-2001/Category/Options"/>
<skos:narrower rdf:resource="http://skos.me/ISO10962-2001/Category/Futures"/>
<skos:narrower rdf:resource="http://skos.me/ISO10962-2001/Category/Others-Miscellaneous"/>
</skos:Concept>
<skos:Concept rdf:about="http://skos.me/ISO10962-2001/Category/DebtInstruments">
<skos:symbol>D</skos:symbol>
<skos:exactMatch rdf:resource="http://skos.me/ISITC/FixedIncomeAndDebt"/>
</skos:Concept>
<skos:Concept rdf:about="http://skos.me/ISO10962-2001/Category/DebtInstruments">
<skos:narrower rdf:resource="http://skos.me/Bonds"/>
<skos:symbol>DB</skos:symbol>
</skos:Concept>
<skos:Concept rdf:about="http://skos.me/Bonds">
<skos:narrower rdf:resource="http://skos.me/TypeOfInterest"/>
<skos:narrower rdf:resource="http://skos.me/Guarantee"/>
<skos:narrower rdf:resource="http://skos.me/Redemption-Reimbursement"/>
<skos:narrower rdf:resource="http://skos.me/Form"/>
</skos:Concept>
</rdf:RDF>
```

7.3 ISO MIC in SKOS

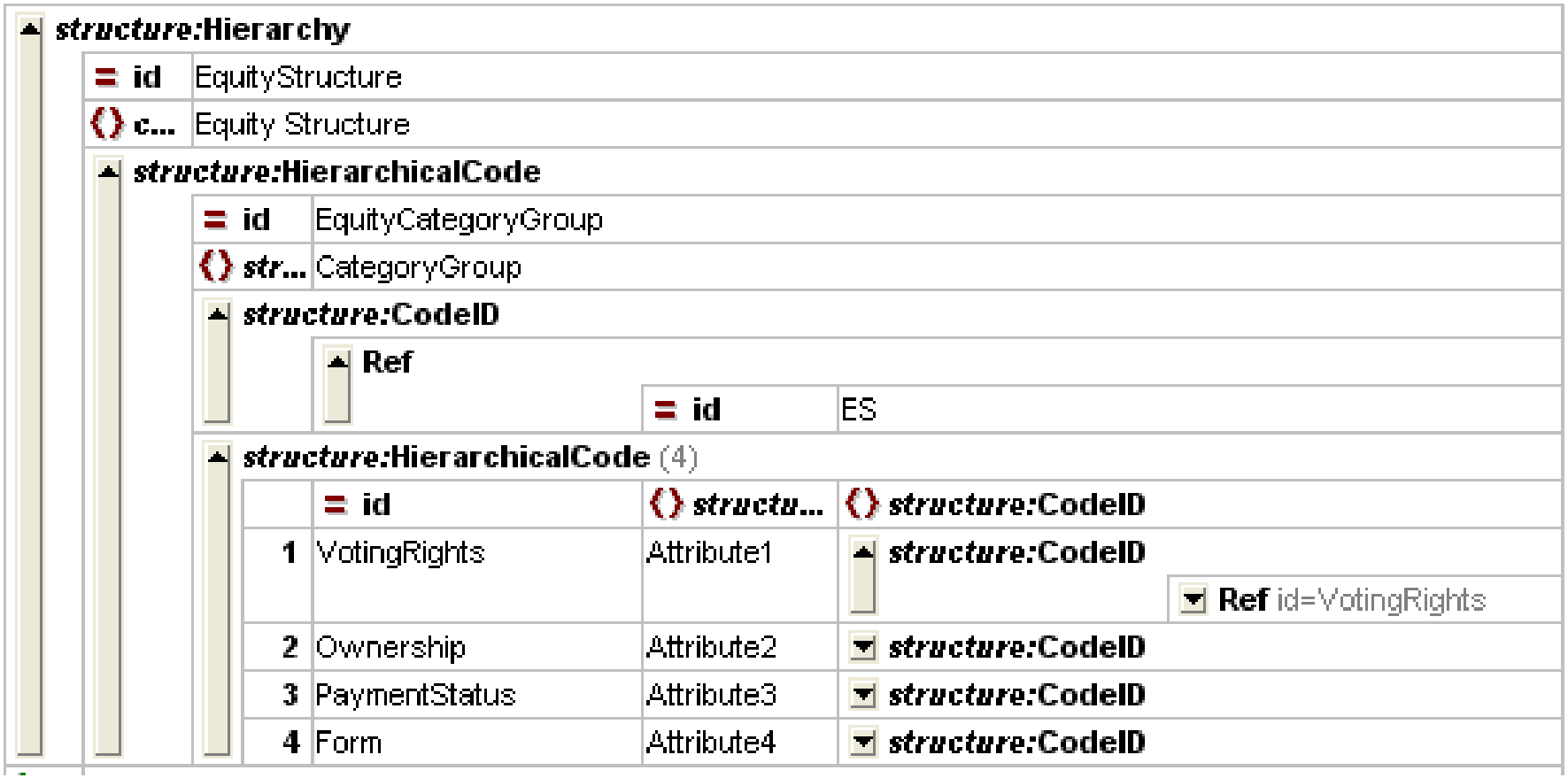
skos:Concept (4)

	= rdf:about	skos:narrower	skos:p	skos:definition	skos:related
1	http://skos.me/ISO 10383	**skos:narrower** (3) 1 http://skos.me/XNYS 2 http://skos.me/XNLI 3 http://skos.me/XLON			
2	http://skos.me/XNYS		XNYS	NEW YORK STOCK EXCHANGE INC. Since: Before June 2005"	**skos:related** (2) 1 http://skos.me/ISOMIC/Status/Active 2 http://skos.me/City/NewYork
3	http://skos.me/XNLI		XNLI	NYSE LIFFE Since: September 2008	**skos:related** (2) 1 http://skos.me/ISOMIC/Status/Active 2 http://skos.me/City/NewYork
4	http://skos.me/XLON		XLON	LONDON STOCK EXCHANGE Since: June 2005	**skos:related** (2) 1 http://skos.me/ISOMIC/Status/Active 2 http://skos.me/City/London

7.4 CodeList Construct



7.5 HierarchicalCodelist



7.6 OASIS Genericode

ColumnSet

Column (3)

	= Id	= Use	{} ShortName	{} Data
1	Code	required	Code	**Data** Type=token
2	Source	optional	Source	**Data** Type=string
3	Description	optional	Description	**Data** Type=string

Key Id=PrimaryKey

SimpleCodeList

```
<SimpleCodeList>
- <Row>
  - <Value>
      <SimpleValue>InterestRate:IRSwap:FixedFloat</SimpleValue>
    </Value>
  - <Value>
      <SimpleValue>ISDA</SimpleValue>
    </Value>
  - <Value>
      <SimpleValue />
    </Value>
  </Row>
```

8. Appendix B. Key Facets

Key Term Analysis		
Asset Class	**Base Product**	**Issuer Type**
Cash	Cap/Floor	Asset Manager/ Fund Provider
Credit	Exotic (multiple Base products)	Bank
Commodity	FRA	Charity
Debt	Forward	Corporate
Equity	Future	Depositary Bank
Foreign Exchange	Loan	Government
Hybrid	Option	Investment Trust
Rates	Security	Municipal
	Spot	Partnership
	Swap	
	Swaption	
	Warrant	

9. Appendix C. Constructing a classification

The following section has been taken from the publication, "Financial Product Classifications" by Martin Sexton, and provides an overview into composing a classification scheme.

2. How are classifications constructed?

There are a number of aspects to consider when developing a classification. If one searches the internet, there is a lot of material discussing both the Aristotelian and Dewey Decimal approaches to classifications. However this is not surprisingly the best place to start. The Dewey Decimal scheme was widely adopted for classifying library books and highlights the opportunity to represent a classification in both of human readable form as well as a numeric or codification equivalent. The importance of the Dewey Decimal system will become apparent later in this publication.

Composition of a classification

A classification comprises primarily Facets and Features. With financial based classifications these are mostly code list based. Facets imply a strict mutually exclusive path and, if the node is present, it is mandatory. Facets are "clearly defined, mutually exclusive, and collectively exhaustive aspects, properties, or characteristics of a class or specific subject.[7]"

The ISO Classification of Financial Instruments (ISO 10962 CFI) provides a good example of the use of Facets in the form of the top level "Category" term and its sub category term, "Group", both mandatory, if present. Each Category is mutually exclusive and each Category has a selection of mutually exclusive groups. The Group and Features are on the other hand are optional. Nonetheless their presence provides the opportunity to narrow down to an explicit product type. Using the ISO CFI as the example, each Group has up to 4 Features (or attributes as they are called in the standard).

It may be appropriate to define a large pool of Features from which a small subset is used to define a classification itself. The existence of this collection of terms also has the advantage of enabling applications that require more detail to dip into the pool and extract their specific requirements.

Some classifications deploy enumerated code lists as the case of the ISO CFI whilst other such as the ISDA OTC Derivative products taxonomies are human readable.

Features themselves can be categorised too, as either definitive or informative. Something definitive about a financial product, is a thing that is clearly defined in terms of a contractual definition, such as the holder of the product has rights to receive income or voting rights etc…, whilst an informative feature is subject to interpretation and could be derived by a combination of characteristics. This type of Feature normally results in a lot of theoretical debate at the conceptual level, but from an operational perspective tends to be more clear-cut. A logical model for example, may

[7] Taylor, A. G. (1992). Introduction to Cataloging and Classification. 8th edition Englewood, Colorado: Libraries Unlimited.

group instruments by Facet, e.g. Base product, due to the need to be able to work within the constraints of existing technologies, architectures and applications.

The important thing to learn from this is that care has to be taken in designing any classification and clear allocation rules must be defined, especially when informative Characteristics are part of the hierarchical structure.

What style of hierarchy structure is appropriate?

There are a number of ways of defining classification hierarchy, either strict or poly. Another possibility is a combination of the two, a multi-dimensional scheme, which I call “matrix” approach. An example of this can be found in the classification based on Asset class and Base product.

Strict Hierarchy

Adopting a strict hierarchy approach means that only a single path can be taken to reach an end node.

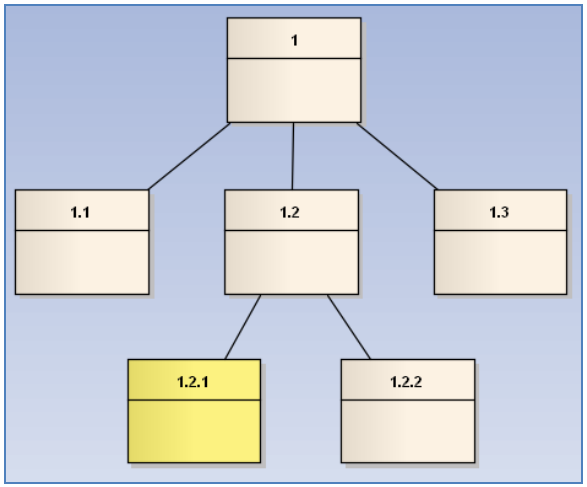


Figure 1. Strict Hierarchy Structure

Poly Hierarchical

The alternative to a strict hierarchical method is a poly hierarchical approach, in which an end node can be reached by multiple paths. Such an approach supports multiple business contexts, though there is a risk of ambiguity unless appropriate rules are put in place.

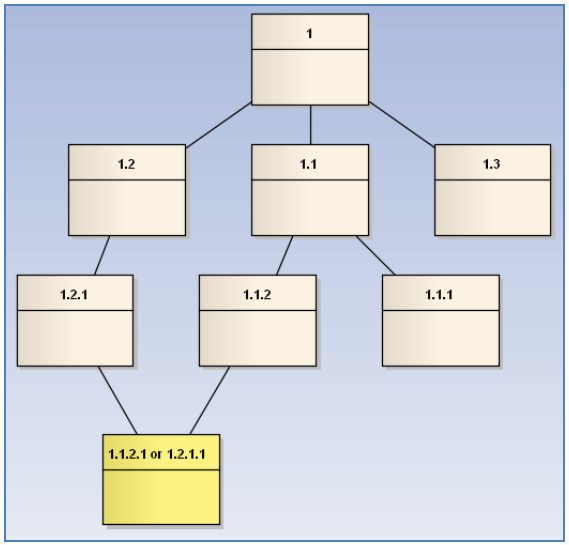


Figure 2. Poly-hierarchical Structure