CLASSIFICATION

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10:00-12:00

Classification

CONTEXT & ISO 12006-2 20

Context: 25 years

- CAWS was published 25 years ago, Uniclass 15
  - Tension has been building
    - Recessions
    - Earthquakes
    - Classification systems
- The longer the interval, the bigger the event!

CI/SfB

- CI/SfB *Construction indexing manual* 1976
  - Derived from Swedish SfB (Samarbetskomittén för Byggnadsfrågor), 1950, and UDC (Universal Decimal Classification)
  - First implemented in UK in 1961 as SfB/UDC *Building filing manual*
  - Five tables:
    - Table 0 Physical environment, e.g. **413** *Hospitals – mental, psychiatric*
    - Table 1 Elements, e.g. **(21.1)** *Walls, external walls – loadbearing*
    - Table 2 Constructions, forms, e.g. **F** *Brickwork, bricks*
    - Table 3 Materials, e.g. **g2** *Fired clay, vitrified clay, ceramics*
    - Table 4 Activities, requirements, e.g. **(P3)** *Sound, quiet – transfer*
- Defunct but still in use, e.g. product literature (to BS 4940-1-3:1994), NL/SfB

Other precursors to Uniclass

- CAWS 1987 *Common arrangement of work sections*
  - Some connections to CI/SfB Table 2, e.g. **F** *Blockwork, brickwork*
  - But not, e.g. **S** *Rigid tile work* – best treated as completely new
- CESMM3 (*Civil Engineering Standard Method of Measurement*) edition 3, ICE, 1991
- EPIC (*European Product Information Co-operation*) – defunct – also used for OmniClass Table 23
- CIB Master List 1993 (Conseil International du Bâtiment ...) (first published 1964)
- ISO TR 14177:1994 *Classification of information in the construction industry* – superseded by ISO 12006-2:2001

Uniclass replacing CI/SfB

- The **SfB Agency** in the UK decided (sometime before 1997) that CI/SfB should be replaced by a 'unified classification' (i.e. Uniclass) rather than revised:
  - Widespread take-up of CAWS by NBS, SMM7 and NES indicated that CI/SfB was not the preferred approach to classification of work sections in the UK.
  - CI/SfB did not reflect changes in the industry, e.g. new building types, new performance issues.
  - CI/SfB notation (brackets, upper case and lower case, etc) is difficult to understand and computerise.
  - Limitations of SfB in terms of computerisation led several countries to develop new approaches to classification, so SfB was no longer being used internationally.

Legacy systems in Uniclass 1997

Uniclass table		Table code	Sources
Form of information		A	-
Subject disciplines		B	-
Management		C	London Classification of Business Studies and RIBA Plan of Work
Facilities		D	CI/SfB Table 0
Construction entities		E	-
Spaces		F	ISO 9836:1992 and RICS and ISVA Code of measuring practice
Elements	Buildings	G	-
	Civil engineering works	H	-
Work sections	Buildings	J	CAWS
	Civil engineering works	K	CESMM3
Construction products		L	EPIC
Construction aids		M	-
Properties and characteristics		N	CIB Master List
Materials		P	-
Universal Decimal Classification		Q	UDC

Revisions to Uniclass 1997

- Table J revised 2008 for engineering services, following launch of NBS ES in 2004
- Uniclass Working Group established 2006
- Elements – for CAD layering & costing – were first on the agenda – always problematic – quick fix
  - Elements vs systems – **discussed later**
- RIBAE/NBS commissioned by CPI to produce first tranche of 'unified' tables by Easter 2012
  - Work sections, elements, systems and products tables in draft – more on this **later**
- Uniclass 2012 to be a dynamic classification system
  - Moderators needed

Non-Uniclass in the UK

- BCIS & RICS – elements classifications
  - BCIS Standard form of cost analysis (SFCA) 2008, e.g. **5C3** *Chemical and industrial waste disposal* – first edition 1961
  - RICS New rules of measurement (NRM) 1, e.g. **05 10 10** *Other transport systems*
  - NRM 2 & revised NRM 1 due in April 2012; NRM 3 due later in 2012 – life cycle costing tools
- UK *Standard Industrial Classification of Economic Activities* (SIC 2007), e.g. **23320** *Bricks made of clay*
- The Town and Country Planning (Use Classes) Order 1987 Schedule, e.g. **Class D2** *Assembly and leisure*

Some overseas classifications: 1

- Aligned to ISO 12006-2:2001
  - Sweden: BSAB 96 – current version 2005
  - Denmark: DBK 2006
  - Norway: NS 3451:2009 *Table of building elements* – first published 1988
  - North America: OmniClass 2011 – legacy systems include:
    - UniFormat (elements) – Table 21
    - MasterFormat (work sections) – Table 22 – 1995 edition replaced by 2004/2011
    - EPIC (products) – Table 23
- Finland: Talo 2000 – re-published 2010
- New Zealand: CBI 2009 – first published 1997

Some overseas classifications: 2

- WIPO Nice and Locarno Classifications
- UN *International Standard Industrial Classification* (ISIC Rev. 4), e.g. **F410** *Construction of buildings*
- UN *Standard Products and Services Code*, e.g. **30131607** *Clay bricks*
- EU *Common Procurement Vocabulary* (CPV), e.g. **44111100-2** *Bricks*
- EU electro-technical products: ETIM 4.0, e.g. **EC002579** *Luminaire for recessed and surface mounting*

BIM 1: Object names

- Configurable library object names, e.g. NBS *Create*
- Preconfigured library object names, e.g. NBL, Revit Architecture Families, BRE Green guide to specification
  - One for each variant, e.g. **Basic Wall:nbl_Ext_CemRdr-Blk-Cavity-CemBnddPbrd-TmbrFrmInsul-MtlFrm-GypPlstrbrd:197170**
  - Standard variants only – overwhelming otherwise
- Project object names – *could* embody the agreed project classification – variants easily dealt with, e.g. type A
- Proprietary object names – *could* use EANs for barcoding & beyond, e.g. 5036335013694
- Names used in classification tables are of course **generic**
- BS 8451-1 in draft – seeks to offer guidance on all this
- See LinkedIn thread too

BIM 2: IDs & properties

- Object GUIDs (globally unique identifiers)
  - The primary key of database tables
  - 32 character hexadecimal string in 5 groups, e.g. 3F2504E0-4F89-11D3-9A0C-0305E82C3301
  - Can be shorter
- Object properties, *including* classification (e.g. IfcClassificationReference)
  - If you change the classification you don't change the object
  - The object can have multiple classifications, but not multiple thickness, colour etc in its property set (see IfcPropertySet)
- Layering (coded using elements perhaps) becoming passé with object-based modelling?

Revision of ISO 1200-6-2

- Being reviewed by the ISO/TC 59/SC 13/WG 2 Task force – first meeting held in December 2011
- John is the UK expert, reporting to BSI committee B/555
- Four issues, so far:
  - The standard does not offer a single definitive framework for classification
  - The sequence of tables does not correlate very well to the project sequence
  - A number of objects do not have tables at all
  - We need tables that classify objects by their composition?
- Any changes made to the ISO should of course be reflected in Uniclass (and vice versa, ideally)
- Framework should facilitate mapping between compliant Tables internationally

Which framework?

Section 3	Section 4 Table 1	Annex A
3.3a Construction result		
Construction entity	Construction entity – form	A.1 Construction entities by form
	Construction entity – function or user activity	A.2 Construction entities by function or user activity
Construction complex	Construction complex	A.3 Construction complexes
Space	Space – degree of enclosure	A.4 Spaces by degree of enclosure
	Space – function or user activity	A.5 Spaces by function or user activity
Construction entity part	Construction entity part	-
-	-	A.6 Facilities
Element	Element	A.7 Elements
Designed element	Designed element	A.8 Designed elements
Work result	Work result	A.9 Work results
3.3b Construction process		
Management process	Management process	A.10 Management processes
Work process	Work process	-
Construction entity lifecycle stage	Construction entity lifecycle stage	A.11 Construction entity lifecycle stages
Project stage	Project stage	A.12 Project stages
3.3c Construction resource		
Construction product	Construction product	A.13 Construction products
Construction aid	Construction aid	A.14 Construction aids
Construction agent	Construction agent	A.15 Construction agents
Construction information	Construction information	A.16 Construction information
3.3d Property/ characteristic	Property/ characteristic	A.17 Properties and characteristics

Project sequence

RIBA Plan of Work		ISO 12006-2						
		Construction result					Construction resource	
		A.3	A.1/A.2	A.4/A.5	A.7/A.8	A.9	A.13	A.14
		Construction complex	Construction entity	Space	Element	Work result (traditional)	Construction product	Construction aid
A	Appraisal							
B	Design brief							
C	Concept							
D	Design development							
E	Technical design							
F	Production information							
G	Tender documentation							
H	Tender action							
J	Mobilisation							
K	Construction to Practical completion							
L	Post Practical completion							

Unclassified objects

Documents and management

- Work sections: A.9.
  - Work section structure .
- Management: A.10.
- Phases: A.11, A.12.
- Disciplines: A.15.
- Roles.
- Form of information: A.16.
- Exchange of information.

Physical objects

- Regions.
- Districts.
- Infrastructure.
- Sites (i.e. facilities or complexes): A.3.
- Buildings, landscape and other entities: A.1, A.2.
- Activities.
- Spaces: A.4, A.5.
- Elements: A.7.
- Systems (= designed elements): A.8.
- Products: A.13.
- Materials.
- Properties and characteristics: A.17.
- Services – including 'soft' FM.
- Aids – design, documentation, construction, operation and maintenance etc: A.14.

By general composition

Sub-elements: Cavity external wall element

- External finish
- External coating
- External coating accessory
- External skin
- Cavity
- Internal skin
- Internal coating accessory
- Internal coating
- Internal finish

- Each ‘solution’ is a system – but solutions not identified

Sub-systems: Board suspended ceiling system

- Suspension grid
- Suspension grid fasteners
- Insulation
- Barriers in ceiling void:
  - Fire barriers
  - Acoustic barriers
  - Plenum barriers
- Linings:
  - Inner layers
  - Face layer
  - Fasteners
- Joint treatment
- System accessories

- Each ‘solution’ is a product – but solutions not identified

By technical composition

Stud partition system

- Studs: [...]

Aluminium

Hardwood

Mild steel

Softwood

Stainless steel

- Facing A: [...]

Medium density fibreboard

Particle board

Plasterboard

- Facing B: [...]

Medium density fibreboard

Particle board

Plasterboard

- Fill: [...]

Glass fibre

Mineral wool

Polyurethane

Rockwool

- Permutations of this configurable clause:
  - 5 x 3 x 3 x 4 = 180
- Preconfigured partition systems in BRE *Green guide to specification*: 10 (3 glazed)
- The specification – not the classification – maps at **technical** level, e.g. systems to products – see NBS *Create* for example

BRE Green guide extract

	Element number	Summary rating
Galvanised steel jumbo stud, plasterboard, paint	809760012	A
Galvanised steel stud, plasterboard, paint	809760002	A
Hardwood veneered MDF framed glazed partitioning, double glazed	809760009	A
Softwood framed single glazed partition, safety glass	809760001	A+
Softwood framed, double glazed partition, safety glass	809760010	A
Timber cassette internal wall panel with plywood (softwood) sheathing, plasterboard and paint	809760054	A
Timber stud, OSB/3 facing, paint	809760025	A+
Timber stud, plasterboard, paint	809760003	A+
Timber stud, plywood (softwood), unpainted	809760024	A+
Timber studwork, t&g softwood boarding, gloss paint	809760004	A+

Classification

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Overview

- Called up in BS 1192:2007 *Collaborative production of architectural, engineering and construction information – Code of practice*
  - In turn called up in *BIM: Management for value, cost & carbon improvement*, March 2011 – Government mandate
- **But** not unified – a bag of unrelated tables. Problems include:
  - Scope: Architecture/landscape, civil, process engineering
  - Coding: Numeric, alpha-numeric (J and K), limit-of-ten
  - Depth: From 2 (K) to 7 levels (D, L and M)
  - Object placement: Lowest level (J and K), any of 2 to 5 levels (the rest)
  - Granularity: Scale of lowest objects can differ markedly, e.g. Table D, oil refineries (**D165 3**) and signal boxes (**D116 1**)
  - Congruence: None, so mapping difficult

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Elements	Buildings	G	-
	Civil engineering works	H	-
Work sections	Buildings	J	CAWS
	Civil engineering works	K	CESMM3
Construction products		L	EPIC
Construction aids		M	-
Properties and characteristics		N	CIB Master List
Materials		P	-
Universal Decimal Classification		Q	UDC

Scope

Uniclass Table		Table code	Architecture & landscape	Civil engineering	Process engineering
Form of information		A	•	•	•
Subject disciplines		B	••	•	
Management		C	•	•	•
Facilities		D	•	•	•
Construction entities		E	••	•	
Spaces		F	•		
Elements	Buildings	G	••	•	
	Civil engineering works	H	•	••	
Work sections	Buildings	J	••	•	
	Civil engineering works	K	•	••	
Construction products		L	••	•	
Construction aids		M	••	•	•
Properties and characteristics		N	•	•	•
Materials		P	•	•	•
Universal Decimal Classification		Q	•	•	•
Computer aided draughting		Z	•	•	•

Coding, depth & placement

Uniclass Table		Level							Example at lowest level
			1	2	3	4	5	6	7	
Form of information		A	9	8	3	-	-	-	Magnetic tape
Subject disciplines		B	9	1	6	2	-	-	Public inquiries, appeals
Management		C	3	4	2	1	1	-	Local authority architects
Facilities		D	5	6	7	1	2	3	Solaria
Construction entities		E	5	1	2	3	-	-	Concrete girder bridges with no pre-stressing
Spaces		F	1	3	6	1	-	-	First floor
Elements	Buildings	G	5	2	4	2	-	-	Extract ventilation
	Civil engineering works	H	4	2	3	2	-	-	Roof slabs
Work sections	Buildings	J	**M**	6	0	-	-	-	Painting/Clear finishing
	Civil engineering works	K	**W**	-	-	-	-	-	Waterproofing
Construction products		L	6	6	1	3	13	1	Stained glass
Construction aids		M	9	2	3	3	1	1	Traffic lights
Properties and characteristics		N	3	2	2	4	1	-	Flame impingement
Materials		P	4	1	4	1	-	-	Electroplated steel
Universal Decimal Classification		Q	(4	3	7	.6)	-	-	Slovak Republic
Computer aided draughting		Z	2	2	1	3			References

Congruence

Table G Elements for buildings	Table J Work sections for buildings	Table L Construction products
58 Removal/disposal	R Disposal systems	73 Waste handling equipment
50 Water supply	S Piped supply systems	71 Supply/storage/distribution of liquids and gases
51 Gas supply		72 Sanitary, laundry, cleaning equipment
52 Heating/ventilation/air conditioning (HVAC)	T Mechanical heating, cooling and refrigeration systems U Ventilation and air conditioning systems	75 Climate control plant and equipment (HVAC)
53 Electric power	V Electrical systems	74 Electric power and lighting services products
54 Lighting		
55 Communications	W Communications, security, safety and protection systems	76 Information/ communication services products
57 Protection		
56 Transport	X Transport systems	77 Transport services products
59 Other services elements	Y General engineering services	78 General purpose and ancillary services products

Other issues

- Missing tables
  - Activities faceted *within* Table N, e.g. **N41:D53** *Social recreation*
- Misaligned with ISO 12006-2, e.g. entities not classified by function
- Some tables offer alternative approaches to classification, e.g. Table E:
  - for buildings it offers several alternatives within the one group:
    - Height
    - Relationship with adjoining buildings
    - Special form of construction
    - Mobility
  - for bridges it offers several alternatives within the one group:
    - Material of construction
    - Construction
    - What's carried
    - Geometry and scale etc

Classification

COFFEE 15

Classification

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Proposals

- Scope
- Coding
- Depth
- Object placement
- Granularity
- New tables
- Alternative approaches to classification
- Alignment to ISO 12006-2
- Congruence

Scope

- All Tables will cover architecture (buildings and landscape), and civil and process engineering
- The work by NBS will only develop the architecture & landscape components of the Tables, but leaving room for civil and process engineering, which are to be developed by others (via CPI)

Coding

- All Tables will use numeric coding below level 1 – the familiar alphanumeric CAWS codes (e.g. **H45**) must go
- Coding for level 1 (Tables) will be revisited, but may be numerical also, e.g. using ISO codes
- All level codes in all Tables will be double-digit, from 00 to 99 potentially
- Decimalization won't be used (though users might apply it, e.g. in project specifications)

Table and object sequence

- Tables will be sequenced to reflect the project timeline, as far as this is appropriate
  - Large-scale objects precede small-scale objects
  - Design precedes construction
- Fabric: core fabric, openings, coverings & finishes, accessories (like Table G) – project timeline
- Services: sources, distribution, outlets, controls, accessories – functional timeline
- A precedes B!

Future-proofing

Letter	Code
A	00-05
B	06-10
C	11-20
D	21-25
E	26-28
F	29-32
G	33-35
H	36-39
I	40-43
J	44
K	45
L	46-49
M	50-55

Letter	Code
N	56-57
O	58-59
P	60-68
Q	69
R	70-74
S	75-86
T	87-91
U	92-93
V	94-95
W	96-98
X	99
Y	99
Z	99

Depth

- All Tables will have four levels, where possible, and five levels otherwise. The four levels would be:
  - Table, e.g. 25
  - Group, e.g. 30
  - Subgroup, e.g. 65
  - Object (product, space, element etc), e.g. 88.
- An object code might then be **25/30-65-88**, for example
- For an application where it is obvious which Table is being used, the first code could be dropped, e.g. in a specification system, which would use only the Work sections Table
  - NBS does this at present, using **H45** rather than **JH45** for example

Object placement

- All Tables will set individual objects at the lowest level
- Higher levels are for groups and subgroups (collections) of objects
- The elements and systems Tables *may* include a lower level, for 'sub-objects', i.e. sub-elements and sub-systems

Granularity

- Objects within a given Table (i.e. at the lowest level) will have similar granularity
- There are obviously limits to this, e.g. both bricks and doorsets are manufactured products, and would be listed in the lowest level of the Uniclass Products Table, but one is a very much simpler object than the other

New tables

Documents and management

- Work sections: J and K.
  - Work section structure.
- Management: C.
- Phases.
- Disciplines: B.
- Roles.
- Form of information: A.
- Exchange of information.

Physical objects

- Regions.
- Districts.
- Infrastructure.
- Sites (i.e. facilities or complexes): D.
- Buildings, landscape and other entities: E.
- Activities.
- Spaces: F.
- Elements: G and H.
- Systems (= designed elements).
- Products: L.
- Materials: P.
- Properties and characteristics: N.
- Services – including 'soft' FM.
- Aids – design, documentation, construction, operation and maintenance etc: M.

Alternative approaches to classification

- Each Table will deliver just one, complete, approach to classification
- Activity (based on the current Uniclass table D) will be used as a unifying approach to the classification of higher level objects, and some others – **next slide**
- Separate tables will offer other approaches where relevant, e.g. spaces by degree of enclosure – but all tables should have an obvious use – no tables for their own sake

By activity

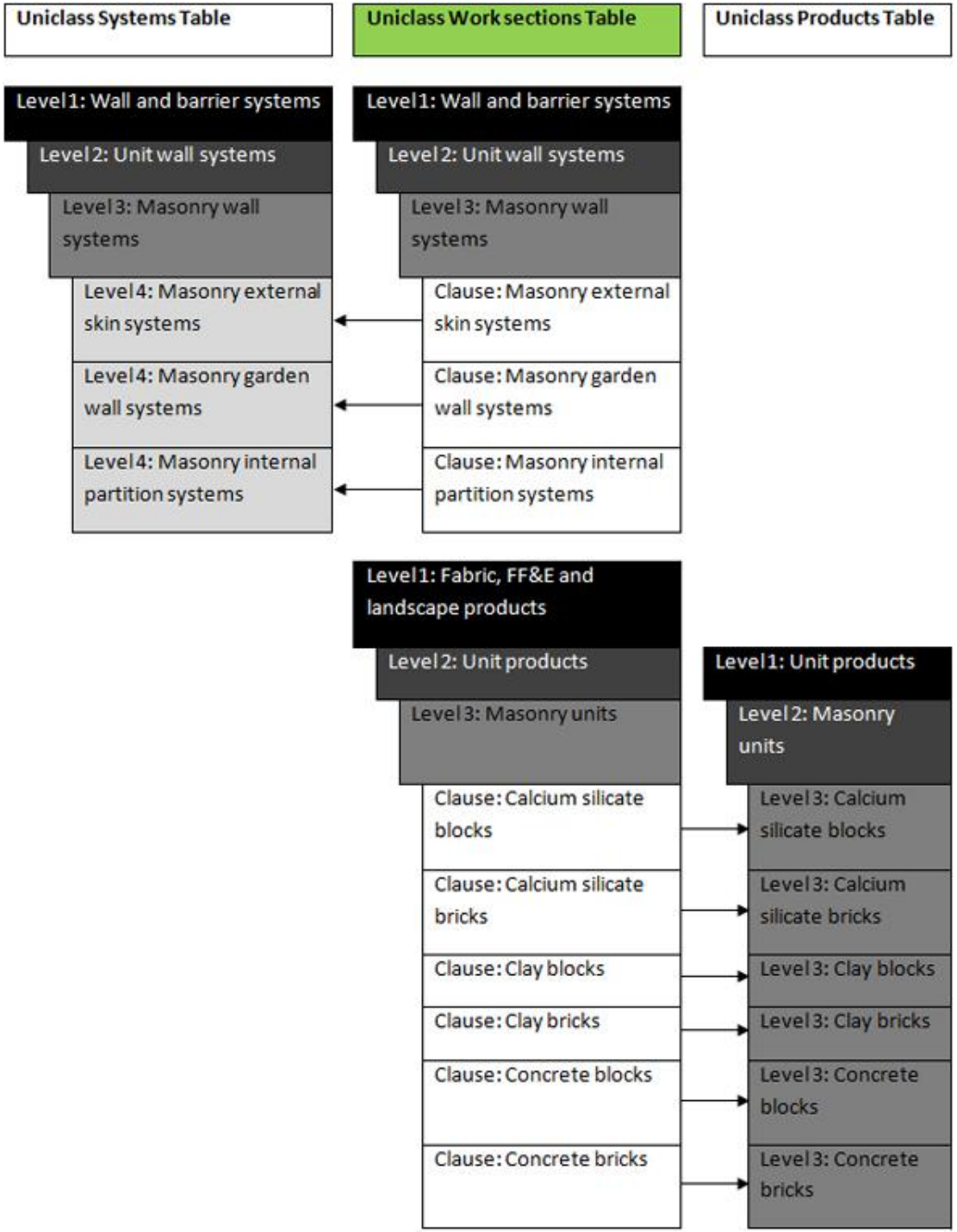
- Agricultural regions
- Agricultural districts
- Agricultural sites
- Agricultural buildings
- Agricultural activities
- Agricultural spaces
- Agricultural FF&E systems
- Agricultural FF&E products

Alignment to ISO 12006-2

- Uniclass should align to the revised ISO 12006-2, but this might not be possible – the revised Uniclass (2012) will precede the revised ISO (2014?)
- Uniclass may have to change later to align with the ISO, e.g. for Table codes, and for table sequence
- Uniclass must leave gaps for ISO Tables it doesn't implement (no gaps at present)

Congruence

- Tables will be structured so that they align with each other, and their terminology revised so that it is consistent
- If possible, coding will be matched across Tables, though it is expected that this will only be possible in part
- Once congruent, if one Table is changed, others must change to match
- For alignment between many Tables, the Work sections Table is the armature (**next slide**)


Uniclass Systems Table
Uniclass Work sections Table
Uniclass Products Table
Level 1: Wall and barrier systems
Level 2: Unit wall systems
Level 3: Masonry wall systems
Level 4: Masonry external skin systems
Level 4: Masonry garden wall systems
Level 4: Masonry internal partition systems
Level 1: Wall and barrier systems
Level 2: Unit wall systems
Level 3: Masonry wall systems
Clause: Masonry external skin systems
Clause: Masonry garden wall systems
Clause: Masonry internal partition systems
Level 1: Fabric, FF&E and landscape products
Level 2: Unit products
Level 3: Masonry units
Clause: Calcium silicate blocks
Clause: Calcium silicate bricks
Clause: Clay blocks
Clause: Clay bricks
Clause: Concrete blocks
Clause: Concrete bricks
Level 1: Unit products
Level 2: Masonry units
Level 3: Calcium silicate blocks
Level 3: Calcium silicate bricks
Level 3: Clay blocks
Level 3: Clay bricks
Level 3: Concrete blocks
Level 3: Concrete bricks

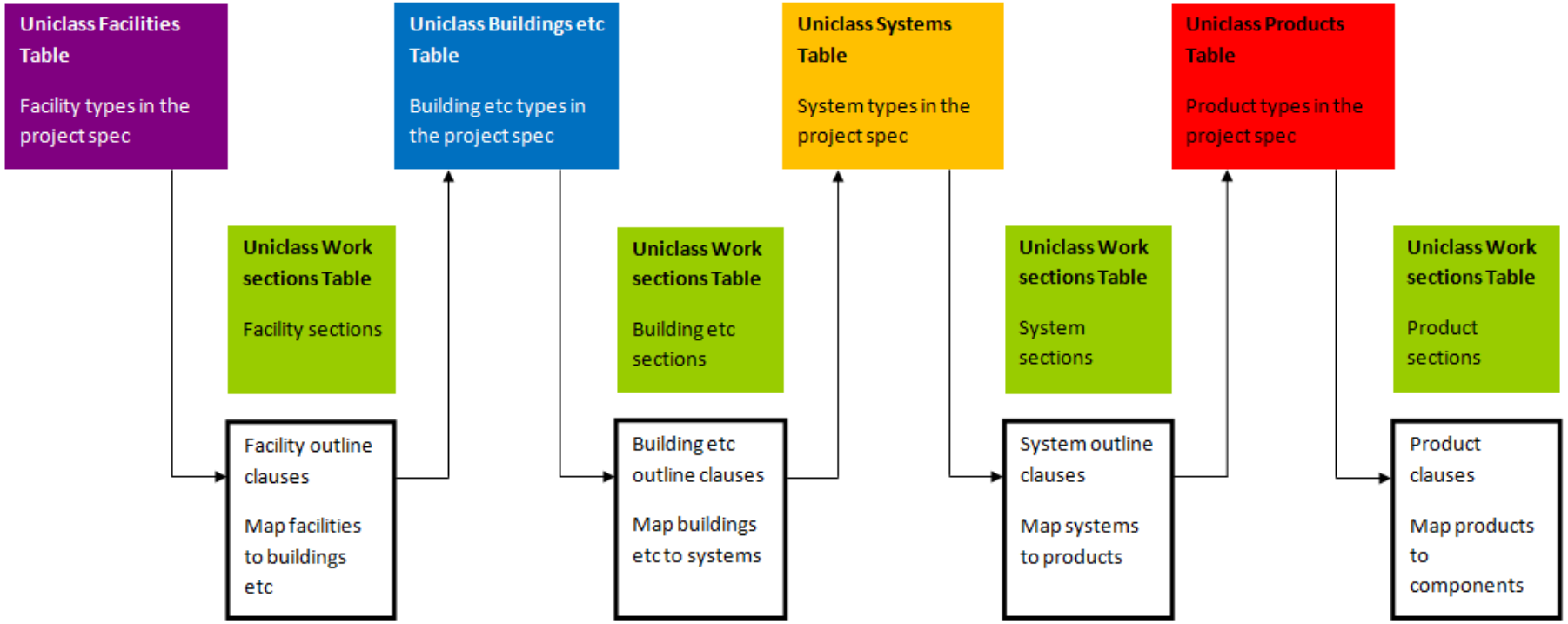
Armature

- We can achieve similar mapping for regions, districts, facilities and so on, using the new Uniclass Work sections Table (which includes sections for these objects) and the corresponding Uniclass Regions, Districts, etc Tables
- We can perhaps align the administrative components of the Uniclass Work sections Table (Group 00 Project management) with the corresponding Uniclass Management Table

Compositional mapping

- The armature function indirectly supports compositional mapping between the various object Tables
- Compositional mapping at **technical** level is the function of the specification, which is structured using the Uniclass Work sections table
- For BIM, this mapping function is critical, so that all objects are connected through the object hierarchy, viz:
  - Sites (facilities) comprise Buildings and grounds
    - Buildings and grounds comprise Systems
      - Systems comprise Products
        - » Products comprise Components

Compositional mapping in the spec



CPI commission for Easter 2012

- Unified Tables – first tranche
  - Work sections – online for comment – **later today**
    - Work section structure – **later today**
  - Facilities – by activity
  - Construction entities (buildings etc) – by activity
  - Activities – by activity
  - Spaces – by activity
  - Elements – in draft – needed for **3D CAD**
  - Systems – in draft with NBS *Create* systems
  - Products – in draft with NBS *Create* products
  - Phases – CPI report on UK plans of work (unpublished)

Systems draft – extract

Work sections table code						
Group code	Subgroup code	Section code	System code	Subsystem code	System group, subgroup & section title	System & subsystem title
10					**Preparatory systems**	
10	35				Site preparation systems	
10	35	30			Embedded retaining wall systems	
10	35	30	10			Contiguous bored pile embedded retaining wall systems
10	35	30	10	10		Piles
10	35	30	10	20		Drainage system
10	35	30	10	30		Floor starter bars and dowels
10	35	30	10	90		System accessories
10	35	30	20			Diaphragm embedded retaining wall systems

Work sections table title

Elements draft – extract

Work sections table code								
Group code	**Sub-group code**	**Section code**	**System code**	**Element group, subgroup & section title**	**System title**	**NRM code**	**Uniclass table G code**	**Omniclass table 21 code**
10				**Preparatory elements**				
10	35			Site preparation				
10	35	30		Embedded retaining walls		**08 04 03** (Retaining walls)	**722** (Retaining walls)	**07 20 60 60** (Retaining walls)
~~10~~	~~35~~	~~30~~	~~10~~		~~Contiguous bored pile embedded retaining wall systems~~			
10	35	40		Gravity retaining walls		**08 04 03** (Retaining walls)	**722** (Retaining walls)	**07 20 60 60** (Retaining walls)
~~10~~	~~35~~	~~40~~	~~15~~		~~Crib retaining wall systems~~			

Work sections table title (adapted)

Products draft – extract

	Work sections table code					
	Group code	Subgroup code	Section code	Product code	Section title	Product title
Work sections table title	**45**				**Fabric, FF&E and landscape products**	
	45	20			Roof, floor and paving products	
	45	20	55		Operable roof vents	
	45	20	55	05		Aluminium framed heat or smoke control roof vents
	45	20	55	10		Automatic glazed roof vents with thermostatic control
	45	20	55	35		Glazed roof vents with remote manual control
	45	20	55	40		Hardwood framed heat or smoke control roof vents
	45	20	55	70		Rigid polyurethane framed heat or smoke control roof vents
	45	20	55	75		Softwood framed heat or smoke control roof vents
	45	20	55	80		Steel framed heat or smoke control roof vents
	45	20	60		Pavement and floor lights	

Classification

REPLACING TABLE J/CAWS 30

Principle drivers for change

- One, rather than multiple, classification system for:
  - All sectors
    - Architecture & landscape
    - Civil engineering
    - Process engineering
  - All forms of procurement
    - Build only – systems corresponding to trades (loosely)
    - Design-build – high-level objects & systems needed
    - Design-build-operate – high-level objects, systems and soft FM needed
  - Complete project timeline

Other drivers for change

- New & resurgent technology, e.g. ETFE foil roofs, straw bale walls
- Package contracting – splitting sections
- Flexibility – avoiding adjacent numbers (future proofing)
- Users – painting, signage, access systems
- Consistency between arch & services etc
- Estimating – elements/systems
- FM contracting

Scope of new Work sections table

	Design e.g. high-level objects such as facilities and buildings	**Build**	**Operate** e.g. hard and soft FM
Buildings and landscapes	•	Uniclass table J (CAWS)	•
Civil engineering	•	Uniclass table K (CESMM3)	•
Process engineering	•	•	•

Overall concept

- Three levels: 21 Groups each of up to 20 Subgroups each of maybe 20 Sections
  - 8,400 Sections maximum
  - 1,145 identified in current draft – plenty of room!
- Systems: Most Groups
  - Suits design-build procurement – services side already systems-based
  - Systems correlate to trades – see **later**
- Products: All located in product supermarkets

Work sections draft – overall

00 Project management.
05 Districts, facilities and buildings.
10 Preparatory systems.
15 General structural systems.
20 Roof, floor and paving systems.
25 Wall and barrier systems.
30 Fixed access, tunnel, tower and vessel systems.
35 FF&E, signage and general finishing systems.
40 Flora and fauna systems.
45 Fabric, FF&E and landscape products.
50 Disposal systems.
55 Piped supply systems.
60 Heating, cooling and refrigeration systems.
65 Ventilation and air conditioning systems.
70 Electrical systems.
75 Communications, security, safety and protection systems.
80 Transport systems.
85 Process engineering systems.
90 Services and process engineering products.
95 Soft facility management (FM) systems.
99 Soft FM products.

Group 00

- Extends the CAWS Group A concept of 'Preliminaries and general conditions' along the timeline
- Covers project management of briefing, design, construction and occupancy, for example

Group 05

- Provides a home for outline and performance descriptions of a number of high-level entities:
  - regions, districts, infrastructure, facilities or sites, buildings and landscapes, activities, spaces and elements
- Requirements for these are typically documented in the early stages of the project, e.g. for briefing and sketch design
- Uniclass 1997 Table D *Facilities* has been co-opted for many of the subgroups

Groups 10-40

- For architecture, structure and landscape **systems**
  - e.g. Group 10 deals with survey, preparation, remediation and temporary works systems
- Each section describes everything to do with a system – its outline (i.e. list of component products), performance, execution, completion and facility management
- The shift to systems on the fabric side of the classification means that we can now provide homes for objects that CAWS has no home for, e.g. structural framing systems
- Relationship between the new sections and current CAWS sections is variously one-to-one, many-to-one, one-to-many and many-to-many – complex

Group 45

- This is the '**product** supermarket' for architecture, structure and landscape systems
- As far as possible the products are grouped in an application-neutral way – the same type of particleboard can be used for flooring, sheathing, joinery and lining systems, for example

Groups 50-85

- For engineering services and process engineering **systems**
- Closely aligned to those in CAWS
- For the most part, the relationship between the new sections and current CAWS sections is one-to-one

Group 90

- This is the '**product** supermarket' for engineering services and process engineering systems

Groups 95 and 99

- Based on BS EN 15221-1:2006 *Facility management. Terms and definitions*
- For specification of contracted activities (**systems** comprising a service) such as cleaning, security, hospitality and logistics services, and their associated **products**

Work sections draft – extract

Group code	Subgroup code	Section code	Group, subgroup and section title
15			**General structural systems**
15	00		Unallocated
15	05		General substructure systems
15	05	15	Concrete foundation systems
15	05	50	Minor concrete substructure systems
15	05	65	Piling systems
15	05	70	Raft foundation systems
15	05	90	Underpinning systems
15	10		Unallocated

NBS extends the classification

Group	25	Wall and barrier systems
Subgroup	25-85	Internal wall covering and finish systems
Section	25-85-60	Plaster coating systems
NBS Subsection		System outline
NBS Clause	25-85-60/150	Multicoat plaster system
NBS Item		First coat: [...]

Trades & systems

- Systems and trades (typical subcontracts) generally align:
  - 75-60-05 *Access control systems* are designed, supplied and installed by specialist access control subcontractors (ideally approved by NSI or SSAIB – this is a recognized trade in the UK)
  - 20-55-80 *Rolled carpeting systems* are supplied and installed by specialist subcontractors (ideally certified by CFI or a member of CFA or NICF – this is a recognized trade in the UK)
- Systems classification maps directly to a trades (work section) classification
- The move to systems does not mean that we have lost the usefulness of CAWS in describing the work of trades – the new classification manages to deal with both systems and trades at the same time

NES & SMM7 use Table J

- NES: National Engineering Specification, published by Amtech
- SMM7: Standard Method of Measurement, published by RICS
- Both NES and RICS are on the Uniclass Working Group
- **RICS** NRM (New Rules of Measurement)
  - To replace SMM7 – development predates UWG
  - To distance RICS' methods of measurement from any particular national classification system, to support the business of measurement along the project timeline (NRM 1, 2 and 3), and globally
  - Aligned to elemental classification and to whole timeline – has broken from CAWS
  - The new Uniclass Work section Table has a similar alignment – should help with UK take-up of the NRM

First implementation

- NBS *Create*
  - Services library launched November 2011
  - Architecture etc libraries due March 2012
- A BIM-ready specification tool
- Other tools will follow in this series, serving the entire project timeline from inception to demolition, e.g. for briefing & FM

Classification

SYSTEM SECTION STRUCTURE 15

NBS Building – ad hoc structure

J10	J21	K10	L40
Types of tanking/ damp proofing	Types of coating/ paving	Types of dry lining	General requirements
	Performance	General/ Preparation	Types of glazing
Materials and making of mortar	Products	Components	
Preparing of substrates	Execution generally	Installation	
Execution	Substrates/ Vapour control layers/ Warm deck roof insulation	Finishing	
	Asphalting		
	Surfacing		
	Completion		

Problems with ad hoc structure

- Requirements grouped as the original author saw fit – but subjective, devised on a section-by-section basis, may not always make sense to others
- No framework or checklist to build on if authoring section from scratch
- Specification lacks consistency – those preparing or using a work section will have to work out each time where to place or look for a particular requirement
- Difficult to spot technical (and editorial) inconsistencies, gaps or overlaps in coverage between sections

Benefits of standard structure

- Objective
- Clear to authors and users
- Functions as a framework or checklist for authoring sections from scratch
- Ensures a consistent approach to specification regardless of discipline, enabling collaborative working
- Easy to spot technical (and editorial) inconsistencies, gaps or overlaps in coverage between sections
- Facilitates manipulation of data, e.g. for reporting
- Facilitates a logical procurement-specific approach to specification
- Simplifies guidance and training

North America: SectionFormat™

- General
- Products
- Execution

- But, no homes for system outline, system performance, system commissioning, system FM – where do they go?
- Can be improved

7 subsections in **system** sections

- System outline – see **next slide**
- System performance
- Products
  - actually held in Product sections, but presented here in the systems **view** of NBS *Create*
- Custom-made products
- Execution
- System completion
- System facility management
  - only implemented for the NBS *Create* landscape library, for now

System outline

Stud partition system

– Studs: [...]

Aluminium studs

Hardwood studs

Mild steel steeds

Softwood studs

Stainless steel studs

– Fill: [...]

Glass fibre insulation

Mineral wool insulation

Polyurethane insulation

Rockwool insulation

– Facing A: [...]

Medium density fibreboard

Particle board

Plasterboard

– Facing B: [...]

Medium density fibreboard

Particle board

Plasterboard

Stud partition system type A

- Studs: Hardwood studs.
- Fill: Mineral wool insulation.
- Facing A: Plasterboard.
- Facing B: Medium density fibreboard.

Audiences

Subsection	Subject matter	Audience	
		Contractor	Other players
System outline	Simple list of component products for each type of system	Contractor as tenderer	Most other users – this subsection is the key to the section – including consultant estimators, building control officers, tenants, clients, contract administrator
System performance	Performance of systems	Contractor as designer	Delegated (e.g. novated) designer, if any; system operator, contract administrator
Products	Ex-catalogue products	Contractor as purchaser	Manufacturer and supplier, contract administrator
Custom-made products	Bespoke products, made off-site	Contractor as purchaser and foreman	Fabricator, contract administrator
Execution	Bespoke products, made on-site	Contractor as foreman	Installer/ erector/ applicator, contract administrator
System completion	Maintenance, training etc to practical completion	Contractor as commissioning agent and maintenance agent	Delegated commissioning agent and maintenance agent, if any, and contract administrator
System facility management	Operation, maintenance, training etc after practical completion	Contractor as operator of system, or as term maintenance contractor	In-house or specialist contract maintenance personnel

Procurement

Subsection	Sketch design	Full contractor design	Mostly contractor design	Mostly consultant design	Full consultant design	Design, build, operate, transfer	Operation & maintenance contract
System outline	Most		Partial	Most	Full		Record or survey
System performance		Full	Most	Partial	Full		Operational
Products			Partial	Most	Full		Record or survey
Custom-made products			Partial	Most	Full		Record or survey
Execution			Partial	Most	Full		Record or survey
System completion			Partial	Most	Full		
System facility management						Full	Full

Interdependency with WS Table

- Everything to do with a system is described in the system section – survey, demolition, performance, construction, commissioning, FM etc
- North America: MasterFormat™
  - System outline: Not included in either *SectionFormat* or *MasterFormat*.
  - System performance: *MasterFormat* **Group** 01 80 00.
  - System commissioning: *MasterFormat* Subgroup XX 08 00.
  - System operation & maintenance (FM): *MasterFormat* Subgroup XX 01 00.

Facilities & Buildings

- **Sections** rather than subsections, but parallel
  - Building & landscape outline by activities
  - Building & landscape outline by spaces
  - Building & landscape outline by systems
  - Building & landscape performance
  - Building & landscape products and execution
  - Building & landscape completion
  - Building & landscape facility management

Classification

SUMMARY

Summary

- Context: Change overdue
- New ISO 12006-2: Revised international framework
- New Uniclass: Revised & congruent Tables
- New Work section Table: Whole timeline, mostly systems; products separated out
- New standard system section structure: Versatile

Classification

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