

Content Interoperability of Multilingual Content Resources – New kinds of certification and QA

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ISO/TC 37

Terminology and other language and content resources



Overview

- **The global picture: demographics**
 - ICT: ubiquity and pervasiveness
 - I18N, L10N, G16N
 - PwD: need reliable content
- **eContent → mContent → structured content at the level of lexical semantics**
- **Attestation, verification, validation, certification...**

FOCUS: structured content and its re-purposing

Content integration and interoperability

Is coming anyhow – imposed by a number of factors:

- **Societal development: demography**
 - **Technical development: ubiquity and pervasiveness**
 - **Science & technology: knowledge growth**
 - **Industrial needs: internationalization and glocalization**
 - **General concern: Cost and quality**
- **needs standards: methodology standards, content standards, other...**

Global changes + content-driven ICT

- **2010: more than 50% world population lives in cities**
- **ALL societies in the world are aging!**
- **EU: 15% persons with disabilities (PwD) = 75 mio**
- **EU 2030: 30% PwD = 150 mio?**
- **EU 2010: 99% small and medium-sized enterprises (SME)**
(20 mio enterprises = 2/3 private sector jobs, 2/3 value-added)
- **EU 2010: 90%< micro- or one-person enterprises (OPE)**
(45% Europeans are self-employed – US: 61%)
- **Micro-enterprises (incl. OPEs) are primary job-creators:**
53% (of 178 mio full-time + 40 mio part-time) = 115 mio!
- **SMEs with “language strategy” perform better on the market**
(7%< growth) than those without (Ø1% growth)
- **10%~25% of all translatable texts are not translated**
→exponential growth of translatable texts →language industry

ICT ↔ content

ICT
increasingly
content-driven

→ structured content

Interoperability

Technical interoperability

→ software interoperability

→ semantic interoperability

→ organizational interoperability

→ content interoperability

Terminology?

The „terminology problem“

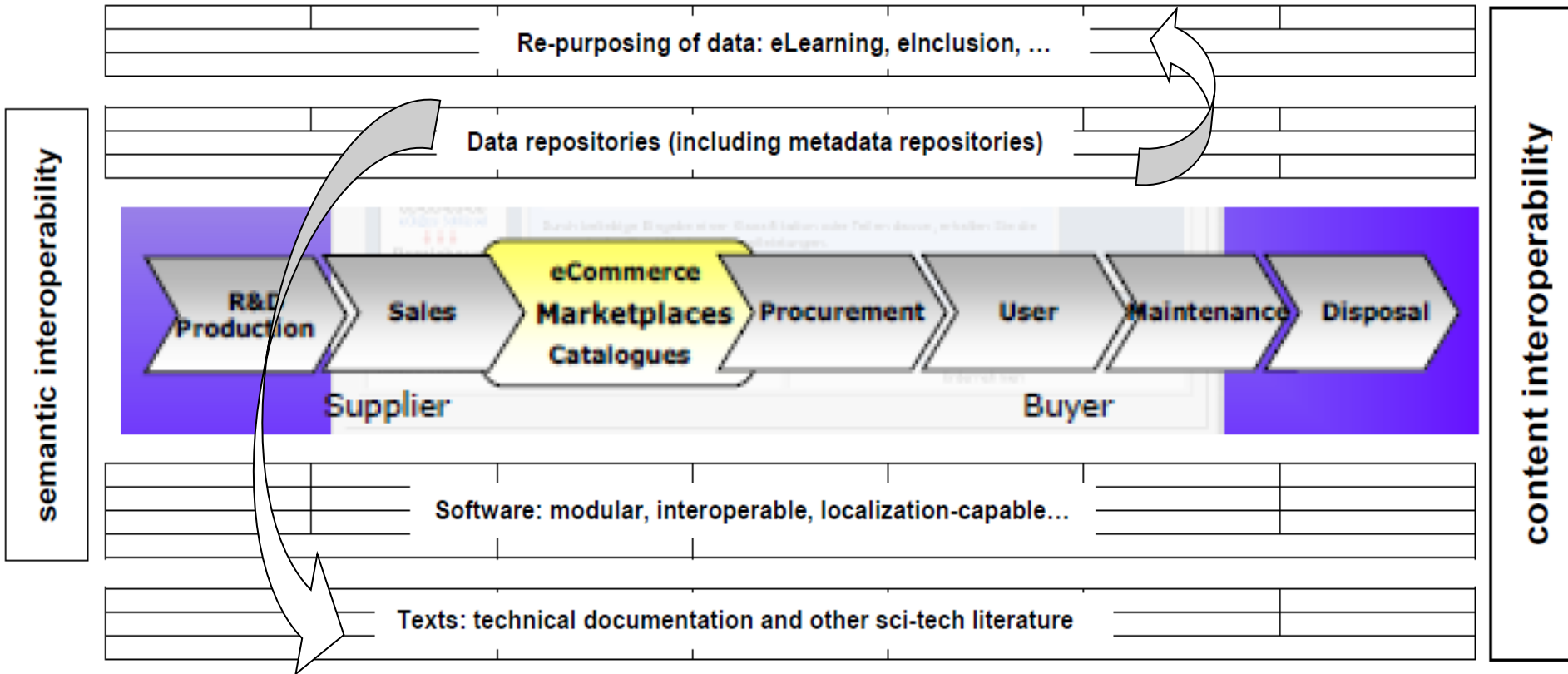
- **There is unfortunately no cure for terminology; you can only hope to manage it.** — (Kelly Washbourne)

→ Terminology management

*Multipurpose: knowledge representation, communication, tool, ...
+methodology →ICTs*

- Software – Content

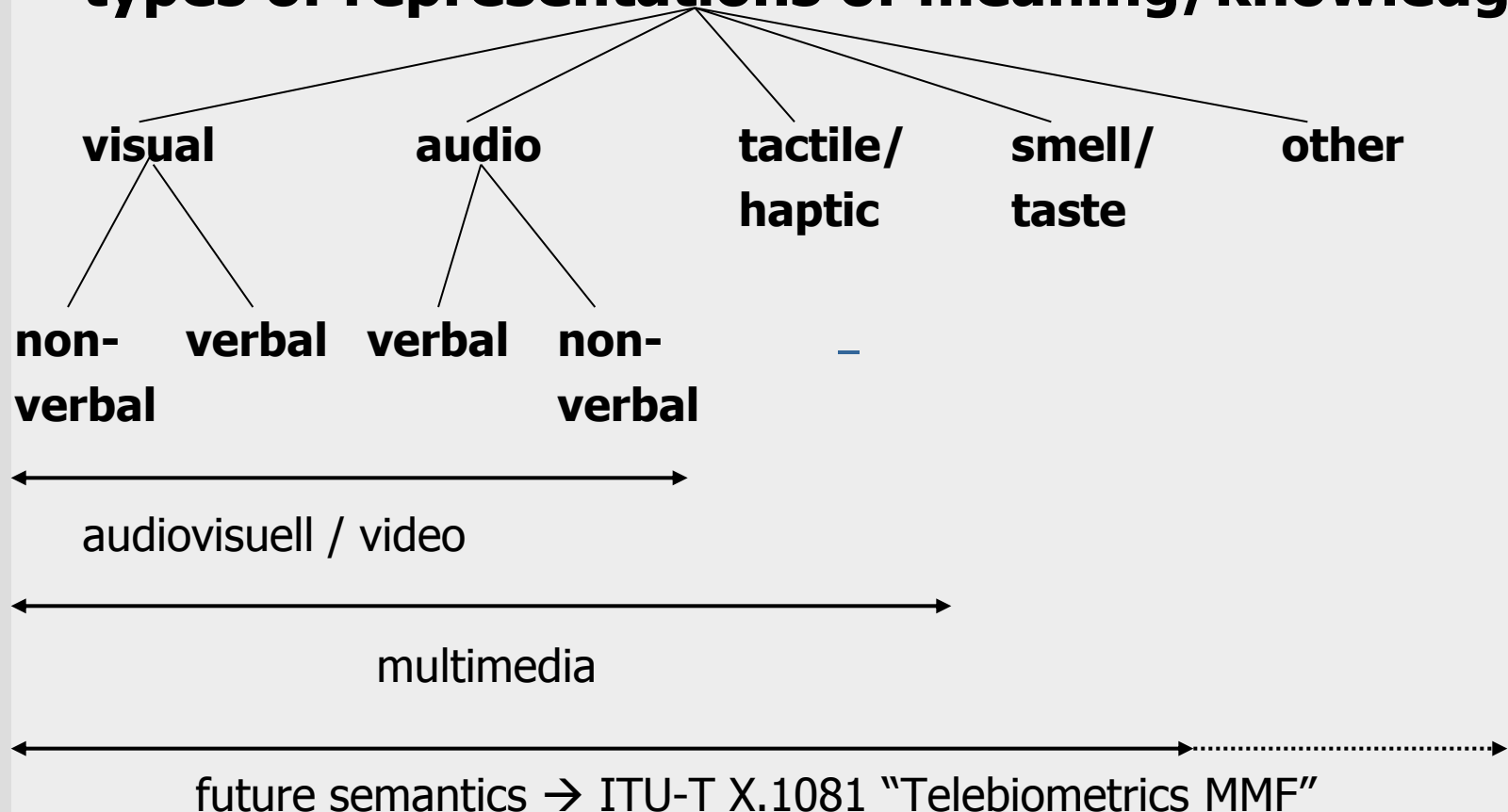
The Production chain – Product lifecycle and content lifecycles



Structured content (1):

content entities at the level of lexical semantics

types of representations of meaning/knowledge



Structured content (2)

- **According to content management (technical p-o-v):**
 - **Texts:** → translation, localization, internationalization...
 - **Speech:** → communication...
 - **Image:** → CAD/CAM...
 - **Multimedia:** → video, presentations...
- **At the level of lexical semantics (content p-o-v):**
 - **Terminology** → basic elements of domain knowledge
 - **Language resources** → lexical resources = basic building blocks
 - **Other content resources** → basic elements of communication
 - *incl. non-verbal representations*
 - **Meta-content** – i.e. content about content
 - **Metadata** – i.e. data about data (data categories)

Structured content

**It's all
catalogues**

→ repositories of structured content



⚓ Consultation of the International Hydrographic Dictionary ⚓

Preliminary version (05/05/2000, reduced database) [Jean-Luc Husson](#)

Select from fields below, enter your search string and then press the SEARCH button

French

Term

Contains

courant

Case



[Help](#)



courant côtier [HR-1074] - n

Définition :

Courant de direction générale parallèle à la côte. Toutefois cette définition ne s'applique qu'au courant que l'on rencontre à l'extérieur de la zone de déferlement lorsqu'une telle zone existe.

coastal current [HR-1074] - n

Definition :

A relatively uniform drift usually flowing parallel to the shore in the deeper water adjacent to the surf zone.

corriente costera [HR-1074] - n

Definición :

Corriente de deriva relativamente uniforme, por lo general paralela a la costa, en las aguas más profundas adyacentes a la zona de rompientes.

courant de densité [HR-1075] - n

Définition :

Courant provoqué par le gradient horizontal de densité de l'eau.

density current [HR-1075] - n

Definition :

A gradient current caused by the horizontal gradient of water density.

corriente de densidad [HR-1075] - n

Definición :

Corriente de gradiente causada por el gradiente horizontal de densidad del agua.

Voir aussi :

- HR-1094

See also :

- HR-1094

Ver también :

- HR-1094

courant de dérive [HR-1077] - n

Définition :

Courant océanique superficiel de faible vitesse et

drift [HR-1077] - n

Definition :

A wide, slow-moving current principally caused by

velocidad de deriva [HR-1077] - n

corriente de deriva - n

aporte - n

deriva - n

Structured content

Example: Traffic informatics



→
5km

Way to the airport – turn right in 5 km



Way to the train station – down to the right



ZONE = verbal

red ring = (morphology) prohibition sign

30 = micro-proposition: max speed 30km/h

→ **variable message sign boards**

communicating with car-driver system

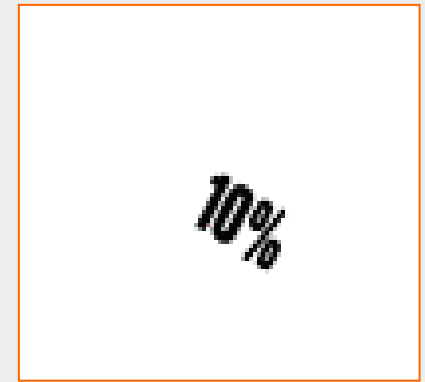
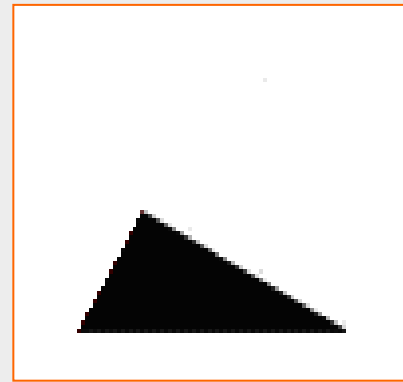
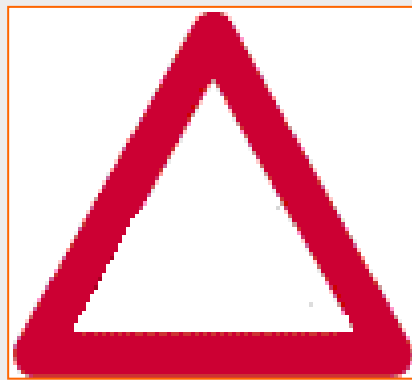
“Morphology” of pictogrammes

- Representation elements



- automatic segmentation?
- “fuzzy search”?

=



Structured content

Example: product catalogues



225/55/16 V

e.g. complex entry in a product catalogue

- **Name of company** (*® enterprise*)
- **Name of product** (model) (*™ enterprise*)
- **Generic name of product** (*e.g. © HS*)
- **Class (name under which the product falls)** (*e.g. © eCl@ss*)
- **Verbal/textual description** (*© enterprise*)
- **Picture** (*© enterprise*)
- **Technical data**
 - (unified) branch properties (*e.g. © OAGi*)
 - Standardized characteristics (*e.g. © DIN*)
 - Enterprise product specific data (*e.g. for collaborative business*)
 - Enterprise internal data (*maybe confidential/secret*)

Structured content: Example

50 Küstenseeschwalbe



Sterna paradisaea
Familie: Möwen (*Laridae*)

Der Flußseeschwalbe (Nr. 51) sehr ähnlich. Die kurzen Füße dieser Möwe verschwinden in Ruhestellung völlig im Federkleid, ihr Schnabel zeigt eine blutrote Tönung.

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2	3	4	5	6	7	8	9	10	11	12
13	14	15	16	17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80	81	82	83	84
85	86	87	88	89	90	91	92	93	94	95	96
97	98	99	100	101	102	103	104	105	106	107	108
109	110	111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130	131	132
133	134	135	136	137	138	139	140	141	142	143	144
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169	170	171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190	191	192
193	194	195	196	197	198	199	200	201	202	203	204
205	206	207	208	209	210	211	212	213	214	215	216
217	218	219	220	221	222	223	224	225	226	227	228
229	230	231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250	251	252
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349	350	351	352	353	354	355	356	357	358	359	360
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385	386	387	388	389	390	391	392	393	394	395	396
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421	422	423	424	425	426	427	428	429	430	431	432
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493	494	495	496	497	498	499	500	501	502	503	504
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649	650	651	652	653	654	655	656	657	658	659	660
661	662	663	664	665	666	667	668	669	670	671	672
673	674	675	676	677	678	679	680	681	682	683	684
685	686	687	688	689	690	691	692	693	694	695	696
697	698	699	700	701	702	703	704	705	706	707	708
709	710	711	712	713	714	715	716	717	718	719	720
721	722	723	724	725	726	727	728	729	730	731	732
733	734	735	736	737	738	739	740	741	742	743	744
745	746	747	748	749	750	751	752	753	754	755	756
757	758	759	760	761	762	763	764	765	766	767	768
769	770	771	772	773	774	775	776	777	778	779	780
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829	830	831	832	833	834	835	836	837	838	839	840
841	842	843	844	845	846	847	848	849	850	851	852
853	854	855	856	857	858	859	860	861	862	863	864
865	866	867	868	869	870	871	872	873	874	875	876
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913	914	915	916	917	918	919	920	921	922	923	924
925	926	927	928	929	930	931	932	933	934	935	936
937	938	939	940	941	942	943	944	945	946	947	948
949	950	951	952	953	954	955	956	957	958	959	960
961	962	963	964	965	966	967	968	969	970	971	972
973	974	975	976	977	978	979	980	981	982	983	984
985	986	987	988	989	990	991	992	993	994	995	996
997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008
1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020

Structured content: Example: Mobile phone user interface



**How many menu items and messages?
(incl. icons) in how many languages?**

**→ 16,000 in
more than 100 languages**

Structured content: example 4

Learning object: Kanji Flashcard 「休」

Front side: kanji, examples and additional information →

10 → キュウ
11 → やす・む/やす・まる/やす・める
12 → rest, take a day off, relax
13 → ■ person ■ tree
14 → 1: ていきゅうび a regular holiday {for a store}
2: ひとやすみする to take [have] a (short) rest
3: やすまる to be [feel] rested; to be relieved
4: やすむ to rest; to take a day off; to sleep
5: やすみ (a) rest; a holiday; (a) vacation; a day off
6: きゅうじつ a day off; a holiday

1: 定休日
2: 一休みする
3: 休まる
4: 休む
5: 休み
6: 休日

13 → 体
15 → 体
7 → 体
8 → 体
9 → 体

← Back side: lexems, pronunciation, meanings and additional information

Source: Whiterabbit kanji flashcard

→ CLIL – Content and Language Integrated Learning

Augmentative and alternative communication (AAC)

Augmentative and alternative communication (AAC) aids have been developed to assist the communication process of people who have a language impairment.

Often, these aids include the use of *symbols*.





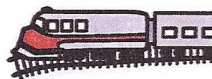






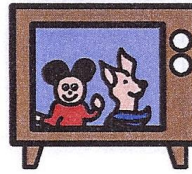


The ideographic symbols, being linked to a meaning (contrary to text, which in the western hemisphere is more or less a transcription of speech), make them suitable for persons with a wide range of language disorders.

AAC for cognitively disabled

Swedish Dutch English	födelsedag verjaardag birthday	pappa vader father	ge geven give	jag mij me	gåva kado present	hund hond dog	lille klein small
PCS							
Picto							
Bliss							

This image shows six different ways to express the same sentence: "For my birthday, father gives me a small dog". Vertically, each single concept is represented in different languages (keywords) and in different symbol systems (PCS, Picto, Bliss).

Example 2

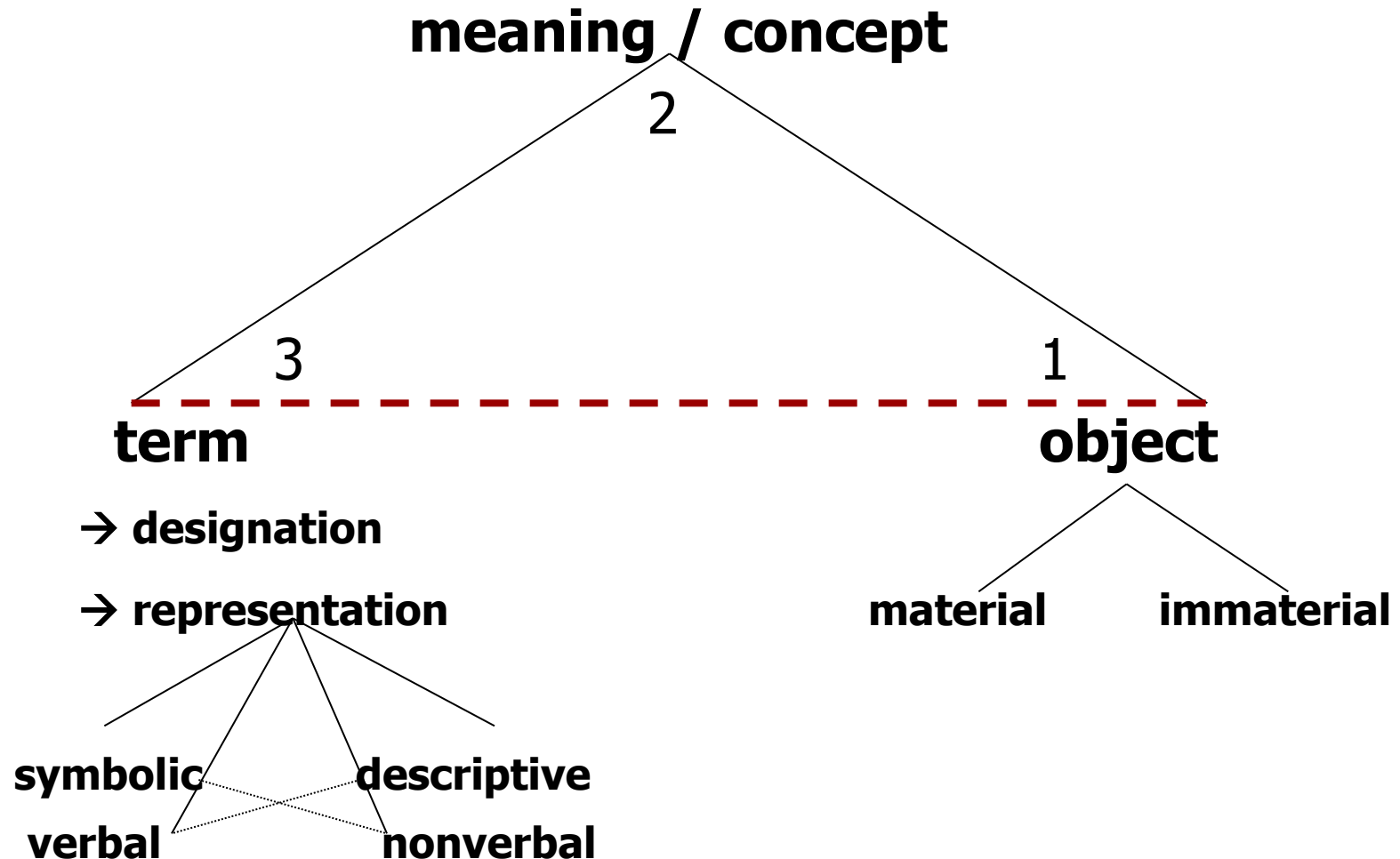
<p>Bonjour!</p> 	<p>Je m'appelle</p> <p>Calum</p>		
<p>j'aime</p> 	<p>les voitures et</p> 	<p>les trains</p> 	
<p>j'aime</p> 	<p>faire du cheval</p> 	<p>lancer des choses</p> 	<p>et les balles</p> 
<p>j'aime</p> 	<p>écouter la musique</p> 	<p>et lesdessins animés</p> 	
<p>J'aime pas</p> 	<p>rester calme</p> 		

+OTHER CONTENT RESOURCES

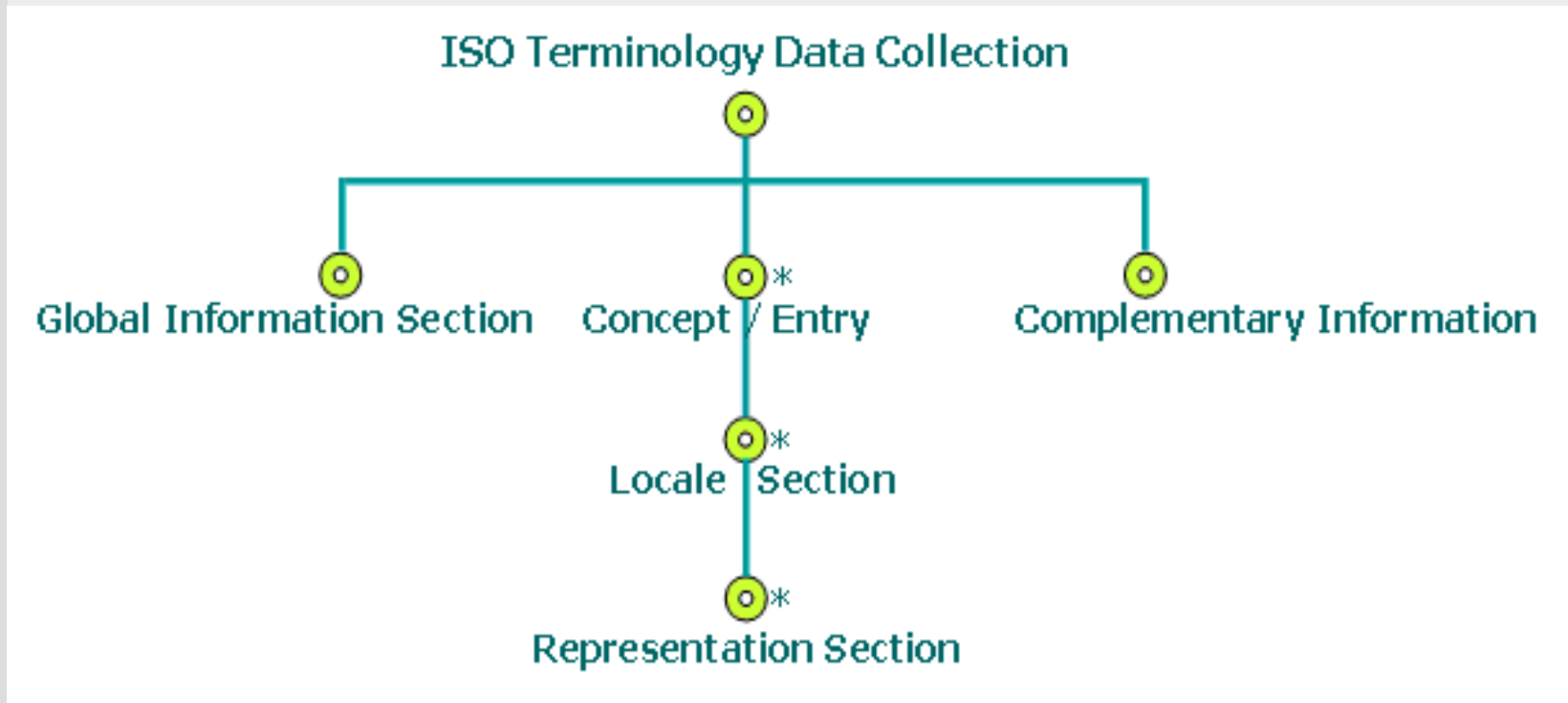
- **Non-verbal representations**
 - Visual: symbols, graphics, ...
 - Haptic
 - Etc.
- **Non-verbal communication**
 - Mimics
 - Gestures
 - Etc.

→ **locales!**

The "semantic triangle"

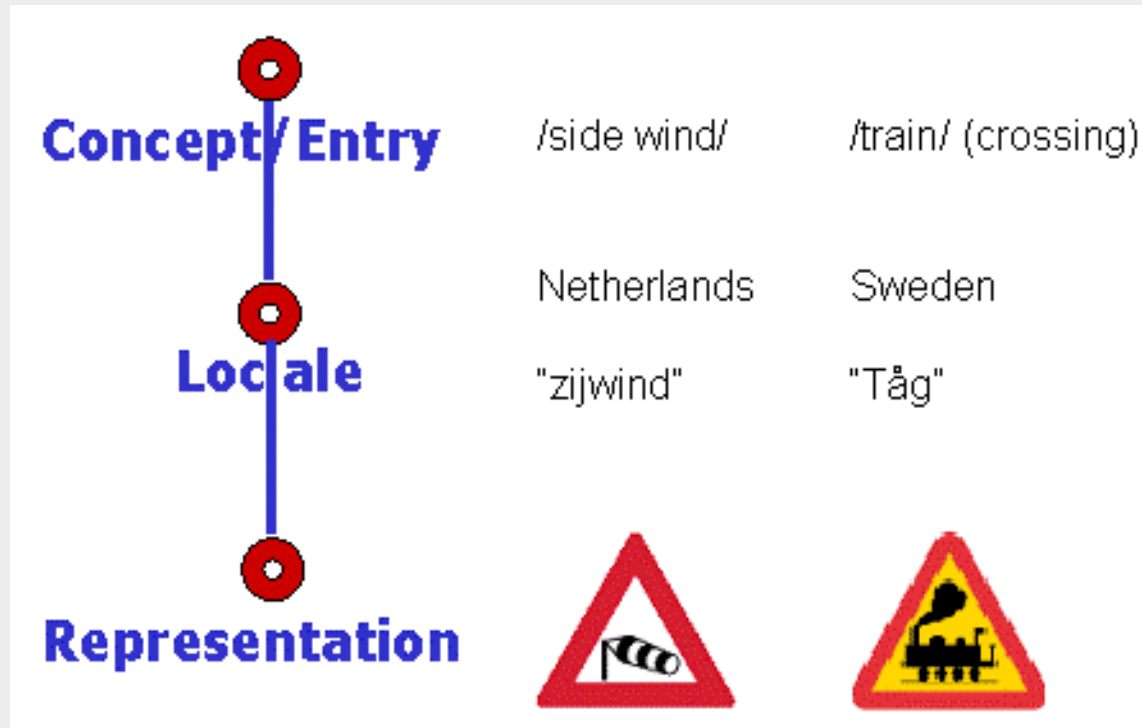


Terminological Metamodel revised



Source: Klaus-Dirk Schmitz 2005

Locales



→ new requirements on content!

More often than not different kinds of
content items are
combined with or
embedded in
each other

Costs of content creation and maintenance

Items of structured content
occur in all kinds of
technical documentation

→ costs

CONTENT INTEROPERABILITY DEFINITION (try)

semantic interoperability → content interoperability

= capability of content items / entities

(i.e. structured content at the level of lexical semantics)

- **to be integrated into or combined with other (types of) content items / entities**
- **to be extensively re-used for other purposes**
(also sub-items/entities to be re-usable / re-purposed)
- **to be searchable, retrievable, recombina-ble from different points-of-view**

content interoperability?

- Extensive re-usability & re-purposability
- Capability for multilinguality from the outset
- Capability for multimodality
- Multi-channel output
- eInclusion / eAccessibility
- Extensive personalizability

Personalization in broadest sense: multilinguality, multimodality, eAccessibility/eInclusion, ...

→ Technology: multimedia, multi-channel...

Agreement on basic standards

Increasingly standards developing organizations (SDOs) are cooperating on the agreed basis of

- **ISO 13584 Series**
- **UN/CEFACT & OASIS**
- **ISO 11179 Series**

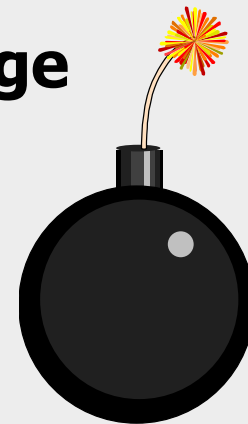
Taking into account the basic requirements for content interoperability:
**multilinguality, multimodality, eAccessibility/
eInclusion, multi-channel, multimedia**

Interoperable methods & models

- **coherent combination of methods:**
- **ISO/TC 37**
“Terminology and other language and content resources”
- ***ONE methodology***

If not - Consequences

- **High costs to create and maintain multilingual data**
- **High barriers to enter new markets (both regarding suppliers and customers)** —
- **High follow up costs/losses due to incorrect data creation and exchange (e.g. recall of products)**



Solution

- **Standardization of metadata for structured content**
(e.g. properties for products and services, terminology, graphical symbols, etc.)
→ **reliable data**
- **Standardized data models and exchange formats to insure interoperability of content and systems**
- **Web-based workflows for development and maintenance of content**



Lessons learned

- **Worldwide collaborative online development of multilingual and reliable content**
- **Harmonization of workflows between organizations creating content is necessary**
- **Availability of reliable meta data (terminology, product properties, graphical symbols,...) is a key factor for security of investments**

Standardization in content reduces the complexity of business processes

Requirements for accessible ICT

For PwD one of the biggest barriers lies in the cost and quality of assistive technology and the respective services

ICTs on the market must become

- **simpler to be used**
- **less expensive**
- **better scalable**
- **more cost-effective**
- **more trustworthy**

If that would be the case, also the services of language service providers (LSP) to micro-enterprises and OPEs can also become less expensive, more cost-effective and more trustworthy.

ICCHP 2010 Recommendation

Prerequisite for global content integration and aggregation as well as content interoperability:

- Content interoperability is the capability of content to be combined with or embedded in other (types of) content items and to be extensively re-used as well as re-purposed for other kinds of eApplications.
- In order to achieve this capability, software must support these requirements from the outset:

multilinguality, multimodality, eInclusion and eAccessibility need to be considered from the outset in software and content development, in order to avoid the need for additional or remedial engineering or redesign at the time of adaptation

Use → re-use → re-purposing

**Any entity of structured content
with or without context / co-text is
potentially re-usable for other eApplications**

- **Technical documentation** _
- **Sci-tech literature**
- **Federated repositories**
- **eLearning**

→reliability

Fundamental content requirements

■ Interoperability

- Multilinguality
- Multimodality
- Multimedia
- Multichannel

■ Reliability

■ Attestability

→ standards-based

Attestation

- **Certification**
 - First-party conformity assessment
- **Validation**
 - Second party conformity assessment
- **verification**
 - Third party conformity assessment

Assessment: conformity to standards

Content-related attestation

- **(1) quality of software/tools**
- **(2) quality of structured content**
- **(3) quality of services related to 1,2&3**
- **(4) qualification of personnel/experts**

(1) Software/tools attestation

Standards-conforming

- user interfaces
- interoperability
- usability
- personalizability
- fitness for eAccessibility&eInclusion
- multilinguality&multimodality
- etc.

(comprising also certain hardware related to the above)

(2) Content quality attestation

Quality of /structured/ content may depend on:

- quality of a repository as a whole
- quality of individual entries and parts of them
- *needs further investigation on basics of content quality:*
- fact of being standards-conformant?
- quality of the sources used?
- authoritative nature of the issuing organization?
- transparent procedures of elaboration?
- "balanced" composition of the elaborating committee?
- "recognized" expert in the field (only one or a few)?

HOW?

- **Formal attestation schemes?**

 - too expensive?

- **New schemes?**

 - standards-based!

- **Web services?**

 - needs further R&D

→must become less expensive and less cumbersome!

→*some can be automatised*

(3) Service quality

Quality of services related to

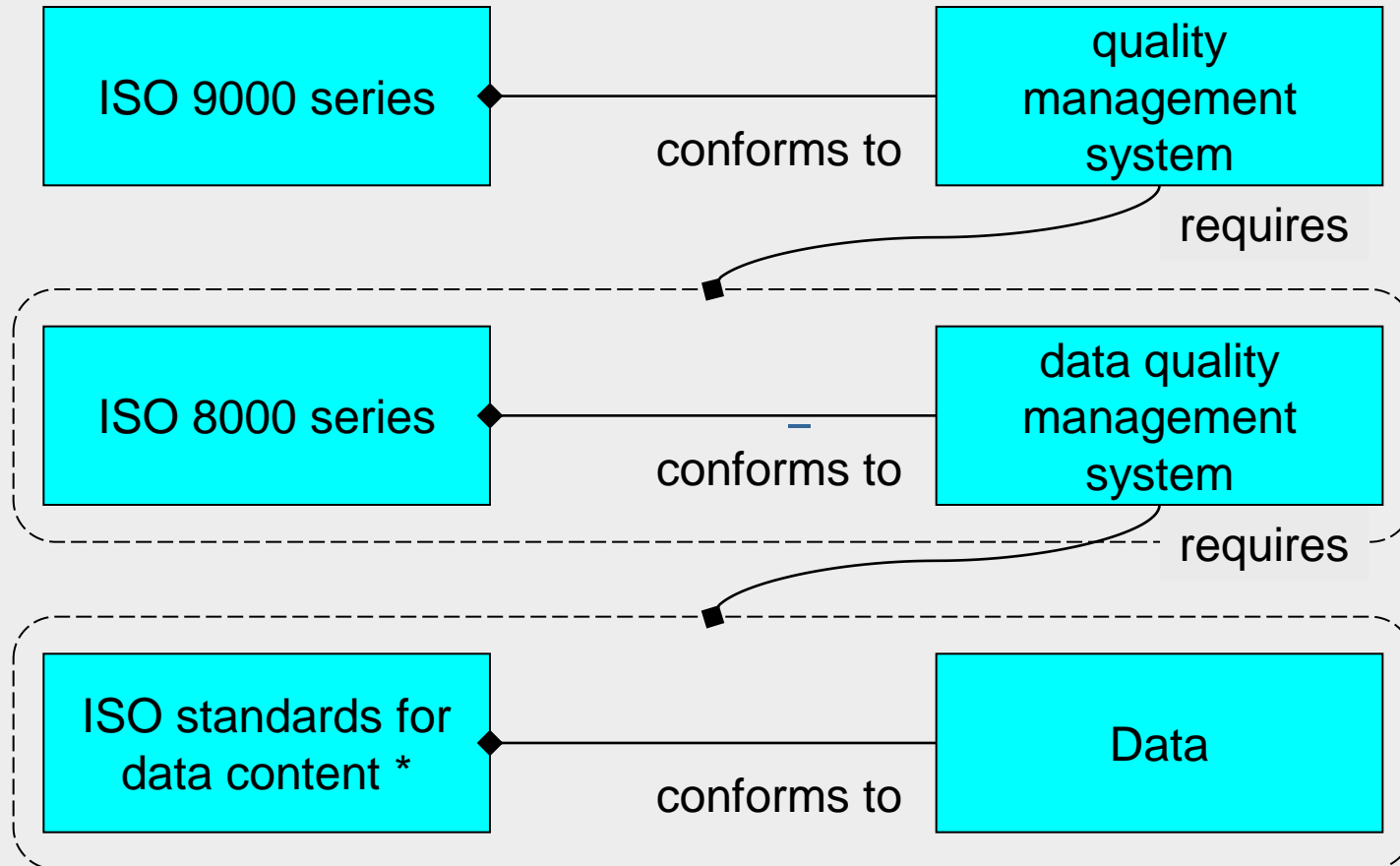
- Software
- Content
- Qualification of persons/experts

(4) Personnel/expert qualification

Qualification related to

- **skills to be achieved**
- **training activities to achieve the goal**
- **training material for the training**

The quality stack from ISO/TC 184/SC 4



* e.g. ISO 10303, ISO 13584, ISO 15926, ISO 22745, ISO 29002

Thank you for your attention

Infoterm

**International Information Centre for
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ADDRESS

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Fax: +43-1-4277-58027
infopoint@infoterm.org
<http://www.infoterm.info>**

Items of structured content

- **Low-complexity items:**
 - Referring only to one concept
 - Referring only to one object or /class/ of objects (e.g. one model or group of models of a product)
- **High-complexity items:** –
 - Referring to more than one concept, e.g. by
 - comprising examples of usage
 - including information on a higher grammatical level
 - Referring to complex objects, such as components
 - Mixing information on concepts and objects

Structured content: complex LO

Learning object: Kanji Flashcard 「休」

Front side: kanji, examples and additional information →

10 → キュウ
11 → やすむ/やすまる/やすめる
12 → rest, take a day off, relax
13 → ■ person ■ tree
14 → 1: ていきゅうび a regular holiday {for a store}
2: ひとやすみする to take [have] a (short) rest
3: やすまる to be [feel] rested; to be relieved
4: やすむ to rest; to take a day off; to sleep
5: やすみ (a) rest; a holiday; (a) vacation; a day off
6: きゅうじつ a day off; a holiday

1: 定休日
2: 一休みする
3: 休まる
4: 休む
5: 休み
6: 休日

13 → 5
15 → 6
115 → 7
1039 → 8
body
crouch

← Back side: lexems, pronunciation, meanings and additional information

Source: Whiterabbit kanji flashcard

→ CLIL – Content and Language Integrated Learning

Structured content: example 4

Learning object: Kanji Flashcard 「休」

Front side: kanji (in one meaning)
and additional information→

10 → キュウ

やすむ

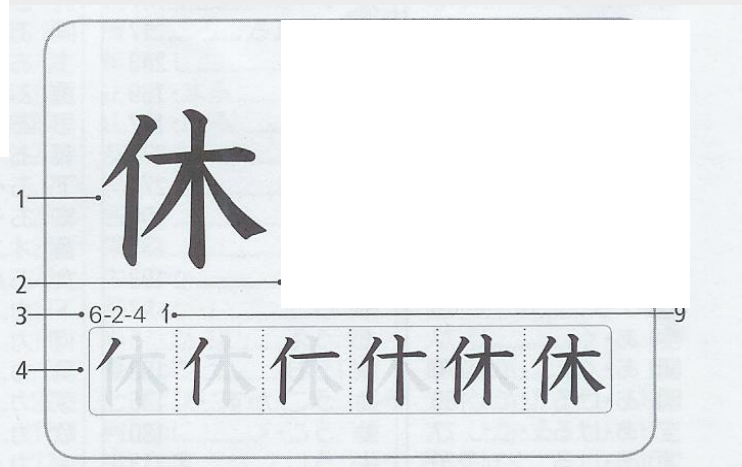
rest vi

relax vi

+speech output

+sign language

+other AAC



← Back side: lexems,
pronunciation, meaning...
and additional information

→ **CLIL – Content and Language Integrated Learning**

Structured content: example 4

Learning object: Kanji Flashcard 「休」

Front side: kanji (in one meaning)
and additional information →

10 → キュウ

やすめる

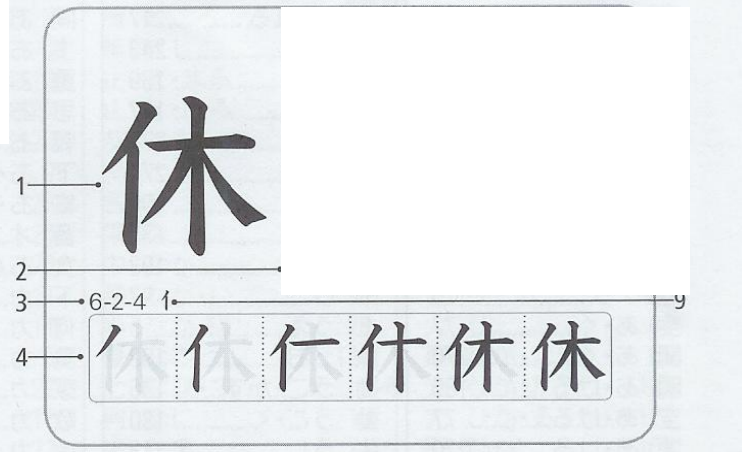
let rest vt

let relax vt

+speech output

+sign language

+other AAC



← Back side: lexems,
pronunciation, meaning...
and additional information

→ **CLIL – Content and Language Integrated Learning**

Structured content: example 4

Learning object: Kanji Flashcard 「休」

Front side: binom (in one meaning)
and additional information →

10 → キュウ

定休日

(→kanji定)

(→kanji日)

regular closing day (e.g. shop)

+speech output

+sign language

+other AAC

1? 定休日

13 → 5

← Back side: lexems,
pronunciation, meaning...
and additional information

→ **CLIL – Content and Language Integrated Learning**

Simple learning objects

- **Lemmas ranging**
from morphemes – words/terms – collocations/multiword terms – collocations/phrasemes to micro statements
- **One concept/meaning one (or more synonymous) lexical item(s)**
- **Pointers from elements to occurrences in other LOs**
- **Frequency of occurrence in text or speech corpora by domain or subject, register, application, etc.**
→ **makes learning progress measurable**
- **Links to corpora?**
- **Links to content resources?**

Corpus-based learning

Each simple LO can be used as keyword (key kanji) to browse corpora in order to look for

- **contexts** (teacher and learner)
 - **material for developing exercises** (teacher)
 - **material for preparing tests** (teacher)
-

Corpora should be

- **classified**
- **tagged**

in such a way that systematic „extraction“ of items by domain or subject, register, application, etc. is possible

Corpus-based learning (CbL): didactization of text corpora

- **tagging/mark-up most appropriate for pedagogic purposes**
- **networked/federated content repositories → steep increase in efficiency and effectiveness**
- **most appropriate “categorization” of corpora for given purposes (at least selection criteria for using a corpus or rejecting it can be found)**

→ federated mutually interoperable corpora

Didactization of corpora

- **Text corpora must be systematically marked-up**
- **Software must produce „sense frequency“ – not only lexical form frequency**
- **„Sense frequency“ differs depending on sort of text (and purpose)**
- **Text corpora must be well classified by domain and language register**
- **Software to support extraction of:**
 - **Contexts / co-texts**
 - **Examples of usage**
 - **Material for tests (e.g. multiple choice)**
 - **Material for exercises / drills**

Resource-based learning

Each simple LO can be used as keyword (key kanji) to browse content resources in order

- **to look for special usages** (teacher and learner)
- **to supplement special software** (e.g. text memory)
- **to be used in special applications** (e.g. style checker)

Resources should be

- **classified**
- **data modelled (incl. additional data categories)**

in such a way that systematic „access“ to items by domain or subject, register, application, etc. is possible

Resource-based learning (RbL): based on structured content

**Any entity of structured content
with or without context / co-text
is **potentially re-usable for eLearning****

**Any teaching / learning
starts with a phase for beginners
and may continue
with a phase for advanced students**

**There can be language teaching / learning
for advanced domain experts and
domain knowledge acquisition for advanced language learners
and **anything between...****

CLIL: limitations

Content and language integrated learning

- **Focusing on one target language**
- **Language-pair problem: source l. → target l.**
- **Low degree of systematic approach**
- **Open to all kinds of didactic approaches**
- **Duplication in teaching material creation**
- **Low degree of re-use of data & material**

→ MCLIL

- **based on multilingual structured content at the level of lexical semantics**

Speed / accelerated learning

- Speed/accelerated learning ↔ eLearning?
- Crash courses
- In-car/in-flight learning, etc.
- Advantages vs. disadvantages
- New approaches: often highly technical
- Technology?
 - Low technology → no problem
 - High pedagogics
 - High methodology
- Flashcards?
- Focusing on specific competences for specific purposes → MCLIL

Combined methodology

- **Resource-based learning**
- +
- **Corpus-based learning**
- +
- **MCLIL**
- +
- **Accelerated/speed learning**

Finetuning to target groups of LLS

- Japanese GPL for **beginners**
- Japanese SPL for **beginners**
 - SPL for Japanese students of a domain or
 - SPL for advanced students of Japanese – e.g. translators
- Japanese SPL for **experts** to talk with colleagues
- Japanese SPL for **experts** to have written communication with colleagues
- Japanese SPL for **experts** to give talks on their domain in Japanese

- **If basically multilingual: also for any other language**

Structured content at the level of lexical semantics ↔ eLearning

- **Advantages from a didactics point of view:**
 - Systematic approach
 - Multilingual approach
 - Re-usability/re-purposability of data
 - Measurability of learning results
 - **Disadvantages from a didactics point of view:**
 - Disregard of higher levels of language competence
 - Disregard of higher levels of knowledge organization
- **Make advantages more productive**
- **Turn disadvantages into benefits**

Language +

- **Multimodality**
not only written \leftrightarrow spoken...
- **Non-linguistic representations:**
graphical symbols, etc.
- **Multi-channel output:**
from large display boards to mobile phone displays
- **+eInclusion / eAccessibility**

→ **unrestricted personalization**

„what is good for PwD, is good for everybody“

CEFR – Common European Framework of Reference for Languages

- **3 levels of competence, each subdivided into 2 sub-levels**
- **Focus on oral competence → to be extended**
- **At present not measurable**

CEFR		French	English
Common European Framework	Levels	DELFS DALF certificates	Cambridge certificates
C2	Very advanced	DALF C2	CPE Certificate of Proficiency in English
C1	Advanced	DALF C1	CAE Certificate in Advanced English BEC Higher
B2	Upper intermediate	DELF B2	FCE First Certificate in English BEC Vantage
B1	Intermediate	DELF B1	PET Preliminary English Test BEC Preliminary
A2	Elementary	DELF A2	KET Key English Test
A1	Beginner	DELF A1	

Updating Item Descriptions

“Fastened by a
steel 3-1/2”
threaded bolt”



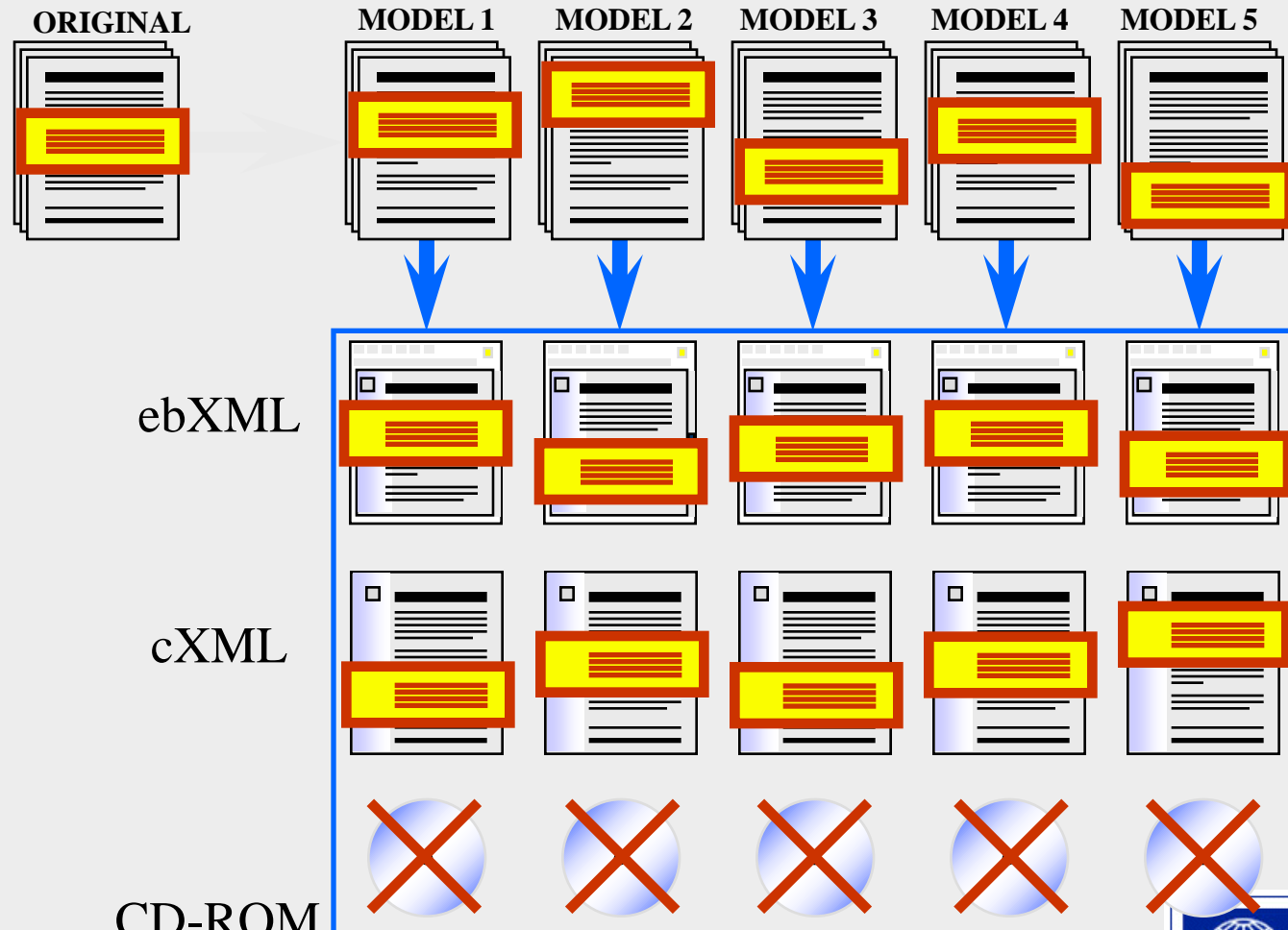
“Fastened by an
aluminum 3-1/2”
threaded bolt”

Source: Ben Martin (J.D. Edwards) 2002

Updating Item Descriptions

Out to different exchanges and formats

Source: Ben Martin (J.D. Edwards) 2002



Updating Item Descriptions

... ideally into various languages

Source: Ben Martin (J.D. Edwards) 2002

