



IFD Library Business Plan

Version 1.0

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1. Mission and Vision Statement

1.1. Vision

Open access to information from diverse sources to support adoption and use of buildingSMART as the standard method world-wide for smart, sustainable construction throughout the entire life cycle of a facility.

1.2. Mission

Provide an accessible, common, language independent, open standard-based structure for organizing terminology so that access and exchange of information can occur between applications, databases, processes and standards used across the facility life-cycle.

2. Purpose and Objectives of IFD Library

2.1. Purpose

The construction industry will increasingly apply building information modeling methods in developing design, procurement, construction and operation/ maintenance of facilities. Building information models apply schema that define the information that they can process.

A schema requires a consistent set of 'names' of things to be able to work. Names could refer to a particular construction (e.g. wall type 1), system (e.g. low voltage electrical supply), material, property set, property etc. Each of these names must have a controlled definition that describes what it means and the units in which it may be expressed. Having a controlled vocabulary of construction terminology is essential to support open data exchange.

IFD Library is a system for making a library of construction terminology that defines the use of a particular 'name' (type, property etc.) in a consistent manner whoever is using the schema and wherever it is used. The terminology library identifies terms using a serial number (Global Unique ID), and its definition is described by associating the term with other terms. The rules about what "kind" of term it is, and how it must relate to other terms is dictated by the ISO standard (akin to the rules of English, but in computer terms) that the IFD Library is based on. Computers can then use the unique ID's to accurately exchange information about the concepts, regardless of the names assigned to them. In addition, when a user further refines an object by adding values and descriptions, those values can all be instantly translated into the other languages available.

2.2. Objectives

- To manage and develop an open, international and multilingual IFD Library based on the principles of ISO 12006-3, 2007.
- To establish and operate IFD Library as financially nonprofit but also self supporting component of buildingSMART technology as a group under buildingSMART International.
- Provide support for implementation of buildingSMART technology in the global building and construction industry through extension of IFC and integration of IFC with IDM.

3. Background

3.1. History

At ISO meetings in Vancouver in 1999, a variety of organizations developing IT standards for the building industry (leading to what we are today calling BIM) agreed that some sort of standardized global terminology was necessary and that its structure must be useful for computers to reliably exchange data irrespective of language. As a result, the ISO committee TC59/SC13/WG6 was tapped to develop the standard now known as *ISO 12006-3 – Framework for Object-oriented Information Exchange*.

Once ISO 12006-3 was published, *STABU LexiCon* in Holland and *BARBi* in Norway each focused their development of the object library databases to be compatible with the standard. In January 2006, the organizations signed an agreement that they would combine their separate efforts into the ***International Framework for Dictionaries (IFD) Library*** to produce a single object library / ontology that they would share between themselves for mutual benefit.

Following the buildingSMART conference held September 2006 in Lisbon, Portugal that included a two day workshop on IFD, the Construction Specifications Institute, Construction Specifications Canada, buildingSMART Norway, and the STABU Foundation (the Netherlands) signed a Letter of Intent to share unified object libraries, developed under ISO 12006-3, as a structure for a controlled dictionary of construction terminology. Following on the goals of the Letter of Intent and a subsequent Partnership Agreement signed in April 2008; the signers applied for and received recognition by the buildingSMART International organization as a Group reporting to the International Council.

3.2. Current Situation

Activity on the IFD Library is focused in three primary areas currently:

1. Management of the business of funding and expanding the use of the IFD Library
2. Development and management of tools for accessing and using IFD Library to structure content libraries
3. Use, harmonization and expansion of content in the library through a series of projects by both Partners and interested organizations.

Progress on these activities is made through the efforts of a Business Management Group (BMG) and a Technical Group (TG). The BMG is made up of representatives of the Partners. The TG is also made up of Partner representatives as well as representatives from organizations conducting projects using IFD Library.

The status of the major components of IFD Library at the beginning of 2009 is as follows:

1. Content – status of creation of integration of existing and creation of new content is as follows:
 - a. Integration of BARBi/LexiCon content is underway with an accurate list of duplicates identified for resolution and upload of the unique concepts progressing.
 - b. Norway has continued to add content to the Library for several projects related to generic products and properties to provide a link to product specific data.
 - c. Several projects in North America are ready to put content into the Library in conjunction with classification in the OmniClass tables.

2. Infrastructure – status of the core components is as follows:
 - a. Application Programming Interface (API) – has gone through testing and debugging and is available for use.
 - b. Content Manager - in development at STABU and is in Draft release.
 - c. Input Tool – PropertyLizer in second release and is available for use by Partners and others undertaking projects.
 - d. Developer’s Toolkit - .NET toolkit completed and in the process of being deployed for software companies.
 - e. Browsers - several browsers are available for download from the website.
3. Projects – Projects are underway in the following areas:
 - a. Technical development:
 - The IFD Library API, currently available as version 2.0. Development work is underway for a version 3.0. A complete list of the technical components of IFD Library is presented in Chapter 7.2
 - b. Content development:
 - Several projects are underway adding content to IFD Library focusing primarily on generic product and product properties and classification.
 - c. Demonstration/early implementation
 - The main focus has been on the development of use case demos as proof of concept for IFD Library. One demo focusing on some of the opportunities IFD Library provides is available at the IFD Library website www.ifd-library.org
 - d. Affiliates projects
 - SINTEF Building and Infrastructure – development of IFD Library Content and content development tools
 - EPM Technology (Norway) – development of IFD Library offline SDK enabling developers to distribute applications which do not require online access to operate
 - e. Several other Affiliate projects pending

4. Opportunities

4.1. Support the efficient delivery of AEC Industry Services

It is anticipated that IFD Library will support the more efficient delivery of many of the processes involved in creating, maintaining and operating facilities both independently and as part of other buildingSMART standards. Any information, guidance or documentation that is published for the industry could potentially benefit from having its terminology rooted in a single, consistent component. Some of those areas where significant business improvement might be possible through the provision of a dictionary to regularize the usage of terminology are:

1. **Codes and Regulations** - Regulations includes documents such as building codes, health and safety and other legislation. All such documents include requirements, elements that are subject to requirements, and exceptional items or conditions that may be outside the requirements. A dictionary is a major addition to the armory of authors of regulatory documents. Without having to check with other members of an authoring team, they can consult a dictionary as a 'controlled vocabulary' source which also incorporates the usage context for the ideas concerned. Where a dictionary does not already contain a required term,

the authoring team can take action to ensure its inclusion and therefore make the dictionary also into a live resource.

2. **Specifications and Standards** - Standards and specifications are also structured documents. They are essentially the same as regulations except that they may not be quite so restrictive in legislative terms. However, for a building client, expression of requirements through specifications and standards may apply exactly the same level of constraint to a construction project as a regulation. As such the same need for application of a controlled vocabulary applies to standards and specifications. In the sense that such documents will also set target values, concepts of values and units may also need to be incorporated into the dictionary idea.
3. **Cost Types** - Every cost on a project needs to be allocated to a cost type and, at present, there appears to be no comprehensive reference to the range of cost types that may be applied to a project. Cost type classification can be of particular value in defining project tenders and even more useful as a basis for recording actual project cost performance for later comparisons.

As well as 'financial cost', the idea of environmental impact values as representing an 'environmental cost' is gaining ground. Classification and definition of environmental costs could form an element within a 'sustainability' dictionary that would have a strong topical applicability.

4. **Product Data** - Product data is considered to be the information about products and materials and their various configurations that may be stored in external product databases and that needs to be delivered to project documents and applications. Various types of product data are defined below.
 - a. **Manufactured Products** - These are the data that will be captured in databases at manufacturers/suppliers or at information brokers. For any given product, there may be very many data items that can be captured. Presently, control of the vocabulary lies with the database producer and therefore there is no guarantee of being able to automatically compare data about a particular type of component from one manufacturer with data about an equivalent type of component from another manufacturer. Comparisons have to be made visually by a human expert. To support consistent information delivery about products, and to support automated searching and comparison, properties of products have to be expressed in a consistent way (or at least be made visible to the outside world in a consistent way). A single source to which all product manufacturers, suppliers and information brokers could go to establish the properties they should use and how they should use them for particular effects would help bring this about. This implies a common dictionary produced and maintained by a single, trusted source.
 - b. **Materials** - Materials, physical properties and material compositions will generally be available from standard industry references as well as from product data sources. However, the same considerations apply. Given the extravagant names of many modern materials, it is possibly even more important that materials names and concepts are captured in a dictionary so that they can be delivered accurately to building information models and project documents and can be checked as part of a code compliance process.
 - c. **Constructed Types** - Constructed types refers to the idea that a project (or multiple projects) make use of a particular configuration of products and materials in a consistent way. Rather than having to continuously specify the configuration, it is more normal to assign a type identifier and refer to this as a definition for every instance of its use.

Construction type definitions may be project specific. However, there are many configurations that are commonly used across an industry sector.

5. **Operations and Maintenance Data** - As with specifications, operating and maintenance instructions (and any other instruction document) represents an opportunity for a structured document and a close relation to building information modeling. Consistent identification of maintenance terms and their use in classifying maintenance operations could prove to be highly useful to clients having multiple maintenance contractors or for clients who are changing contractor on completion of a particular contract.

4.2. Extend IFC Model to achieve cross platform Interoperability

The open international IFC (Industry Foundation Class) standard defines an exchange format for information related to a building and its surroundings. The upcoming release of version 2x4 of the IFC standard will include facilities to exchange GIS data, (e.g. where the building is located and information about surrounding buildings) and facilities to tag all information with a globally unique ID (GUID) from an internationally agreed ontology. With this added functionality the IFC will provide a computer understandable format in which all relevant building information can be exchanged between two parties. The IFC allows various data to be exchanged in various ways. If a receiver of information wants to be sure they can utilize the information received, the sender and receiver need to agree on exactly which information to exchange.

In order to automatically verify the information in an exchange process (as described above) the information needs to be detailed further than the general level of the IFC standard. For example, if an architect wanted to supply information about the type of materials in the beams and columns this would be done in IFC using a plain text string. Even if all of words are spelled correctly there is no guarantee that the receiving application will understand exactly what this text string means. And if a different language, dialect or form of the word is used there is no reliable way to achieve verification. Ideally the computer should be able to understand even this type of information in the IFC formatted information received. This is typically the scenario addressed in semantic searches on the web but in order to automatically interpret the semantic, the semantic needs to be described first. The IFD (International Framework for Dictionaries) (ISO 12006-3) together with the upcoming version of the IFC standard, 2x4, provides a means to make this possible. IFD is a supplement to IFC; it cannot and is not trying to replace IFC.

4.3. On-Line Construction Industry Terminology Resource

IFD Library will provide an open, on-line construction industry terminology resource to support terminology look-up and translation services. Public access to look up terms and translate between supported languages is a by product of the terminology library that can provide a needed service and bring attention to the existence and value of the IFD Library for its more in-depth uses to support interoperability.

5. Market Segments

5.1. End users

Direct Customers/Users for IFD Library are primarily expected to be organizations that provide software and information services for the building industry. End users of the applications and databases these organizations produce will benefit from the presence of IFD Library. Some of

them may directly utilize IFD as well. Major market segments and expected timelines¹ for their adoption are expected to be:

Company Category and Type		Opportunity Timeline ¹
Software	BIM authoring tool	Near-term
	Analysis tool	Near-term
	Facility/Maintenance Repair and Operations (MRO) Management	Mid-term
	Product Lifecycle Management (PLM)	Long-term
	Real Estate Information (OSCRE)	Mid-term
	GIS (OGC)	Mid-term
	Search engine	
Information Publishing	Master guide specification	Near-term
	Cost Data	Mid-term
	Product data	
Building Product Manufacturers		Near-term
Major Architecture/Engineering/Construction/Owner/Operators (AECOO)		Near-term
Standard Setting	Codes (ICC)	Near-term
	Design (ASTM/ISO/Standards Norway)	Near-term

5.2. Regions and languages

Current Partners cover the following geographic areas and languages:

1. Norway – Norwegian
2. Netherlands - Dutch
3. Canada – Canadian English/French (potentially)
4. USA/North America – English

The goal of the current Partners is to add other Partners over time to expand the language coverage to support translation services. The anticipated plan for adding new regions/languages and the anticipated timeframes¹ for doing so are:

- Major languages needed to support desired translation services and potential timeframes for adding to content
 - Spanish – Spain, Americas (CSI CR/PR chapters) – long term
 - Mandarin Chinese – Singapore, Hong Kong - long term
 - French – France (EDIBATEC-SDC) – mid term
 - German – Germany (BauClass/DIN) – mid term
 - Japanese – Japan – long term
 - Russian – long term
 - Arabic – long term
- Other regions/Languages where buildingSMART International is active
 - Finland – interest – mid term
 - Denmark – mid term
 - Switzerland – CRB – near term
 - UK - NBS/Barbour Index/ASITE - near term
 - Australia/New Zealand – mid term

¹ Timeframes for planning purposes: near term = 1- 3 years, midterm = 3 –7 years, long term = 7+ years

6. Related Standards Activities/Organizations

Other organizations involved with the building industry are working on initiatives and systems that address structured terminology in a variety of ways. Known initiatives are identified here with a link to those organizations sites where available. Plans call for IFD Library to try and collaborate with these organizations as appropriate. While these initiatives overlap with IFD Library in some ways, we do not see them as competitors or replacements for IFD Library for the AECO industry. More information about these initiatives will be included in Appendix A as discussions with these organizations are held.

1. FIATECH (<http://fiatech.org>) and POSC Caesar Association (PCA) (<http://www.posccaesar.org/>)
2. United Nations Standard Products and Services Code (UNSPSC) (<http://www.unspsc.org>)
3. GS1 – UPC/Bar Codes (<http://www.gs1.org>)
4. The North American Industry Classification System (NAICS) (<http://www.census.gov/eos/www/naics/>) – (formerly Standard Industrial Classification)
5. NATO Codification Systems (NCS) (http://en.wikipedia.org/wiki/NATO_Codification_System) and (http://www.nato.int/structur/AC/135/ncs_guide/e_guide.htm)
6. Electronic Commerce Code Management Association (ECCMA) (<http://www.eccma.org/>)
7. bau:class (in German only) (<http://www.bauclass.org/>)
8. ETIM International (<http://www.etim-international.com>)
9. OKSTRA (in German only) Object catalog for Construction (www.okstra.de)

7. Components

7.1. Content

Concepts and/or terms contained in IFD Library are openly available to all for look-up. Joining of terms with properties is controlled and associated with a context. Contexts can be public or private; open or copyrighted; from multiple sources; and owned jointly or individually. The ability to define rights and access exists.

Content in IFD Library can be divided in two main categories based on access and organization.

1. **General Terminology Access** - This includes all terminology in IFD Library but no structured collections/contexts(no way to filter by context) - Web browser read-only access through ifd-library.org site
 - Uses:
 - Identify names of objects and their relationships in a BIM authoring, analysis or other system provides translation service based on supported languages
 - General look-up of terminology including synonyms and translation
 - Funding models:
 - Free to end users through IFD Library website
 - Funded by IFD Library Group
2. **Specific-purpose Content Libraries: Contexts** - Content structured based on end use purpose and ownership/responsibility for maintenance using the IFD Library function Context. This content will be available for construction industry either through on-line service (API) or off-line SDK (Software Developers Kit) implementation



- Uses:
 - Structure exchange of data between model authoring and analysis tools
 - Provide translation service based on supported languages
- Funding models
 - Annual license fee for use from s/w or info pub, etc. company embedding access to IFD Library into product or service
 - Reseller license fee for s/w companies developing tools that are licensed to other s/w, information publication companies.

Annual end-user license fee for use by AECO company embedding access into internal knowledge management system where IFD Library is hosting others content. Content in the IFD Library is coming from two main sources:

1. Original BARBi/LexiCon content – these are the terms that were originally created by both initiatives prior to the agreement to merge systems. The BARBi content is currently accessible in the Library. The LexiCon content is currently being merged with original BARBi content. This work is underway and slated for completion in 2009.
2. Project driven content – new content coming into the IFD Library will be generated by projects that are approved by the BMG and TG and follow the established guidelines for operating approved projects and introducing content to IFD. Examples of areas where projects are underway or are anticipated currently are identified by use cases. A table of planned use case types is in Appendix B. A plan for when and by whom these use cases will be developed is being prepared and will be posted on the website when available. For a comprehensive list of active projects refer to the website www.ifd-library.org/projects.

7.2. Technology

The IFD Library is delivered, accessed and used through the following technology components. All technology components identified here are either the property of the IFD Library group and available for use on approved projects or provided openly for use by their developers. All IFD Library technology is available at www.ifd-library.org.

Technology Components	Use	Types	Funding	Availability
IFD Library API and Components	Web Service, programming interface for software applications accessing IFD Library content online.	N/A	Shared expense of IFD Library Group	Open and free at www.ifd-library.org . Use of content licensed.
Programming toolkits	Facilitate development of software tools accessing the IFD Library API both for content creation and access	<ul style="list-style-type: none"> ▪ .Net toolkit ▪ Others types may also be developed 	.Net toolkit is a shared expense of IFD Library Group.	Access controlled by IFD Library BMG, available for Partners and affiliates. Pending guidelines for use
General purpose input/maintenance tools	Create and/or upload existing content/contexts to IFD and then maintain (edit, extend, modify) terms, definitions, properties, relationships	<ul style="list-style-type: none"> ▪ Propertylizer, developed by buildingSMART Norway ▪ CSI/CSC Input Tool – tool, under development ▪ IFD Librarian/Manager (STABU) desktop/web tool – under development 	Self-funded by Partners to access content, funding may pass between Partners to support development in one area or another.	Propertylizer open and free at www.ifd-library.org for demonstration. Upload and maintenance of content only available for Partners and selected affiliates
Browser	Access to view IFD Library terminology and relationships	<ul style="list-style-type: none"> ▪ Desktop application ▪ Online web browser, not developed 	Shared expense of IFD Library Group, free to end users through IFD Library website	Two desktop browsers available at website
IFC property set management tools	Software tools to organize and manage property sets in IFC in different languages.	N/A	Development cost by buildingSMART Norway, handed over to bS Int. Maintenance and further development by bS Int MSG.	bS Int MSG members, not open use
IFD Library websites	Information, documentation and downloads	<ul style="list-style-type: none"> ▪ www.ifd-library.org – general ▪ dev.ifd-library.org - technical 	Shared expense of IFD Library Group	All information open and free. General website content by BMG and technical website by TG
IFD Library collaboration tool	Document handling system through STABU's tool PIM	N/A	Funded by STABU	For IFD Library BMG and TG

7.3. Services

The presence of tools and access to IFD Library will create a market for services to help potential users of IFD Library build libraries using terminology already in IFD Library and add content needed but not present in the Library. This work will likely be done by consultants that have experience working with the IFD Library. Benefits to the IFD Library Group will come from participation in IFD Library by consultants and project sponsors.

8. IFD Library Group Organization

IFD Library Group became a part of the buildingSMART International Organization as of April 2007. The Charter that defines how IFD Library will operate within bSI is included as Appendix C. It defines reporting, meeting, membership and fee requirements. Participation levels defined in the Charter are:

1. **Partners** - members of the Business Management Group, currently CSI, CSC, buildingSMART Norway, STABU
2. **Affiliates** - Organization which has been approved by the IFD Partners to execute a project to extend or enrich the IFD and signs a project agreement.
3. **Observers** - Organization which has expressed an interest in the IFD, signs an LOI and may become Partner in future but not automatic.

Regular operations of the IFD Library are handled by two groups:

1. **Business Management Group (BMG)** - responsible for the operation, funding and overall management of the endeavor, it is made up of representatives from the Partners. Responsibilities are further identified in the Charter.
2. **Technical Group (TG)** – responsible for ongoing development of the IFD Library tools and content and for interacting with organizations using the Library, is made up of Partners, Affiliate and Observer representatives. Responsibilities are further identified in the Charter.

9. Operations

9.1. Sales and Marketing

Marketing Program

Communications about what IFD is and how it supports IFC and IDM to core development community through website, demos and white papers are the major components of the Marketing plan.

1. **Website** - a public site with information on IFD Library, demos, access to IFD Library through browser interface, access to tools (PropertyLizer), links to collaboration site, developer forum, and content forum. It is to be hosted by CSC/Digicon. Will continue to develop on an ad hoc basis in short term, may require added development/funding in midterm.
2. **Demonstrations** - helpful to show potential uses, also need to develop a series of use cases. Norwegian demo that illustrates how an architect would build a model then perform language translation, select products, prepare cost estimates, and store relevant data back on model is a good example of what is needed.
3. **Collateral Material** – current documents available or in development are:
 - IFD Library Brochure describing group and membership categories/programs
 - IFD Library White Paper describing what IFD is, how it works with examples

- IFD Library Use Case Paper

Sales Approach

1. Expect to generate revenue initially from fees paid by Partners, Affiliates and Observers. As projects are completed and consistent usage is established expect to transition to usage fees. For more information on fees see Financial section.
2. To attract participants and generate interest in IFD Library plans to conduct periodic workshops on both national and regional level.
3. Expect to attract sponsors through projects.
4. Expect new observers and affiliates from promotion of IFD through communications and participation in industry events.
5. Expect to target major BIM software companies, product data publishers, building product manufacturers, major government agencies and standards organizations.

9.2. IP/Copyright/Legal issues

IFD Library will include combination of open source and copyrighted material from diverse group of providers. Terms submitted to IFD Library are available to all; contexts (collections) can be restricted from viewing as group and restricted from editing by others in the defined context.

The following Agreements are in place to define the relationships between parties involved with or using the IFD Library. :

1. IFD Library Partner Agreement - Between IFD Library Partners defines roles and responsibilities of partners
2. Observer Agreement - Between IFD Library Partners and interested observers
3. Affiliate Agreement - Between IFD Library Partners and Affiliates (organizations undertaking projects using IFDL technology) defining project scope, timeline, support required
4. End User License Agreement - Standard form of agreement between IFD Library Partners and companies/organizations embedding IFD Library access into commercial products and services

Ownership of the IFD Library assets/intellectual property (the IFD Library Technology, the IFD Library Database, the IFD Library Content, and the .Net Toolkit and PropertyLizer) is shared by the partners that are signatory to the Partner Agreement. In the future ownership of the IFD Library assets may be moved to an international organization such as buildingSMART International. This will be determined by the BMG through discussions with buildingSMART International over the coming year.

9.3. Content Management

1. **Development Approaches** - determined and funded by national organizations based on needs/demands, agree to coordinate efforts to try and avoid redundant work/leverage effort
 - a. General terminology development
 - b. Project-driven development – preferred approach because connects to demand
 - c. Agree that primary view of construction types is element (UniFormat) view and will attach to terms, future goal is a common element library
2. **Management** – process of reviewing and authorizing content for publication in IFD public space for use by others responsibility of each region
 - a. Agree to follow shared procedures in each region based on Norway draft

- b. Regions manage review process for content input/adopted based on agreed procedures
 - c. Regions bear cost of review for their own projects
 - d. Establishing global context would require review by IFD Library Partners, cost would be shared by those interested initially could be funded by group in the future
3. **Maintenance** – Will need to establish procedure for adding/changing content in future
- a. Feedback procedure for question needed
 - b. Measure usage of terms to identify where to focus effort
 - c. Region responsibility for now but could be IFD Library Partners for global approved content

9.4. Support of Tools and Infrastructure

1. IFD Library Partners will need to arrange for support of API, Server and shared Applications
 - a. Direct service to projects through talking directly with developers has a cost, IFD Library Group shared expense to make available, need to set some guidelines and move to share basic funding from IFD Library Group, additional requirements above basic would be borne by requester
 - b. Developers wiki and forum monitoring – getting minimal use now, expect to grow over time, will provide basic level of support through IFD Library Group
2. Regions support tools they develop as part of projects and bear cost

9.5. Training

1. Initially through workshops to promote use of tools and development of content
2. Partner participation self-funded, attendees pay fee to cover cost of meeting
3. Driven by project requirements as needed, attempt to develop online delivery
4. Funded by regions/projects depending on requirements
5. Will develop over time into more extensive requirements as IFD Library grows but would strive to make it cost-neutral

9.6. Staffing

1. Initially no IFD Library staff, services from Partners, may need a volunteer Secretariat towards end of near term, add in future as/when revenues and number of Partners grow, mid-term issue
2. Currently regions need to identify and make available a business and technical point of contact
3. Administrative services could come from buildingSMART International

9.7. Accounting

1. For collection/management of funds and for taxation purposes
2. Assume no cost impact, in near term one of Partners (CSC currently filling this role.) will handle, in future may be by buildingSMART, will need to establish legal entity at some point in future, may follow buildingSMART

10. Financials

10.1. Business Model Components

Membership

Charge annual membership fees for each category of participation to pay for ongoing expenses of providing, maintaining, further developing IFD Library platform (server, API, core tools) based on following schedule (tentative):

- Partner – target annual fee at €5000, 4 organizations
- Affiliate – target annual fee at €2000, potential of 10 organizations
- Observer – target annual fee at €1000, potential of 10 organizations
- Fees may be adjusted over time to match costs of operating IFD not covered by other payment streams as IFD is deployed. Fees began in 2008.

Project by project funding

Payment for project work undertaken by members accrues to organization with project. May undertake joint projects in future but not currently anticipated for IFD Library Partners.

Licensed product fee

Licensed product fee is an annual fee for the use of IFD Library content by an organization embedding access to IFD Library into a product or service. This will be the main source of revenue for operating IFD Library longer term as a profit neutral enterprise. For now this provides access to IFD Library and any relevant collections/contexts. In the future this may move to licensing of collections based on amount of content accessed.

1. **Embedded license fee** – to software developers, other integrators for using IFD Library access in a product (per product/product line, would require negotiation), tiered annual fee based on broad measures of organization size/sales volume. Possible fee structure:
 - a. Large global - €30,000
 - b. Mid-size regional/national - €15,000
 - c. Small national - €5000

Fees would be waived for first year then graduated over next 2 - 3 years to provide for integration and content development timeline (will require a plan to illustrate intent and availability) in accordance with following schedule.

Annual charges in €	YR1	YR2	YR3	YR4	YR5
Global	0	5000	15000	30000	30000
Regional	0	2000	8000	15000	15000
National	0	1000	3000	5000	5000

Additional requirements to be considered in the future:

- d. Discount schedule for multi-product companies and renewals
 - e. Reseller situation where an organization is embedding IFD Library in a product they will sell to another organization that is selling a product.
2. **End-user fee** – paid directly by a practitioner/organization for access to value added services above basic browser access where use is not embedded in a product that is being directly sold.



- a. Global Companies
 - BPM - €5000
 - AEC - €2000
 - Owners - €2000
- b. National Companies
 - BPM - €2000
 - AEC - €1000
 - Owners - €1000

No fees will be charged until a product is fully implemented to support commercial activity.

Services

Revenues and costs by organization that delivers it.

Training

Costs and revenue to be handled by organization that delivers the training. Perhaps this some time in future will be an IFD Library Partners activity but for now will be by each organization with sharing of development between Partners.

10.2. Treatment of Revenue and Cost

- IFD Founding Partners (STABU/BSN) have invested in considerable development to date that they are contributing to the formation of the IFD core content and platform to create IFD
- Beyond this investment revenue and cost associated with the IFD Library core content and platform application will be shared by Partners
- Partner organizations can contribute development to core content and application based on capacity and projects
- Partner organizations can ask for compensation from other Partners for needed core development work. Partners agree if need and whether can provide funding.
- Development projects associated with applying IFD accrue to organization that gets the project
- Revenue and cost associated with applications developed on top of platform accrue to organization developing application
- CSC will act as bank for IFD Library Partners.

10.3. Financial Worksheet

A summary of anticipated revenue and expenses shows the initiative sustaining itself with funding from fees and projects. This model represents a minimal investment in the ongoing development and expansion of the Library. It may not fully account for costs to support the expanded use of IFD Library when projects begin to yield regular use. It also reflects a very modest growth in membership classes. It is anticipated that these projections will continue to be refined based on growth in adoption, use and interest with the goal of keeping the initiative self-sustaining and reinvesting in needed resources to do so as growth is demonstrated. This is derived from a more detailed financial model worksheet posted on the collaboration site and expected to be updated annually.

IFD Library Summary Financials

2008-05-09

	2008	2009	2010	2011
Revenue				
1 Fees	€ 24,000	€ 30,000	€ 38,000	€ 68,250
2 Additional Partner Funding	€ 87,187	€ 31,332	€ 20,000	€ 20,000
3 Licensing				
Total	€ 111,187	€ 61,332	€ 58,000	€ 88,250
Costs				
4 Development	€ 90,568	€ 36,532	€ 25,200	€ 25,200
Content	€ -	€ 2,000	€ 5,000	€ 10,000
5 Marketing	€ -	€ -	€ -	€ 5,000
Support	€ 15,213	€ 23,624	€ 30,000	€ 40,000
Total	€ 105,781	€ 62,156	€ 60,200	€ 80,200
Margins	€ 5,406	€ (824)	€ (2,200)	€ 8,050
		-1%	-4%	9%

Notes:

- 1 Partner, Affiliate, Observer Fees
- 2 Additional funding from all partners in 2008 and from bSN in later years. Funding from bSN and STABU for earlier development contributed to the Partnership not reflected here.
- 3 No licensing revenue is forecast at this point until content and access more widely distributed and available. When access to IFD is embedded in applications, these Licensing fees will begin to be generated however it is anticipated that these will be largely offset by increasing support expenses.
- 4 Development expense is largely for maintenance of existing assets, new development to be based on requirements and funded if warranted.
- 5 Marketing expenses borne by partners initially

11. Risks

1. **Funding** – continuing the ongoing funding of development work until IFD Library comes into wide enough use to be self-sustaining for the Partners is a real threat. Currently the Partners are able to keep the initiative going with their own funds augmented by additional investment from Norway. Given that the core development is in place and funded projects are starting to be done using IFD, this risk should be manageable through matching expenses to available resources and bringing in other Partners. If steady progress on growing usage is not made, then this will become a problem in the future.
2. **Related Semantic Standards Initiatives** – no other initiative exists with the same characteristics as IFD Library. While other semantic standard initiatives exist, most notably ISO 15926, see Appendix A for a full list of related standards, no others are connected with the buildingSMART standards and as a result as relevant to the building construction industry.

3. **Resistance/Apathy** - Resistance is simply the natural inertia of a large body such as the building construction industry. It can take time and effort to change the way that people do business. In this case however, the now rapid take-up of building information modeling within the industry provides an opening through which it is possible to demonstrate the value of dictionary driven services. Mitigation of this threat is seen to be by marketing and education. It is likely that this will be undertaken in conjunction with other organizations who want to develop specific services on top of the industry move to modeling and who themselves may be key customers of a dictionary service.
4. **Never getting it done and used** – creating a common terminology library for a large and diverse industry is a significant undertaking. The technology involved is relatively complex and still being refined. Either of these challenges are daunting, both exist in this project. Having said this, there is a significant need for better control of the namespace in the building industry and IFD Library offers a potential solution. While the technology will be an ongoing challenge to make accessible and keep current, there are resources with these capabilities. As more projects are undertaken, the pool of qualified technologists will expand along with the reliance of more users providing more ability for the Partners to fund support resources.

12. Recommendations

The following recommendations for IFD Library are the result of this Plan:

1. Pursue the continued development of the IFD Library at a measured pace to advance the technology and the content in concert with each other.
2. Bring in Affiliates and Observers in the Partner countries to start making use of the technology and to use and expand the content while developing procedures and support that ensure the IFD becomes a valuable and useful service.
3. Add Partners to expand the language coverage of IFD Library as the technology and procedures for content usage are established and become commercially usable over the next year.
4. Continue to work with buildingSMART chapters and international to integrate IFD with IFC and IDM/MVD and ensure the use of IFD Library on all buildingSMART projects.
5. Seek opportunities to collaborate with other related terminology standard initiatives to reduce confusion in the industry and leverage benefits through shared efforts.
6. Operate IFD Library as a self-sustaining enterprise that provides a stable and reliable platform for the global building industries terminology structure.

Appendix A - Related Standards Activities/Organizations

1. FIATECH (<http://fiatech.org>) and POSC Caesar Association (PCA) (<http://www.posccaesar.org/>)

Brief Description: FIATECH is a consortium of industries and companies – owners from the industrial, power, and retail markets that, of necessity, build large assets such as refineries, power plants, large commercial buildings, or manufacturing facilities. In addition, it includes the leading providers of engineering, design, and construction services.

PCA is a global, nonprofit member organization that shall promote the development of open specifications to be used as standards for enabling the interoperability of data, software and related matters. PCA initiated ISO 15926 “Integration of life-cycle data for process plants including oil and gas production facilities” and is committed to its maintenance and enhancement.

FIATECH and PCA has joined in a formal collaboration focused on the development of the ISO 15926 standard for the integration of life cycle data for process plants, and the development of a tool to deploy it.

Markets: FIATECH is a membership organization with member companies and organizations primarily from North America, including universities and research organizations. PCA is a global, nonprofit member organization. FIATECH has 61 members (organizations) and some additional individual student members. PCA has 30 – 40 members.

Revenue Model: FIATECH has an annual membership fee ranging from \$100 to \$45 000 in a wide range of categories. PCA has an annual membership fee from €2 000 to €25 000, depending on type of company and gross revenue.

Recommended Strategy: Parts of the development of POSC Caesar is very relevant for IFD Library and the potential for a more formalized collaboration should be evaluated.

2. UNSPSC (www.unspsc.org)

Brief Description: A globally used classification hierarchy for products and services owned by the United Nations Development Programme (UNDP) and managed by GS1 US. UNDP owns all rights to the UNSPSC. The UNSPSC classification system that can be used for

- Company-wide visibility of spend analysis
- Cost-effective procurement optimization
- Full exploitation of electronic commerce capabilities

Markets: UNSPSC has a global market with 4000 members representing more than 80 countries

Revenue Model: UNSPSC is funded through member fees. Membership: \$300 individual - \$6 000 Corporate Global

Recommended Strategy: The UNSPSC could be relevant to IFD Library with respect to classification content and mapping of classification. This should be evaluated more closely as more progress is made with respect to classification content.

3. **GS1 – UPC/Bar Codes** (www.gs1.org)

Brief Description: GS1 is a global organization dedicated to the design and implementation of global standards and solutions to improve the efficiency and visibility of supply and demand chains globally and across sectors. GS1 manages UPC (Universal Product Code) a global system that allows companies all around the world to globally and uniquely identify their physical things like trade items (products & services), assets, logistic units, shipments, and physical locations and logical things like a corporation or a service relationship between provider and recipient.

When the GS1 identification system is combined with for example GS1 BarCodes the connection is made between these physical or logical things and the information the supply chain needs about them.

Markets: GS1 has a global market but the GS1 Member Organizations handle all enquiries related to GS1 products, solutions and services. GS1 has Member Organizations in over 100 countries globally.

Revenue Model: Products and subscription

Recommended Strategy: Needs further evaluation

4. **The North American Industry Classification System (NAICS)**

(www.census.gov/eos/www/naics)

Brief Description: The North American Industry Classification System (NAICS), (formerly Standard Industrial Classification) is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy.

Markets: North America (Canada, USA, Mexico)

Revenue Model: Development publicly funded, freely available on website

Recommended Strategy: Needs further evaluation

5. **NATO Codification Systems (NCS)**

(http://en.wikipedia.org/wiki/NATO_Codification_System) and

(http://www.nato.int/structur/AC/135/ncs_guide/e_guide.htm)

Brief Description: NCS is a standard approach to identify, classify and number items of supply. This is applicable to items that are repetitively used and stocked (e.g., repair parts, equipment, food items, etc.). The System has been agreed by all signatories of the NATO and sponsored non-NATO nations for use in identifying equipment and supplies. The result is a unique identification and a data set that can be easily shared and understood by a wide range of users. The data set may be shared in the form of printed catalogs, on line systems, electronic data exchange, etc. Users include logistician and manufacturers.

Markets: NATO Members

Revenue Model: Development funded by NATO and member countries

Recommended Strategy: Needs further evaluation

6. **ECCMA –Electronic Commerce Code Management Association** <http://www.eccma.org/>
Brief description: An international association of industry and government master data managers working together to increase the quality and lower the cost of descriptions of individuals, organizations, goods and services through developing and promoting International Standards for Master Data Quality. ECCMA operates under a defined architecture with comprehensive rules and procedures for code development and maintenance. Specifically code development and maintenance must remain an open consensus process and shall not be dominated by a single organization or interest category. Any person or organization with a direct and material interest may participate in the development and maintenance of the codes maintained by the ECCMA.

Markets:

Revenue Model: Membership fees: \$ 25 educational - \$ 5000 Corporate global

Recommended Strategy: Needs further evaluation

7. **bau:class** www.bauclass.org
Brief description: German classification system for building products and building materials. The system consists of approximately 5000 product and part groups and is developed further with working groups.

Markets: Germany

Revenue Model:

Recommended Strategy: Needs further evaluation

8. **ETIM** www.etim-international.com
Brief description: The fundamental idea is the international use of a standard ETIM model. The integration of the ETIM structure in international companies against the background of globalization only makes sense when the application can be carried out internationally long-term. Suppliers and wholesalers alike see a strategic option to standardize the flow of data and exchange the article information between the countries as far as centrally administered databases for all available products. The main goals for ETIM International is to secure the intellectual property of the ETIM product classification, secure integrity and basic uniformity throughout Europe, to establish one standard for the electro technical-, mechanical- and sanitary industry, to coordinate cooperation with other standardization organizations and to start initiatives on concern of the European Commission.

Markets: Electro technical-, mechanical- and sanitary industry, Seven European countries.

Revenue Model: Membership fees (unclear on fee structure)

Recommended Strategy: Needs further evaluation

9. **OKSTRA** (www.okstra.de in German only)

Brief description: Objektkatalog für das Straßen- und Verkehrswesen (Object catalog for roads and transportation)

Markets: Needs further evaluation

Revenue model: Needs further evaluation

Recommended Strategy: Needs further evaluation

Appendix B – Planned Use Cases

Name	Description	Actors
Product Selection from a BIM	Selection of product to fit general requirements from a BIM and placing the appropriate/relevant information about the specific product back into the BIM	Designers BIM operators
Product Library Structure	For an owner/author of a product library (information publisher or building product manufacturer), organizing information to support searching on common properties/attributes by a user of a BIM design application and providing relevant/appropriate information back to the BIM authoring application (for organizations interested in satisfying case i.)	Content publishers Product Manufacturers
Facility/Asset Management	For an owner of building assets, use a common set of names for items they are interested in managing such as pieces of equipment that need to be managed/maintained from within a CMMS system (IFACT project) or spaces to support space measurement, space planning and common naming on design documents (VA project and GSA)(HOK Aquarium Room Logistics)	Designers Contractors Owner - Facility/ Maintenance Managers
Facility/Asset Management	Information handover of manuals, documentation, warranties, maintenance manuals, as-built drawings/models at project completion from contractor to owner (COBIE project)	Designer Contractor Owner
Specifications and BIM	Generate specifications from BIM with mixture of different specification types to meet project requirements	Designer Specifier
Specifications and BIM	Identify objects in a BIM and establish the requirements for information about objects in a model to be present in the specifications (SPIE project)	Owner Designer Specifier
Code Checking	Checking Code requirements and compliance from a BIM (SMARTCodes project) (SN in research)	Designer Code Official
QTO	Establishing work items from model and performing quantity take-off (in Norway and other countries, this is linked to specifications) (AECOO Testbed project)	Designer Contractor Cost Consultant
Costing	Cost estimating of a BIM – related to QTO but discreet process	Designer Contractor Cost Consultant Owner
Design Analysis	HVAC Drawing/Model and Specification Coordination (NEMI/NCSEMBT project)(Norway Aquarium MEP costing)	Designer Specialty Contractor Fabricator
Design Analysis	Structural Steel analysis – as part of work already done in this area by ASIC (and others)	TBD
Design Analysis	Precast Concrete analysis – as part of work already done in this area by bSA (and others)	TBD
Energy Analysis	Energy analysis (AECOO Testbed project)	TBD

Appendix C – IFD Library Charter

General

IFD Library Group (IFDLG) is a standing committee of buildingSMART International (formerly known as IAI International) operating as an externally funded group under the regulations of IAI International². IFDLG is established according to the decisions made at the IAI International Council meeting #21 in London April 2007.

Objective

The overall objective of IFDLG is to:

- To manage and develop an open, international and multilingual IFD Library based on the principles of ISO 12006-3, 2007.
- To establish and operate IFD Library as financially nonprofit but also self supporting component of buildingSMART technology as a group under buildingSMART International³.
- Provide support for implementation of BuildingSmart technology in the global building and construction industry through extension of IFC and integration of IFC with IDM.

Organization

The IFDLG consists of a Business Management Group and a Technical Group. IFDLG has Partners, Affiliates and Observers.

- **Business Management Group (BMG):**
 - Is responsible for the advancement of the IFD Library
 - Directs the Business Management of the IFD Library
 - Develops a Global Strategy/ Business Plan for IFD Library.
 - Develops and approves administrative, input and technical procedures
 - Reviews Regional Strategies for IFD Library from Partner Organizations.
 - Reviews all new IFD Library projects by Partners and approves all new Initiatives by Affiliates (unanimous approval required). BMG will retain rights to terminate or change any project/initiative that fails to meet Regional or Global Strategies, or if the project/initiative fails to meet the proposed terms.
 - Is responsible for all IFD Library Workshops, demonstrations, and general meetings.
 - Approves new Partners and Affiliates (unanimous approval required)
 - Responsible for the content and the development of the IFD Library official websites (www.ifd-library.org)
 - Appoint members to the Technical Group
 - Approves all Technical Group activities and budgets
 - Reports to the buildingSMART International Council
 - Responsible for liaising with ITM on technical matters
 - Membership to BMG: Partners only.
 - Shared leadership (may appoint chair in future)
- **Technical Group (TG):**
 - Acts under the direction of and reports to the BMG

² Articles of association of IAI International Council Limited, May 16th 2003

³ IFD Library Outline Business Plan, 09.10.07

- Proposes technical development activities to BMG.
 - Is responsible for progress of technical development projects approved by BMG
 - Develops content management procedures
 - Reviews technical aspects of all proposals from Affiliates and provides recommendations to BMG.
 - The TG consists of at least one representative from each Partner and Affiliate organizations as appointed by BMG
 - Technical meetings are open to all Partners, affiliates, observers and others as invited by the TG
 - The TG will elect a Leader from its membership for a two year term.
- **Partner:**
 - Is a permanent member of the BMG.
 - Must sign the official Memorandum of Understanding.
 - Partners individually develop Regional Strategies for IFD, with review of the BMG.
 - Region/Language gatekeeper for the IFD.
 - Regionally responsible for Quality Assurance of content.
 - Jointly responsible and committed to the technical development, content development and the implementation of IFD Library regionally and globally.
 - CSI, CSC, buildingSMART Norway, STABU Foundation are the founding Partners of the IFDLG .
 - The intention is to expand the Partner group over time.
- **Affiliate:**
 - Organization which has applied and been approved by the IFD Partners to execute a project to extend or enrich the IFDL. The Affiliate Project Proposal must:
 - Be complete, and include execution, funding, scope, and timeline plans.
 - Follow the IFDL global strategy, and must not conflict with any of the Regional Strategies.
 - Conform to accepted IFDL standards
 - Affiliate status is dependent upon the existence of an approved current or planned project.
 - Must provide regular reports to the Business Management and Technical Groups.
 - Affiliates can attend all IFD Library meetings with the exceptions of BMG meetings.
 - Must agree to allow IFDLG to publish their names as “IFD Library Affiliates”
 - Must provide a statement why the IFD Library is interesting/ useful, and allow the statement to be published.
 - Must sign a simple, brief agreement, outlining these responsibilities.
 - Affiliates may be considered for partnership.
- **Observer:**
 - Organization which has expressed an interest in the IFD Library.
 - Must agree to allow IFDLG to publish their names as “IFD Library Observers”
 - Must provide a statement why the IFD Library is interesting/ useful, and allow the statement to be published.
 - Will receive periodic information about the IFD Library
 - Optionally participate in workshops and demonstrations
 - Must sign a simple, brief agreement, outlining these responsibilities.
 - Observer status does not automatically imply eventual partnership.



- **buildingSMART International Chapters:**
 - In their participation in the buildingSMART IC, buildingSMART International Chapters will automatically receive reports and updates on IFD Library development.
 - buildingSMART International Chapters will have the right to observe all IFD Library workshops, general meetings and Technical Group meetings.
 - buildingSMART International Chapters may not automatically attend BMG meetings.
 - buildingSMART International Chapters may become Observers, Affiliates, or Partners if they meet the requirements of each respective group.

Meetings

Meetings will be associated with appropriate buildingSMART International events as far as possible. Meetings are open to all observers with the exception of BMG meetings which are open to IFD Library Partners and invited observers only.

Projects

IFDLG has complete control over IFD Library the technical infrastructure and official content. Any project aiming at changing, altering or further developing the IFD Library infrastructure or claiming to be an official IFDLG project requires review and approval from the IFDLG Business Management Group.

Appendix D – Acronyms and Definitions

Acronym/Term	In full	Description
General		
BARBi	Bygg og Anlegg Referanse Bibliotek	The original Norwegian development which is part of IFD Library
IFD	International Framework for Dictionaries	Initiative to build a construction wide object library based on the principles of ISO 12006-3:2007
IFD Concept		The IFD Concept is the building block of IFD Library. A concept is a thing that can be distinguished from other things and recognized as such, and is represented by a name (term). In IFD Library a concept is described both by a set of names and definitions in multiple languages but also with relating a concept to other concepts.
IFD Context		A context in IFD Library is a grouping of relationships that exists between concepts. There are multiple ways of viewing a concept and the relationships between concepts. IFD Context is the filtering mechanism used to organize these views.
IFDL	IFD Library	An object-oriented database of concepts which we can use to describe the built environment. A component of the buildingSMART technology http://www.ifd-library.org
IFDLG	IFD Library Group	The group of participating organizations in building IFD Library. See IFD Library Group Charter in Appendix C
IFDLG-BMG	Business Management Group	The BMG is made up of representatives of the IFD Library Group Partners. See IFD Library Group Charter in Appendix C
IFDLG-TG	Technical Group	The TG is also made up of Partner representatives as well as representatives from organizations conducting projects using IFD Library. See IFD Library Group Charter in Appendix C
IFDLP	IFD Library Partners	See IFD Library Group Charter in Appendix C
IFD Library Affiliates		Organization which has been approved by the IFD Partners to execute a project to extend or enrich the IFD and signs a project agreement. See IFD Library Group Charter in Appendix C
IFD Library Observers		Organization which has expressed an interest in the IFD and signs an LOI. May become Partner in future but not automatic. See IFD Library Group Charter in Appendix C
IFD Library Partners (IFDLP)		The organizations working together on the development of IFD Library and members of the Business Management Group. See IFD Library Group Charter in Appendix C
LexiCon		The original Dutch development which is part of IFD Library

Acronym/Term	In full	Description
Organization(s)		
bSN	buildingSMART Norway (NO)	http://www.buildingsmart.no/
buildingSMART International		buildingSMART International (formerly IAI International) http://www.buildingsmart.com is an international membership organization with representation in North America, Europe, Asia and Australasia. IFD Library Group is a part of buildingSMART International
buildingSMART IC	buildingSMART International Council	The highest decision making body within the buildingSMART International.
buildingSMART ITM	International Technical Management Committee	The International Technical Management Committee is the highest level technical decision-making and technical project management body for buildingSMART International.
buildingSMART MSG	Modeling Support Group	Model Support Group (MSG) is a standing group under ITM. MSG members are modeling specialists selected for their proven skills. Their primary role is the quality assurance, integration and maintenance of the IFC model and its documentation.
CSC	Construction Specifications Canada (CA)	http://www.csc-dcc.ca/ IFD Library Group Partner
CSI	Construction Specifications Institute (USA)	http://www.csinet.org IFD Library Group Partner
EPM Technology		Developer of model servers, currently hosting IFD Library database. www.epmtech.jotne.com/
FIATECH		FIATECH provides global leadership in identifying and accelerating the development, demonstration and deployment of fully integrated and automated technologies to deliver the highest business value throughout the life cycle of all types of capital projects.
Holte Byggsafe		Developer of the IFD Library PropertyLizer and IFD Library .NET toolkit.
ICC	International Code Council	US organization that administers the International Building Code (IBC) and developer of SmartCodes
ICIS	International Construction Information Society	ICIS is a worldwide association of organizations which provide national master specification systems and/or cost information systems for the construction industry.
NOBB	Norsk Byggevarbase	Norwegian system for product information
SINTEF Building and Infrastructure		Norwegian research institute heavily involved in the development of the IFD Library Technical Infrastructure www.sintef.no/Home/Building-and-Infrastructure/
STABU Foundation	Dutch Specification Institute (NL)	http://www.stabu.org IFD Library Group Partner

Acronym/Term	In full	Description
Technical		
IFD Library API	Application Programmers Interface	The way to access the IFD Library through a web service. Full documentation on http://dev.ifd-library.org
BIM	Building Information Modeling	The process of developing a virtual representation of a real building. Beyond geometric data, BIM includes all types of information about a facility.
CITI	Construction Industry Terminology Initiative	CSI program for identifying term used in drawings and specifications
EULA	End User License Agreement	
GUID	Globally Unique ID	Identifier for an item that is guaranteed to be unique everywhere. A pseudo-random number used in software and database applications. While each generated GUID is not guaranteed to be unique, the total number of unique keys (2 ¹²⁸ or 3.40282366×10 ³⁸) is so large that the probability of the same number being generated twice is very small. The term GUID usually references Microsoft's implementation of the Universally Unique Identifier (UUID) standard, however, many other software developments and standards including IFC use the term GUID.
Pset tool	Propertyset tool	Connection tool between IFC and IFD. Managed by buildingSMART MSG
SDK	Software Developers Kit	Set of programming tools that allow programmers to develop specialized computer applications and adapt them to various operating systems
UI	User Interface	

Acronym/Term	In full	Description
Classifications/Standards		
EPISTLE	European Process Industries STEP Technical Liaison Executive	
ETIM	Electronical system Installation techniques	Article classification for Electrical articles. Developed in The Netherlands, now being implemented in multiple European countries.
EXPRESS		A data definition language defined by ISO 10303-11 EXPRESS language reference manual. EXPRESS is a formal language that can be used to define product data models. Note: IFC Object Model is defined using the EXPRESS language.
EXPRESS Model		An information model described using the EXPRESS language. An EXPRESS model may comprise a number of interrelated schemas.
EXPRESS-G		A graphical notation for the EXPRESS language. EXPRESS-G defines graphical symbols for a subset of the elements of the EXPRESS language.
EXPRESS-X		A mapping specification language for defining a mapping between data sets based on different EXPRESS-models.

		EXPRESS-X is defined by ISO 10303-14 within the EXPRESS language family.
IDM	Information Delivery Manual	A standard, ISO DIS 29481-1 under development of ISO/TC 59/SC 13, which enables building processes to be modeled; enables delivery of relevant model data to the appropriate user. According ISO DIS 29481-1 The IDM specifies: <ul style="list-style-type: none"> ▪ a methodology that unites the flow of construction processes with the specification of information that is required by this flow, ▪ a form in which the information should be specified, ▪ an appropriate way to map and describe the information processes within a construction lifecycle.
IFC	Industry Foundation Classes	An international specification for product data exchange and sharing for AEC/FM. IFC enables interoperability between the computer applications for AEC/FM. A subset of IFC is approved as ISO/PAS 16739.
ISO 10303 Standard		ISO 10303 Product data representation and exchange standard. An international standard that has defined the basis for product data technologies, and product data exchange standards for a number of industry sectors.
ISO 12006-3	Framework for Object Oriented Information Exchange	This part of ISO 12006 specifies a language-independent information model which may be used for the development of vocabularies used in information about construction works. It enables classification systems, information models, object models and process models to be referenced from within a common framework.
ISO 15926	Methodology for the creation of reference data libraries	Industrial automation systems and integration - Integration of life-cycle data for process plants including oil and gas production facilities
MVD	Model View Definition	Model View Definitions (MVD) are used for documenting IFC based data exchange capabilities in software. www.blis-project.org/IAI-MVD
OmniClass		North American classification System for the construction industry developed according to ISO 12006-2. www.omniclass.org
SfB	Samarbetskommitten for Byggnadsfragor	The original SfB system was developed in Sweden in 1959. Still used widely in construction industry in multiple countries. Available in multiple languages.
STEP	Standard for The Exchange of Product model Data.	A set of international standards under the designation ISO 10303.
Uniclass	Unified Classification for the Construction Industry	British classification system for construction industry published in 1997 in UK by the Construction Project Information Committee (CPIC). www.en.wikipedia.org/wiki/UniClass