Document id	Title	Organisation /Author	Date	Status
	IFC for Site, Landscape, and Urban Planning	Jeffrey W. Ouellette	2018-11-12	V1.0

Activity Proposal

Descriptive Name

Open Standard Based Data Modelling, Workflows, and Data Exchanges for Site, Landscape, and Urban Planning Design, Procurement, Construction and Operations

AKA "IFC for Site, Landscape, and Urban Design"

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Room

The domain of site and landscape is a significant interstitial realm between the building and infrastructure domains, having significant integrated opportunities with each, as well as connecting those two together. Urban and regional planning and design can be seen as a larger, abstract superset domain with interests in the physical (land use, environmental impact, transportation, communication systems, etc.) and more abstract aspects (demographics, economics, public welfare, development policy and strategy, etc.) of the others. As buildingSMART International embraces the concept of "describing the entire built environment", it must also recognize the intricate weaving, often merging, of all these distinct disciplines with each other in the undertaking and completion of individual projects as well as the larger aggregation of projects into regional, national, international, and continental results.

The work in this proposal should commence as a new Working Group within the Building Room in close cooperation with the Infrastructure Room and their Common Schema efforts, as well as the Product Room and Data Dictionary group. While there is a significant inclination that the work of this group should be governed by the Infrastructure Room, there are a high number of projects already concurrently operating within the Infra Room before adding one of this scope, whereas a parallel, yet highly-coordinated effort, under the auspices of the Building Room may prove to be efficient and effective.

The ultimate formulation of IFC classes and properties which fill in current gaps in the representation of site, landscape and urban planning related elements will need to be included in the buildingSMART Data Dictionary. The expertise of the Model Support Group will be needed during the process of defining needed data requirements, as well as the resulting expression of these in the IFC schema.

Potentially, the product of this Working Group could lead to the formation of a Site/Landscape/Urban Planning Group/Room, whose purpose is to focus on the significant domains of building site design, landscape architecture, and urban planning for buildings and infrastructure.

Opportunity Addressed by This Project

To date, the development of the IFC schema and associated workflows has concentrated primarily on the explicit description of a building from its exterior skin, as well outside elements attached directly to itself, to all parts inside. The site is an abstract concept primarily for uses of identification and location, with a nominal geometric representation. Many site and landscape related elements - such as trees, understory plants/ground cover, sidewalks/paths, site furnishings, drainage structures, geotechnical layers and forms, and water bodies - have no explicit semantic or geometric representation within the schema and rely on the use of *IfcBuildingElementProxy* with custom naming rules and property sets to define them. Some site/landscape elements like slabs, retaining walls and even freestanding pavilions (as a collection of explicit building elements like columns, beams, and etc.) can adopt explicit building element schema definitions, but are only related to the site via a spatial containment relationship (within IfcProject > IfcSite, but NOT within IfcBuilding) and not a product type relationship.

Currently, a great deal of work is being undertaken by many parties in the buildingSMART International community to address how the IFC schema can be extended to express built infrastructure – roads, railways, bridges, tunnels, and more, as well as their constituent objects – thereby enabling a broader description of the built environment and building on the legacy of building-centric IFC-enabled workflows, data exchanges and resulting efficiencies for infrastructure design, procurement, construction and operations. This includes developing a set of common concepts and elements across the many different forms of infrastructure (aka, the "Common Schema"), parallel to the shared common concepts/elements in the building-related schema. From the common set, the infrastructure schema can "branch out" to unique concepts. As it stands, the emphasis of this work is on "built" products, that is, elements and aggregations that are manufactured and assembled from offsite materials, very similar to buildings.

However, there is still a lack of knowledge or application of expertise in the area of site, landscape, and urban design to expressions in the IFC schema. IFC4 did introduce the concepts of *IfcGeographicElement* (assumed for further development of "natural" site-related concepts) and *IfcCivilElement* (assumed for use by the built infrastructure development), but only at the highest level, parallel to *IfcBuildingElement* with no further subordinate enumeration of concepts, types and property sets.

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In the meantime, efforts to address site/landscape design workflows at the same level of buildings, sometimes referred to as site information modeling (SIM), have been independently undertaken in some markets by national professional associations, government agencies or buildingSMART chapters. Such efforts include:

> Landscape Institute (UK),
>
> BIM for Landskapsarkitektur (Norway),
>
> Norway SOSI
>
> American Society of Landscape Architects (ALSA),
>
> buildingSMART Germany
>
> buildingSMART Finland

Landscape Institute

The Landscape Institute (LI) < https://www.landscapeinstitute.org > of the United Kingdom (UK) *"…is the chartered body for the landscape profession. It is an educational charity that promotes the art and science of landscape practice."* As part of their operations, the LI has formed a Digital Practice Working Group < https://www.landscapeinstitute.org/technical/bim-working-group/ > to address the issue of enabling its membership, as well as the UK landscape architecture and design practices at large, to participate in BIM processes and projects by leveraging related technology. Most recently, this Working Group has been addressing how their practices can be digitalized and efficiently connected to the current BIM processes and workflows being undertaken by the building industry. To date, the DP WG has invested a considerable amount of time, expertise, and resources to develop a comprehensive picture of landscape practice, important stakeholders, stages of the overall design-to-operations process, and needed data exchanges between stakeholders at the various stages. In addition, they've also develop a series of Product Data Templates (PDTs), a standardized format for product specification information from suppliers and manufacturers, specifically for the landscape sector < https://www.landscapeinstitute.org/technical-resource/pdt-store/ > including, but not limited to, such items as bollards, flora, planters, play equipment, and tree guards.

Just before the 2017 Fall bSI Standard Summit in London, Jeffrey W. Ouellette, Assoc. AIA, IES, buildingSMART International Implementation Support Group (bSI-ISG) Chair, met with members of the group to evaluate progress and offer advice on how to best map identified data points to IFC parameters/attributes/properties. Before moving too far down that route, it was suggested that the work-to-date be shared with the larger bSI community as part of this project, harmonizing the work with the Norwegian effort and rationalizing with additional interests from other chapters and markets to develop a bSI-related solution.

BIM for Landskapsarkitektur

In 2015, Statsbygg provided funding to form a working group to address the development of a "landscape architecture information model" based on the IFC schema, "BIM for Landskapsarkitektur" < http://bimforlandskap.no/?lang=en >. The working group included representatives from Statsbygg, as well as landscape professionals from the Oslo area. As a result of their work, the group produced an dictionary of required objects, necessary parameters, definitions of objects, and an "Object Hierarchy" of elements determined to be important for the capture and exchange of data for landscape architecture < http://bimforlandskap.no/wp1/objekthierarki/objekthierarki_eng.html >.

Mr. Ouellette met with members of this group before the Spring 2017 bSI-ISG meeting in Oslo to evaluate their progress and gather interest in joining this proposed bSI project. The working group has considered its work complete, but Jeffrey has suggested that the knowledge and products developed by the group can be further leveraged by the greater bSI community and this proposed project. Surprisingly, there is only a small amount of overlap with the LI's efforts, but together they represent a great deal of thought about landscape practice and needs for digitalization to be effective.

Norway SOSI Landskapsarkitektur 5.0

SOSI (Samordnet Opplegg for Stedfestet Informasjon or Systematic Organization of Spatial Information) 5.0 is an object-oriented, Norwegian Open Standard geospatial vector data format for mapping data, based on ISO 19100. It is developed and maintain by the Kartverket, the Norweigan Mapping Authority < https://www.kartverket.no/en/About-The-Norwegian-Mapping-Authority/ >. SOSI includes standardized definitions for geometry and topology, data quality, coordinate systems, attributes and metadata and used for the exchange of geospatial in Norway. Version 5.0 added Product Data Templates for landscape architecture elements.

The primary documentation of the standard can be found in Norwegian:

< https://kartverket.no/geodataarbeid/standarder/sosi-standarden-del-1/ >

Version 4.0 of the standard is published in English:

 < https://www.kartverket.no/en/geodataarbeid/SOSI-Standard-in-English/SOSI-Standard-in-English/ >

American Society of Landscape Architects (ASLA)

In the United States, the American Society of Landscape Architects (ASLA) *"is the professional association for landscape architects in the United States, representing more than 15,000 members. The Society's mission is to advance landscape architecture through advocacy, communication, education, and fellowship"*. Within the ASLA, the Professional Practice committee's Firm Technology sub-committee has worked with Mr. James L. Sipes, ASLA to produce "*Integrating BIM Technology into Landscape Architecture,* 2nd ed., (2014)**"** a Landscape Architecture Technical Information Series (LATIS) publication by

the ASLA. It provides practitioners in the U.S. with information and guidelines on BIM value, processes, technology, and implementation. There are discussions regarding integration with GIS, as well as BIM and the need for standards for success. The document recognizes IFC, as well as other digital formats and standards, but notes that there is still work need to address landscape design workflows.

buildingSMART Germany

Landscape Architecture and Open Space Planning have so far played small roles in the digitisation of the German construction industry. To change that, the processes and product data of planners, contractors, and operators, as well as manufacturers and suppliers, must be defined and standardized accordingly. At the beginning of 2017, during the "Forum for the Exchange of Experience and Pre-standardisation in Germany", the board of buildingSMART e.V (aka, buildingSMART Germany). decided to establish a new working group, "BIM in Landscape Architecture" (aka, buildingSMART Deutschland Fachgruppe „BIM in der Landschaftsarchitektur"), which will address and focus on specific topics, needs, and issues concerning BIM, legislation, standards, and German Norms (DIN) in the field of landscape architecture, as well as site information modeling (SIM). The group is comprised of various landscape architects/planners, software developers, and manufacturers, as well as the universities at Geisenheim, University of Applied Sciences Erfurt, University of Applied Sciences Osnabrück, and many more.

The German market is very familiar with existing technology solutions, such as LandXML and CityGML, but has only recently made significant market-wide efforts to embrace BIM and buildingSMART standard technologies and processes as part of practice in the building industry by engaging directly with the buildingSMART International community.

For Germany, the subjects of sustainability and climate change are important drivers for using BIM in site planning. In most cases, professionals are using national or international guidance or rating systems like LEED, BREEAM, DGNB, SITES, and more. These systems require quantifiable documentation, most of the time forcing planners to develop their models within the BIM environment. As an example, LEED certification focuses on less water consumption, optimal storm water management, and reduction of storm water runoff (especially pavement water runoff capacities), sedimentation, protection of habitat, and sustainable irrigation (drip-irrigation, xeriscaping, etc.). In addition, there are concerns for heat island effect (e.g. a pavement area's SRI-values), light pollution, greenhouse gas emissions and more. Therefore, the German chapter advises that the topic of sustainability should be also addressed and incorporated within the scope.

buildingSMART Finland

In 2016, Finland commenced with a preliminary study of LandscapeBIM ('MaisemaBIM'), alongside the early efforts of the UK and the ongoing revisions of SOSI in Norway. The 'MaisemaBIM' project was founded by the three largest municipalities in the greater Helsinki metropolitan area (Helsinki, Espoo, and Vantaa). The results of the project evolved into the seven-volume, Common InfraBIM Requirements YIV 2015 < https://buildingsmart.fi/en/infrabim-en/common-infrabim-requirements-yiv-2015/ > and Inframodel4 definition < https://buildingsmart.fi/infra/inframodel/index.html > based on LandXML v1.2.

As the 'MaisemaBIM' study reaches completion, the following proposals for InfraBIM guidelines include:

> Part 1: Specification to the infra classification (terms, vegetation catalogs, property sets...)

> Part 2: Modelling guidelines in different phase, LOD/LOG issues

buildingSMART Finland (bSF) also has initiatives in other 'InfraBIM' sectors, such as geotechnics. From 01 February 2018, the Finnish Transport Agency and all major Finnish cities will require the Inframodel4 standard to be used in new design and implementation projects.

Proposed Solution

It is proposed that the past and current efforts of the groups included above be consolidated at the buildingSMART International level to develop a comprehensive project, the "Open Standard Based Data Modelling, Workflows, and Data Exchanges for Site, Landscape, and Urban Planning Design, Procurement, Construction and Operations". All of the meritorious work can be leveraged to avoid starting the entire project from a zero baseline and instead push progress though examination of existing results and rationalization with the needs and observations by professionals in other markets. The intent is to codify workflows and data exchanges, as well as new concepts and definitions of elements in the IFC schema, to further mesh the landscape workflows with the existing building and emerging infrastructure ones.

By the end of this project, the buildingSMART International community should have a clearer view of how site/landscape/urban design is connected to buildings and infrastructure via information technology and standard practice workflows, for both the current IFC schema environment and its future evolution. It should also have a clear understanding of how the resulting work can be delivered as bSI standards, and in turn, adopted at the international (ISO) and various regional (e.g. CEN, ASEAN), and national levels (e.g. BSI/BS EN, DIN/DIN EN, NBIMS-US).

Scope/Statement of Work

Within the overall Project Group, Working Groups are expected to identify the workflows, data encoding, and data exchange needs of the stated domains and how those needs can be expressed in the IFC schema as well as information exchanges.

Phase 1 – Determining Needs

The first set of objectives should be to identify current needs, contemporary solutions, and deficiencies.

A) Establishing and documenting the business cases, workflows, and needed information exchanges:

1) Compile a list of common workflows relating the scope of work necessary for the planning, design, procurement, construction and operations of sites for buildings, infrastructures, and landscape facilities (e.g. public parks, public/private green spaces, buffer zones, etc.), as well as urban planning workflows which draw from aspects of all such domains;

2) Identify the elements and attributes of elements required to execute previously determined workflows and complete the duties of such domains. This includes explicit objects (e.g. trees, plantings, site furniture, and bodies of water), as well as processes, relationships, and responsible actors;

3) Work Product(s): Information Delivery Manuals (IDMs);

(a) Site & Landscape IDM

(b) Urban Planning and Design IDM

B) Comparison and analysis of extant solutions

1) Survey existing data encoding and exchange schemas and formats currently used by the domains (e.g. LandXML, CityGML, etc.). Compare/analyse where these formats may succeed or fail in fulfilling the identified requirements versus the current IFC schema, IFC4. *Support for IFC2x3 is also an option.*

2) Survey the existing IFC specifications for elements that may already address the identified workflows and needed elements. This includes IFC4, IFC4.1 and the infrastructure domain work being proposed in the Infrastructure Room projects;

3) Identify the gaps between requirements, existing and proposed schema (IFC4, IFC4.1, IFC5) elements;

4) Work Product: Analysis Documentation of Extant Solutions

Phase 2 – Proposed Schema Enhancements

From the Phase 1 IDMs and Analysis Documentation, Working Groups should propose the needed enhancements to the IFC schemas in order to meet the needs identified in Phase 1. These proposals should operate in two streams. Stream 'A' would propose ways to supplement the current IFC4 schemas (likely with custom property sets) for immediate use. *Support for IFC2x3 is also an option.* Stream 'B' would propose more extensive augmentations and additions to future versions of IFC (IFC5 and beyond).

A) Current Schema Proposals (Stream 'A')

   1) Propose specific augmentations to existing IFC schema, IFC4 (and optionally include IFC2x3), most likely as standardized custom property sets to fill in identified gaps;

   2) Work Product – Documentation

   3) Prototyping by vendors

B) Future Schema Proposals (Stream 'B')

   1) Propose specific augmentations and additions to future IFC schemas to fill in the identified gaps;

      (a) Additional object classes and types

      (b) Geometric representations for objects classes and types

      (c) Object class and type attributes

      (d) Additional enumeration values for existing object classes and type attributes

      (e) Property sets and value types

      (f) Establish appropriate Relationship classes to new objects and types (e.g. aggregates, component assemblies, dependencies, hierarchies

   2) Identify concepts which may be part of the "Common Schema" as defined by the Infrastructure Room leadership. These concepts would be elements that can be found across the many disciplines identified in the Infra Room projects, such as Road, Rail, Bridge, Tunnel, and Maritime (Ports & Harbors). These concepts and their specifics need to be rationalized with the other Infra domains to eliminate redundancy.

   3) Work Product – Documentation for the bSI Model Support Group (MSG) to include proposed extensions to the schema for IFC5;

   4) Prototyping by vendors & testing by project participants.

Phase 3 – Proposed Model View Definitions

Based on the IDMs from Phase 1 and the proposed schema enhancements from Phase 2, the identified Information Exchange Requirements should then be applied to various specific workflow MVDs. This work should follow the two streams identified in Phase 2, current and future IFC schemas. The work of MVDs for future schema may commence concurrently with, or prior to the finalized version of IFC5 and its acceptance as an ISO standard.

A) Current Schema Proposals

    1) MVDs for existing schemas, identifying most appropriate use of existing concepts, as well as use of custom property sets;

    2) Work Product(s) - MVD documentation, including mvdXMLs

B) Future Schema Proposals

    1) MVDs for future schemas

    2) Work Product(s) - MVD documentation, including mvdXMLs

C) Implementation

    1) Prototyping / Implementation by vendors

    2) Testing by project participants

Workshops

In addition to work being undertaken by smaller groups throughout the year, via online communication, to meet the desired deliverable schedule it is proposed that there are nine in-person workshop events over the course of the project, three in each of the Asian, European, and Americas regions, in addition to three Standards Summits occurring in the same time period. These 2-day(?) workshops would bring together the project participants in a dedicated setting to advance, coordinate, or complete work products identified by the project steering committee. These face-to-face sessions are very often the most valuable way of getting disparate views to come together into one and focus people's attention on producing needed results without typical day-to-day distractions. In addition, later workshops should be used as opportunities for participating vendors to develop and demonstrate implementation prototypes. Ideally, each workshop would be hosted by a project partner organization, providing meeting facilities for the group over the 2-day working period.

Skills Required

While the site/landscape and urban design domains might seem to be appendages to building and infrastructure design and development, there is a great amount of expertise devoted solely to the design, execution, and operations of sites and landscapes, as well as urban planning. The expertise necessary for the project to comprehensively address all concerns includes the following:

- Program manager/coordinator
- IFC expert / MSG representative
- Project Steering Committee
    - Sponsors
    - Key participant representatives
    - Infrastructure Room liaisons
- Appropriate domain experts from multiple markets are needed, including:
    - Landscape architect
    - Civil engineer
    - Storm water management engineer
    - Utilities (Gas, Water, Sewer, Communications)
    - Geotechnical engineer
    - Surveyor
    - Urban planner
    - Governmental / regulatory authorities
    - Material supplier
    - General Contractor / Trades (stone, earthwork, utilities, etc.)
    - Electrical Engineer / Lighting Designer
    - Arborist
- Partner organizations:
    Previous verbal commitment, needs formal validation:
    - *buildingSMART Germany - "BIM in Landscape Architecture" working group*
    - *buildingSMART Australasia*
    Proposed, needs formal validation:
    - *OGC*
    - *Landscape Institute (UK)*
    - *ASLA (USA)*
    - *Statsbygg (Norway)*
    - *Kartverket (The Norwegian Mapping Authority)*
    - *Vegdirektoratet (Norwegian Public Roads Administration)*
    - *NAML (Norway)*
    - *buildingSMART Finland*
    - *buildingSMART Norway*
    - *Georgia Tech University Digital Building Lab*

- Vendors:
  Previous verbal commitment, needs formal validation:
    - *Obermeyer Planen+Beraten*
    - *12d Solutions Pty Ltd*
  Proposed: needs formal validation
    - *Vectorworks, Inc.*
    - *Autodesk*
    - *Trimble*
    - *Bentley*
    - *Dataflor AG*
    - *Widemann Systeme GmbH*
    - *ESRI*

Resources Required

People

- Project Manager to coordinate overall activities and enable delivery of Work Products

- Participant/user expert to lead each Work Product Task Group

- Participant/user experts to write the IDM(s) with Project Manager

- User Experts and IFC Experts to work on schema extension proposals

- User Experts and IFC Experts to work on MVD(s)

- MSG member to advise and finalize schema extension proposals for "IFC5"

Other resources

- Project management platform: Monday.com

- File Collaboration platform: ShareFile

- Communication platform: GoToMeeting

- IfcDoc Tool

- Software (and provisional licenses) for testing, including:

  o Authoring/design tools;

  o Project management;

  o Analysis tools (e.g. Costing);

  o Model/data viewer.

- Test models

- IFC schema editing

- Experimental IFC libraries for import/export in software

Schedule

Activity / Task	Duration	Milestone
Project proposal review		2018-06-01
Project Proposal submitted to Standards Committee		2018-04-25
Project Proposal Approved by Standards Committee		2018-06-04
Kick-off Meeting/Session – Fall 2018 International Standards Summit, Tokyo		**2018-10-18**
Call for Sponsors / Call for Participants		2018-11-12
Call for Sponsors / Participants CLOSED		2019-01-01
Project Launch		2019-01-14
Spring 2019 International Standards Summit, Dusseldorf		**2019-03-25**
Phase 1/WP-01 – Site & Landscape IDM	4 months*	2019-04-30
Phase 1/WP-02 – Urban Planning & Design IDM	4 months*	2019-04-30
Phase 1/WP-03 – Analysis of Extant Solutions	4 months	2019-06-30
Phase 2/WP-01 – Schema Proposals for IFC4 *(*IFC2x3)*	3 months*	2019-10-29
Fall 2019 International Standards Summit, Beijing		**2019-10-29**
Phase 2/WP-02 – Schema Proposals for "IFC5"	6 months*	2019-12-20
Submittal of "IFC5" Schema Proposals to SC and MSG		2020-01-14
Phase 3/WP-01 – MVD Proposals for IFC4 *(*IFC2x3)*	3 months*	2020-01-30
Phase 3/WP-02 – MVD Proposals for "IFC5"	3 months*	2020-03-25
Spring 2020 International Standards Summit, ??		**2020-03-25??**
Final submissions to SC for approval		2020-04-01
Project Completion		**2020-04-30**

concurrent projects

Deliverables

***Open to discussion based on changes to the Scope/Statement of Work, proposals by interested parties, available resources, and timeline determined by project team.**

****Proposed****

Phase 1/WP-01 – Site & Landscape IDM
Determining the business cases, processes and data exchange requirements for the Site & Landscape Design domain

Phase 1/WP-02 – Urban Planning & Design IDM
Determining the business cases, processes and data exchange requirements for the Urban Planning & Design domain

Phase 1/WP-03 – Analysis of Extant Solutions
Analysis of existing data exchange formats and methodologies available for GIS, site/landscape, and infrastructure

Phase 2/WP-01 – Schema Proposals for IFC4 (*IFC2x3)
Proposals for best practice use of existing schemas, including "standardized" custom property sets (*e.g. "LpSet_xxx"*)

Phase 2/WP-02 – Schema Proposals for IFC5
Proposed additions to the IFC schema (based on IFC4.1) for optimal representation of Site, Landscape, and Urban Planning domains

Phase 3/WP-01 – MVD Proposals for IFC4 (*IFC2x3)
MVDs, based on existing schemas and Phase 2 best practice use proposals, to address workflows identified in the IDMs

Phase 3/WP-02 – MVD Proposals for IFC5
MVDs, based on Phase 2 "IFC5" schema extension proposals to address workflows identified in the IDMs

Software vendor implementation includes short-term support for MVDs for IFC4 *(*optionally IFC2x3)* and longer-term support for resulting schema extensions and MVDs for "IFC5". Ideally, a number of software vendors will be part of prototyping the Work Products, including MVDs and "IFC5" schema extensions.

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*****buildingSMART Germany Proposal*****

WP-01: IDM #1 – for Plants and Vegetation

During the 2nd Meeting of the Working Group "BIM in LA" late in October and 3rd Online WebConference in November of 2017, our group has agreed that its suitable task to start to develop of IFC/IDM for Plants.

By December 2017 the working group started searching and reviewing of existing IDMs and MVDs, that potentially could be adopted for further re-development. The work is still in Progress. The further steps would be defining Process Maps and updating Exchange Requirements. In order to gain enough data, the group has proposed to engage other non-buildingSMART association that deals with LA, which also possess a Databank, which contains vast information on Plants as well as Vegetations. So far negotiation with one of the associations hasn't been finalized.

Prior to an Official Call of this Project, our member University, has submitted its related proposal on BIM and Landscape Architecture to gain local Funding for further research and development. This proposal largely coincides with the research proposal submitted by our member university to the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR). In the case of a permit, additional work could be carried out in an optimal way. This proposal also addresses at the similar problems and focuses on developing potential solution for LA Sector.

The group agrees with the assessment (see Opportunity Addressed by this project) that an inventory of the existing IFC objects from building construction and infrastructure must first take place in order to identify expansion requirements. They also see that the need for expansion of the main level of IfcGeographicElement and IfcCivilElement is necessary step, like it has been proposed by Mr. Ouellette.

This should be accompanied by practical tests with commercially available software in order to gain clues for the requirements of the future development of landscape architectural apps.

When defining the properties of landscape architecture objects (especially plants, etc.) an adaptation to specific National (German, US, UK…) requirements are certainly necessary to take into account.

The result of this would be new release of ifcPlant+its Entities, which would be incorporated into upcoming release of IFC5.

WP-02: IDM #2 – for Surface Coverings

Surface Coverings is the second major topic that our working groups is willing to working within the Landscape Architecture and Site Planning.

Same procedure as previous WP.

WP-03: PDTs

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WP-04: Extension proposals to future IFC schemas

Like it was previously mentioned, ifcPlants with its potential entities like ifcTree, ifcBush etc. is the main focus point our working group. Thus, we propose to continue in the same way and join our forces with other bS Chapters.

Items 3, 6 and 7 would be our focal point to work and co-op on.

Additionally, IfcRoad could be adopted and adapted for Landscape Pathways and Roadways.

Cost

Project Manager

Salary:
€112.000,00 salary (€100/hr, avg. 20 hrs/week, maximum 64 weeks) for project duration

> €8.000,00 paid on monthly invoice (14 months maximum)

Travel Expenses:
€57.000,00 total project manager travel

> €5.000,00 per Standards Summit trip (1 week) x3 = €15.000,00

> €7.000,00 per Asian region project coordination trip (4 days) x3 = €21.000,00

> €3.500,00 per European region project coordination trip (4 days) x3 = €10.500,00

> €3.500,00 per Americas region project coordination trip (4 days) x3 = €10.500,00

> Reimbursement with monthly invoice from Project Manager

Workshop Expenses:

€30.600,00 total workshop expenses (Expect 20 people per workshop. Cost may be borne as in-kind donation by workshop host)

> €4.000,00 per 2-day venue rental x 9 = €27.000,00

> €600 of meals (lunch) and refreshments (coffee, tea, snacks) per workshop @ €15,00 per person x 2 days x 20 people = €600,00 x 9 = €3.600,00

> €0.000,00??? Translation services (if needed, provided by host, in kind)

IFC Schema Development Consultant

€15.000,00 A lump sum, not-to-exceed contract should be procured from consultant, for time and travel expenses.

If the Project Manager is unable to fulfil this role, then the Project should secure the services of an IFC schema expert to assist in the technical proposals for the schema, prior to submitting to the MSG for inclusion in IFC5

Total

€214.600,00 = Salary + Travel + Workshops + Schema Consultant
(translation services not factored)

Total represents maximum budget projection. Any non-invoiced funds at the end of the project shall be applied toward future bSI projects, with sponsor attribution carrying over.

Support / Funding

Direct support and participation for this project includes:

Pending

Direct funding is being provided by:

Pending

buildingSMART Germany Proposal
buildingSMART Germany would assign one Project Manager on behalf of the chapter and its working group, coordinating and guiding internal activity, as well as further cooperation and exchanges with this proposed project team.

Budget per 1x Person = 60k € per annum (normal regulated Working Hours) + Travel Expenses.

Software prototyping and initial implementation provided by:

TBD. Ideally, the project would engage at least 4 vendors that represent different stakeholders and workflows within the larger context.

Governance

The intent of this proposal is that the project be governed directly under bSI and proceed as a typical bSI activity under the supervision of the Building Room Steering Committee and in cooperation with the Infrastructure Room and associated projects. Progress and results will be reported to the Building Room Steering Committee, as well as the Standards Committee Technical Executive and Standards Committee.

Additional notes

Progress on an "open IFC toolkit" by the Technical Room would be of great benefit to the project, where future schema extensions could be encoded and tested.

Project Management will be handled via Monday.com. Project meetings will be conducted via GoToMeeting. Project files will be stored and shared via the buildingSMART International Citrix ShareFile.

Appendix A: List of Site, Landscape, and Urban Design Elements/Concepts

While not exhaustive, the purpose of this list is to provide a comprehensive look at the concepts that lie within the concerns of site, landscape and urban design.

Abstracts

- Boundary / Property Line / Right-Of-Way (ROW)
- Centerline / Alignment
- Cadastral Data
- Benchmarks
- Easements
- Terrain contours / survey points
- Political Boundaries
- ...

Geotechnical

- Earth (soil/rock) strata
- Voids
- Geothermal structures
- Underground waterways and bodies
- Groundwater / Watertable
- Flood plain
- ...

Organics

- Tree
  - Deciduous vs. Evergreen
- Groundcover
  - Grass
  - Non-grass
- Understory plantings
  - Shrub
  - Perennials vs. Annuals
  - Bulbs and tubers
- Agricultural plantings

Water Features/Bodies

- Freshwater vs. saltwater vs. brackish
- Harbor, Cove, Bay, Inlet
- Moving – Stream, River, Creek
- Still – Lake, Pond
- ...

Site Furnishings

- Bollards
- Furniture
  - Seating - chairs /benches
  - Tables
  - Waste/trash receptacles
  - Bike rack
- Lighting
- Signage
- Poles
- Playground equipment
- Tree protection
- Public art
- ...

Drainage Structures

- Drain inlets
- Curb inlets
- Catch basins
- Collected water storage
- Dam
- Filter
- Reservoir
- …

Site improvements

- Sidewalk
- Drive(ways)
- Parking
- Curb & Gutter
- Paving
  - Impervious vs. Pervious
  - Concrete, Asphaltic, Crushed rock/Gravel, Stone,…
- Retaining Walls
  - Solid (Cast Concrete, Masonry, Timber)
    - Gabion
    - Rammed earth
- Railings (Handrails, Guardrails)
- Ramps
- Stairs / Steps
- Fence / Screen
- Shelter / Pergola / Shed
- Fountain
- Premium soil
- …

Utilities

- Water Supply
- Sanitary Sewer
- Storm Sewer
- Steam
- Electrical (above and below ground)
- Natural Gas
- Communications (above and below ground)
- …