

This *strategy document* identifies the mechanisms and resources needed by the **BIMe Initiative Community** to deliver the **Model Use Templates project** (Project F2 > part of **Information Management Project F**) and positions it as a *leading research effort* in digital process re-engineering across the Built Environment.

I. Model Uses

A [Model Use](#) identifies and collates the [Information Requirements](#) to be delivered as – or embedded within – 3D digital models. It represents the interactions between a *human actor* and a *digital system* to generate [Model-based Deliverables](#). Model Uses are part of a more comprehensive array of [Information Uses](#) that collectively represent Targeted Digital Deliverables¹ across an Asset's life cycle. The full list of Model Uses is available as a BIMe Initiative resource - [211in Model Uses Table](#) - in multiple languages.

Model Uses fall under three categories²:

- **General Model Uses** are applicable across industries, information systems and knowledge domains. There are currently 52 General Model Uses – with 100s of potential synonyms – organised as a single MU Series, General Modelling (1000-1990);
- **Domain Model Uses** are industry specific. The ones addressed by this project are Construction Domain Model Uses (or BIM Uses for short). The naming syntax for each Domain Model Use is either a noun + adjective (or just an adjective). There are currently 76 Domain MUs, organised in seven MU Series, Domain Modelling (2000-8990);
- **Custom Model Uses** are a combination of General and Domain model uses. Custom Model Uses are tailored – when needed – to each project, client/employer, or market's specific modelling requirements. There is no fixed number of Custom MUs and are all organised under a single MU Series, Custom Modelling (9000-9990).

II. Model Use Templates

As elaborated in the [351in Model Use Templates Guide](#), a Model Use Template (MUT) *extends the Model Use definition* by explaining the activities and resources needed to deliver it. A Model Use Template collates all relevant information about a specific Model Use in a structured manner. This strategy document guides the development and delivery of these templates by international domain researchers.

A. Model Use Templates – Benefits

Model Use Templates are intended to assist *practitioners* in identifying the activity flows, competencies, and resources needed to execute a Model Use. By clearly *defining* activities and resources, they are offered as a *starting point* for practitioners to develop new activity flows that match their respective organisational and project requirements. Also, by providing these templates, practitioners can more efficiently integrate multiple activity flows, reduce process duplication, and improve their productivity.

¹ Refer to Information Milestone 3 in the Lifecycle Information Transformation and Exchange (LITE) framework - Succar, B., Poirier, E. (2020). Lifecycle information transformation and exchange for delivering and managing digital and physical assets, *Automation in Construction*, 112, April 2020. <http://bit.ly/PaperA11>

² Succar, B., Saleeb, N., Sher, W. (2016). Model Uses: Foundations for a Modular Requirements Clarification Language, Australasian Universities Building Education (AUBEA2016), Cairns, Australia, July 6-8, 2016. <http://bit.ly/BIMPaperA10>

B. Model Use Templates – Properties

Each Model Use Template has three sets of properties:

- **Basic Properties** that identify and briefly describe the Model Use;
- **Advanced Properties** that explain the resources and methods supporting the Model Use; and
- **Activity Flows** that illustrate the actions needed to execute a Model Use (activity flows need to be at Activity Flow Level 4 – as described in the in [351in Model Use Templates Guide](#)).

III. Developing Model Use Templates

This strategy document is intended as a guide for organising, managing and supporting the development of MUTs for all Domain Model Uses listed in [211in Model Uses Table](#).

A. Roles

The project requires multiple roles to be played by different *volunteering groups* during the development period. These roles - briefly described below in Figure 1 - will be tweaked as more MUTs are completed:

- Role 1: **MUT Coordinator** is responsible for organising, managing, and supporting the research, development, and release of MUTs. It is also responsible for deploying completed MUT Technical Sheets through the BIM Dictionary ([see example](#)).
- Role 2: **Project Coordinator** is one of the MUT coordinators that represents the F2 project within the BIM Excellence Initiative.
- Role 3: **Performance Analyst** is responsible for the administering the F2 project and ensuring progress towards the achievement of project goals.
- Role 4: **MUT Teams** are responsible for the development of assigned MUTs.

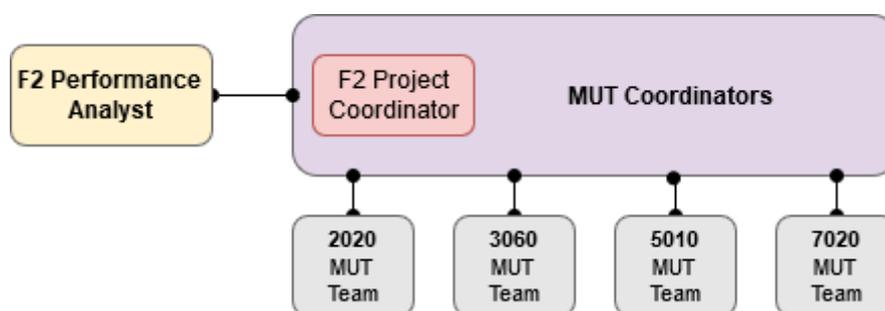


Figure 1. Organisation chart of the MUT project

B. Development and Release Path

As detailed in the [351in Model Uses Template Guide](#), the **Development and Release (D&R)** path for each MUT is organised into four categories: Development (D); Formalization (F); Localisation (L); and Review (R).

Development (D)

Development includes three steps:

- **Step D1: initial development of MUT** will be conducted by a vetted MUT Coordinator and their team. The template can involve collaborating with researchers from outside the Community provided they agree to the BIMe Community's General Principles and its open-access approach to knowledge sharing. After identification of a model use for development and the selection of a MUT development team, the development process can start.
- **Step D2: review by the BIMe Community** of the quality, consistency, and modularity of all deliverables.
- **Step D3: publication of a draft MUT** alongside an MUT development report identifying all MUT properties, and offering lessons learned and background information for any major decisions made during the development process.

The three development steps are explored in more detail below.

Step D1 requires a thorough bibliographical study of peer-reviewed articles and industry materials related to the Model Use. This review will inform adding content to the predefined MUT categories, properties, and fields. Each category (Basic Properties, Advanced Properties and Activity Flows) undergoes review gates for validation (**Step D2**). Review gates imply updates of the content, as well as the moving forward to the next stage of development. Thus, there is a constant parallel development/review process, capped by a final review (Figure 2). The final review connects to the next Development & Release Stage (Formalization **Step F1**) involving a testing of the MUT across different environments (theory or practice) by members and non-members of the BIMe Community.

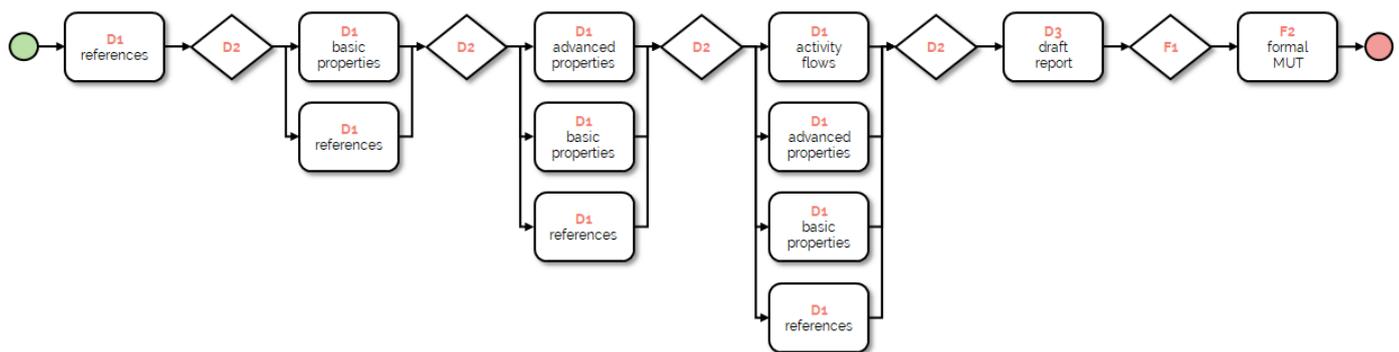


Figure 2. The iterative development process for each MUT

Formalization (F)

Formalization includes two steps:

- **Step F1: evaluation/testing of the MUT** in different environments to improve its applicability and consistency.
- **Step F2: publication of the formalised MUT** with the assignment of a version number.

Note of Evaluation: The methods and procedures deployed to evaluate the properties/fields within MUTs are, as described by Hevner et al. (2004, p. 86)³, *observational, analytical, experimental, testing, and descriptive*. They are conducted according to well-established research techniques⁴.

Formalization concludes with the publication of the (a) **MUT Technical Sheet** through the BIM Dictionary⁵, (b) **MUT Development Report**, and where possible, a (c) **peer-reviewed scientific paper**. Publication of results through the sheet, report, and paper follow the BIMe Initiative [General Principles](#) and are key knowledge-sharing outcomes to be targeted during the recruitment of new MUT Teams. Once a MUT is delivered and published, a MUT team may request – or may well be offered – another MUT's development if that fits within their competency profile. The teams will also be invited to improve all technical aspects of future MUTs. The experiences gained, and the lessons learned from developing a MUT will be captured and employed in continuously enhancing the deliverables of the F2 project. This captured knowledge will then be shared publicly and reinvested to optimise the recruitment processes and improve the speed/quality of delivering the remaining MUTs to be developed.

C. Recruitment process

The development of MUTs is reliant on the efforts of BIMe Community researchers. To maintain the quality and consistency across the project, MUT Teams will be vetted to satisfy the following requirements:

- The team size needs to be at least 3 members (preferred maximum is six members);
- The nominated team leader needs to have adequate research and practical experiences in the MU targeted for delivery;
- At least one member needs to be affiliated with academic institutions;
- The MUT team needs to be available to meet the F2 Process Coordinator on every two weeks to align efforts with other teams;
- The MUT team must commit to quality delivery within an agreed timeframe; and
- The MUT team must accept the BIMe Initiative [General Principles](#) and all of its team members need to sign the [Excellence Manifesto](#).

³ Hevner, A., March, S., Park, J., & Ram, S. (2004). Design Science in Information Systems Research. *MIS Quarterly*, 28(1), 75-105. doi:10.2307/25148625

⁴ The experimental approach of evaluation can be executed in a controlled experiment or in a simulated environment. According to Dresch et al. (201, p. 99) "focus groups also facilitate the critical analysis of research results and can generate new possibilities to obtain better solutions to problems." Tremblay et al. (2010) suggest exploratory or confirmatory focus groups. Exploratory focus groups can be applied to achieve rapid incremental improvements. Confirmatory focus groups demonstrate the utility of the development applied in the field. In the development of MUT 4040 Clash Detection, the formalisation stage involved an exploratory focus group evaluation using SWOT dynamics.

⁵ See example of a published Model Use Template here: <https://bimdictionary.com/en/clash-detection/1>

The recruitment process (Figure 3) is composed of several internal (administrative) and external steps. The foundation internal step is *recruitment planning* which includes:

- Establishing the availability and ability of members of the F2 Project Team to launch or expand the recruitment of additional MUT Teams;
- Identifying the next MUT to be developed according to F2 project priority, availability and practice benefits; and
- Deploying the tools and initiating the processes as needed for interviewing prospective teams, mapping MUT Team profiles, and on-boarding team members to the BIME Initiative.

Following recruitment planning, a "Prepare to Call" milestone is reached⁶. Then, upon receiving applications from candidate teams who have met the call requirements, candidate teams are *provisionally registered* as to prevent multiple teams from applying to develop the same MUT. Following provisional registrations, *team interviews* are conducted, and formal recruitment is made. Finally, accepted teams will be invited to a *kickoff meeting* to agree on a **Communications and Delivery Programme**.

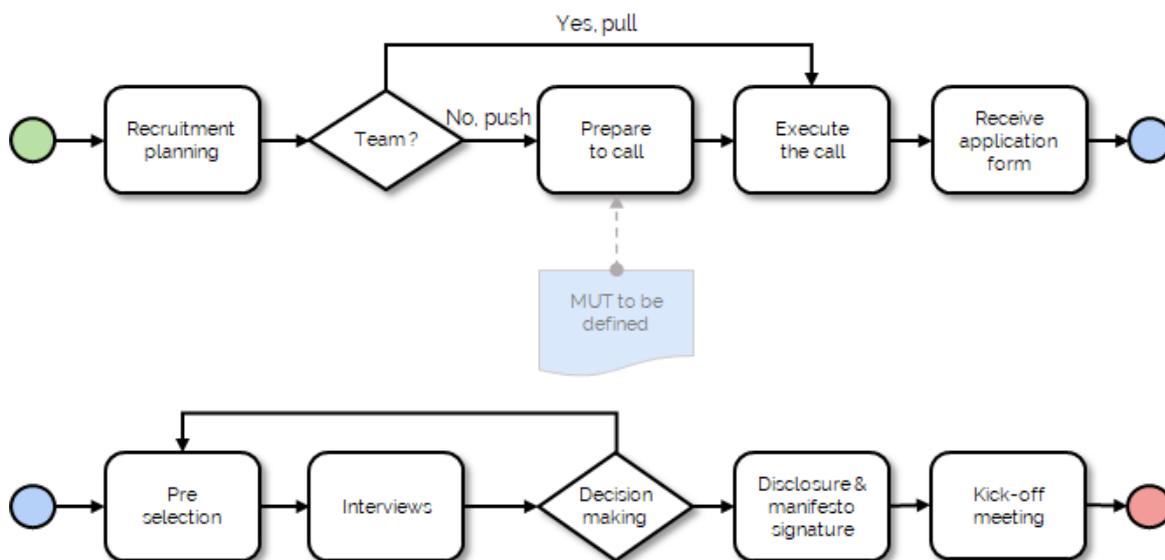


Figure 3. Recruitment Process and Initiation Steps

In more detail, the **Recruitment Process** is initiated with a call and a response through an **Application Form** by the candidate MUT team. The form collects the candidate team's names, contacts, affiliations, and relevant experiences and qualifications. Aggregate team competences is then mapped using the Competency Sets and Topics defined within the [201in Competency Table](#) document. Team members are also asked to self-evaluate their competence using the **Individual Competency Index (ICI)**⁷ so to identify their conceptual **knowledge** and practical **skills** of relevance to the targeted MUT.

⁶ This step may be skipped to "Execute the Call" for invited pre-qualified MUT teams.

⁷ Refer to BIM Framework [Post 15: Individual Competency Index](#)

IV. Reference Materials

This strategy document needs to be read in conjunction with the following BIMe Initiative resources:

- [103in BIMe Initiative Projects](#)
- [201in Competency Table](#)
- [211in Model Uses Table](#)
- [291in Conceptual BIM Ontology](#)
- [351in Model Use Template Guide](#)
- [Lifecycle Information Transformation and Exchange \(LITE\) framework](#)
- The MUT 4040 Development Report (provided to candidate teams upon request)
- The ModelUseTemplate_MU4040_20200623 (provided to candidate teams upon request)

Also, it is recommended that candidate MUT Teams read the following resources which act as foundations of this project and its expanding efforts:

- Dresch et al. (2015) *Design Science Research: a method for science and technology advancement*. Cham, Heidelberg, New York, Dordrecht, London: Springer. <https://doi.org/10.1007/978-3-319-07374-3>
- Hevner, A. R., et al. (2004). Design science in information systems research. *MIS Quarterly*, 28(1), 75–105.
- https://researchgate.net/publication/201168946_Design_Science_in_Information_Systems_Research
- Tremblay, M. C., Hevner, A. R., & Berndt, D. J. (2010). Focus groups for artefact refinement and evaluation in design research. *Communications of the Association for Information Systems*, 26(June), 599–618. <https://www.semanticscholar.org/paper/Focus-Groups-for-Artifact-Refinement-and-Evaluation-Tremblay-Hevner/42ca36b8c3d6cd88281b356b2a0766ea453deb75>

V. Acknowledgements

This document and the examples provided were developed from January to November 2020 as a collaborative effort between Ms. [Fernanda Machado](#), Technical Sales Specialist at Autodesk, Brazil; Ms [Paula Mota](#), BIM Director at SIPPRO, Brazil; Dr [Lorena Moreira](#), Federal University of Bahia, Brazil; Prof. [Regina Ruschel](#), School of Civil Engineering & Architecture, University of Campinas Brazil; Mr [Bruno Mota](#), Lean Consultant at Logikal, UK; and [Dr Bilal Succar](#) of ChangeAgents AEC, Australia. Community review was conducted by [Mr. Danny Murguia](#) and [Erik Poirier](#).

VI. Additional information

This document will be continuously updated. For the latest version, please refer to the BIMe Initiative [resources page](#). To cite this document version, please consider using the following:

BIMeI (2021), *726in.F2 Information Management, Information Uses, Model Use Templates Strategy v1.0*, The BIMe Initiative, <http://doi.org/10.5281/zenodo.4659554>. Last accessed, [Date Accessed].

For more information about the BIM Excellence Initiative and participation in Micro project F2, please [Contact Us](#). To stay informed of all BIMe Initiative's activities, tools and publications, please subscribe to the BIMeI Newsletter or follow us on Twitter. You can also join the BIMeI Forums to engage directly with all BIMeI teams: forums.bimexcellence.org.

VII. License to use

The BIMe Initiative is managed by [ChangeAgents AEC pty ltd](#). Permission is hereby granted to all who wish to use this document for academic research or other non-commercial activity under a [Creative Commons Attribution-Non Commercial-Share Alike 3.0 Unported License](#).

VIII. Change Log

VERSION	DATE	DESCRIPTION
0.1	Dec 17, 2019	Initial draft – for internal use and review
0.6	Feb 12, 2021	Community version
1.0	Apr 2, 2021	First online release - DOI assigned

...