**American Society of Civil Engineers (ASCE)**
**Computing Division**
**Visualization, Information Modeling, and Simulation (VIMS) Committee**

# 2020 Datathon Competition

**Description:** The VIMS Committee invites all interested parties to its first 2020 Datathon competition to be hosted on the sidelines of the 2020 Construction Research Congress (CRC 2020) at Arizona State University (ASU). This datathon is focused on rapid 3D and virtual reality (VR) modeling, and will be launched in two phases (off-site and on-site), where teams will work on generating accurate building information models (BIM) and VR models from a given set of drawings of a real project.

**Team Formation:** Teams will consist of 2 to 5 graduate students who has vested interest in ASCE Computing Division. Teams can be from the same institution or from multiple institutions. Each team must have a mentor who is selected by the members of that team from full-time faculty members in one of the participating institutions, and who is a current member of any of the four ASCE Computing Division Committees (VIMS, DSA, EDU, Global). Only teams that are formed and registered through Google Form (https://forms.gle/wii6fv5Ls1AUgNBu6) on or before 11:59 p.m. AoE (Anywhere on Earth) on 01/25/2020 will be eligible to participate in the off-site (Phase 1) of the Datathon.

**Benefits and Recognition:** Participating in this Datathon will help accelerate the transformation of academic concepts into practical, innovative solutions for the industry. It also helps students generate new ways of thinking and bring to light new ideas for approaching complex problems under constraint. Winners of Phase 1 (off-site) and Phase 2 (on-site) will be announced and formally recognized during the VIMS Committee's 2020 annual meeting at CRC on 03/09/2020. During this meeting, winning teams of both phases will be invited to give a short presentation to attendees. All participating teams will have the opportunity to utilize the generated work and initial data in the future as well.

**Data:** A full set of drawings (in CAD and PDF formats) of an office building will be provided to all registered teams. This set includes (i) architectural, (ii) structural, and (iii) mechanical drawings.

**Important Dates:** Please refer to the corresponding paragraphs for specific times.

Call for participation: January 18, 2020
Team formation and registration: January 18-25, 2020
Phase 1 competition: January 26-February 23, 2020 (four weeks)
Phase 1 evaluation: February 24-March 1, 2020
Phase 2 announcement: March 6, 2020
Phase 2 conclusion: March 9, 2020 (at ASU)
Final announcement of results: March 9, 2020 (at VIMS annual meeting)

**Phase 1 (Off-site):** This phase invites teams to utilize the project drawings to generate a complete model of the project including architectural, structural, and mechanical models. Teams are not constrained with the tools to use, however they should be using a BIM authoring tool with parametric modeling capabilities (e.g., Revit Suite, ArchiCAD, Bentley Suite) to generate their models. Any 3D model generated in Sketchup or similar tools will disqualify the team from Phase 2 of the Datathon.

**Phase 1 Deliverables:** Teams shall upload the following deliverables to the designated Google Drive folder (link will be provided to participating teams). The submission deadline is 11:59 p.m. AoE on 02/23/2020:

- The final merged model (architectural, structural, mechanical models if modeled separately) in the native format of the BIM authoring tool,
- An IFC file exported in Ifc2x3 version, and
- A video (.avi file) of the rendered model from exterior and interior spaces with a walkthrough.

**Phase 1 Evaluation:** VIMS Officers (and ad-hoc experts, as needed) will evaluate all Phase 1 submissions, and identify the winner of this phase, who will be announced during the VIMS Committee's 2020 annual meeting at CRC. The evaluation criteria are listed below:

- Model completeness (30%): All major components (teams may ignore connecting components if any) of each discipline that are detailed in the project drawings should be represented in the models.
- Semantic data representation (10%): Components should be modeled using/creating the families as indicated in the drawings.
- Model accuracy (40%): All components should be on correct location, and have correct dimensions and shape information. Level of development (LOD) of components should be as shown in the drawings.
- Rendering and presentation (20%): Each participating team will also be required to render their finished model with a rendering tool of their choice, and prepare a video presentation. The quality of the video presentation will be evaluated.

**Phase 2 (On-site):** This phase will start on 03/06/2020 and conclude by 03/09/2020 at 9:00 a.m. MST (local time in Tempe, AZ). VIMS officers will hold an on-site meeting on 03/08/2020 (time TBD but most likely in the afternoon) to answer questions from participating teams. All teams continuing from Phase 1 will be eligible to participate in this phase. However, participating teams in this phase will have to bring their own computing resources (i.e., VR-ready PC/Laptops, such as those running

on Nvidia GTX 1080 graphic cards). In Phase 2, teams will create a single-person VR model using a single BIM model from Phase 1 (selected by the VIMS evaluators). Teams will be given the flexibility to use any VR platform of their choice as long as it is an open-source game engine (e.g., Unity 3D) and not an off-the-shelf product (e.g., Revit Live). The VR environment should be realistic, hence should include basic expected interactions such as no-free fall, obstacle recognition, and realistic first person height. More instructions will be provided to participating teams on 03/06/2020.

**Phase 2 Deliverables:** Teams will create and submit their final package by the end of the competition period at ASU. The submission deadline is 9:00 a.m. MST on 03/09/2020:

- The final single-person VR model in native format, and
- A video (.avi) file of the user navigating the space in VR.

**Phase 2 Evaluation:** VIMS Officers (and ad-hoc experts, as needed) will evaluate all Phase 2 submissions, and identify the winner of this phase, who will be announced during the VIMS Committee's 2020 annual meeting at CRC. The evaluation criteria are listed below:

- VR model completeness (30%): A bug-free VR model containing all elements from the given BIM in Phase 1.
- User experience (30%): Implementing each of the three functions listed above is worth 10% of the total score.
- Creativity (15%): Additional VR functions (beyond the three listed above) to improve user experience while navigating in the space.
- Realistic renderings (25%): How teams dealt with the loss of data when transitioning from BIM to VR model. The presence questionnaire (PQ) will be used to determine this score.