

AEC Hackathon



BLOX **HUB**

AEC Hackathon @ BLOXHUB 2020-
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GROUP 1 – FABRIFY

Hack Category

Support digital fabrication and mass customization

Short Project Description

Several issues are already there in the industry for very simple building components. At the same time, a momentum in the industry is being built towards digital fabrication and integrated processes, which lead us to much more complex management solutions. To support this trend, we need to strive towards new tech that take these as premises, instead of trying to apply legacy solutions for future problems.

How is the problem being addressed?

A web-based interface is being developed, that connects the three main agents of the AEC industry, namely the designers, fabricators and builders.

What value does the solution generate?

Fabrify concentrates the project's minimum information needed for the project agents to stay on the same page and succeed on their endeavors. As a management assistant that was thought to support unique digital fabricated pieces since the very beginning.

GROUP 2 – MODULO

Hack Category

Modular design

Short Project Description

Development of a grasshopper script to automate the design process of timber buildings using CREE's revit families from bimobject.

How is the problem being addressed?

By automatization of otherwise time consuming process when designing with modular elements.

What value does the solution generate?

- Faster design process (automated design)
- Early implementation of the modular elements into the concept proposal
- cost and sustainability aspects considered in the early design phases
- User interface

GROUP 3 – LCC

Hack Category

Object based life cycle costing

Short Project Description

We are using BIM models to quantify object costs during their lifetime.

How is the problem being addressed?

We created a database of objects along with their parameters, then we extract the data from the model and calculate total costs based on room. With visualized data, the user can compare different object solutions and see how they influence the total cost.

What value does the solution generate?

Our tool supports the decision-making process related to cost optimization during different design stages for new and refurbished buildings. Client is informed about all the costs associated with an object (not only initial purchase cost) so they can choose more sustainable solutions. Our solution can be also used to create more accurate, object-based facility management contracts.

LINK

<https://github.com/Mindowe/LCObject>

GROUP 5 – AEC ON THE BEACH

Hack Category

Best MASHUP

Short Project Description

Inspired by the interactive, educational AR Sandbox from UC Davis, we mashed up a Microsoft Kinect sensor running on Linux with Augmented Reality running on Unity to create a generative design project with a new type of interface. If you move the soil of the display, a new cityscape is dynamically created using generative design.

How is the problem being addressed?

Our focus is on people. We want to change people's understanding and engagement with the built environment. Cities are complex collections of systems and this is an example of how cities are shaped by geography. We want people to engage understand how cities are shaped by all these systems.

What value does the solution generate?

We hope we create an unforgettable, repeatable, and scalable solution that can serve as a learning tool for the city systems. This project can be extended and improved in innumerable ways and, as an open-source project, that is our expectation.

LINK

<http://www.aeconthebeach.com>

GROUP 6 – LOUD COMPUTER ARTISTS

Hack Category

Short Project Description

We are creating a web app to incorporate LCA data (carbon foot print) in the very early stages of the building design.

Through this design tool we are creating a foundation and an initiative for companies to make EPDs (or LCA) of their products, and reduce the environmental impact of their products.

How is the problem being addressed?

We are using linked data, Open source software, existing technologies, BIM before revit and early stage design.

What value does the solution generate?

A design tool for architects to include environmental sustainability before it is too costly or left out.

Lowering the environmental impact of buildings.

Force companies to reduce the environmental footprint of their building materials.

GROUP 8 – DIGITAL TWIN 4 EVERY1

Hack Category

Short Project Description

Making digital twins available to everyone. Building the bridge between physical sensors and the virtual world and back again.

Demonstrate that everyone can build a digital twin of their local environment on a low budget using IoT and cloud-tech.

How is the problem being addressed?

The problem is that typical digital twins are only available for large building owners and these are very complex systems.

Therefore by using open-source sensors, cloud databases and viewers, digital twins' complexity can be reduced. The accessibility of knowledge of your local environment can be increased as well.

What value does the solution generate?

Make people aware of their physical environment to improve building usage and energy performance with an affordable digital twin.

A system, which is customizable, simple and flexible for everyone (homeowner, office owner, employer etc.)

GROUP 9 – THE GEEKY WATCHMEN

Hack Category

Short Project Description

Safe Step: This is an app for women, tourist and people who are new to an area which tells them the safest route possible to their destination. The app also has an option for rating a place based on the user experience. People can add their reviews and comments which contribute towards building a safer community.

How is the problem being addressed?

Identifying the parameters contributing towards the direct impact and the perception of safety is the first step. Teaming together with Geoinfo, we aim to access the data available for different regions. Furthermore, we develop an algorithm that provides a scoring based on the available data in a specific region. The algorithm feeds into identifying the safest route for a person, based on the identified factors.

What value does the solution generate?

The output not only contributes majorly towards citizen safety, it also helps in monitoring the urban nature of a region like lighting and transit routes that can be used by the municipalities, urban designers, architects and planners for various uses. It helps in improving and monitoring the infrastructural elements along with the direct impact of making places safe.

Teaming together with Geoinfo, the app proves how collaboration between designers and developers can be directly useful for the benefit of the citizens.

GROUP 10 – FREIBOT-O

Hack Category

Poor knowledge-sharing and use of existing data within AEC companies

Short Project Description

An AI bot on the company's intranet that connects people, data and knowledge. It captures, categorizes, stores and grows the collective knowledge and makes it easily accessible through one point of entry.

How is the problem being addressed?

The team has made a bot that uses machine learning to harvest the questions and answers within the company and connect these with the relevant data. By connecting data from files in the project database to the accumulated knowledge from an experienced colleague, the bot sources the collective genius of the organization.

What value does the solution generate?

The solution generates value by making sure knowledge is captured and stored for continued use.

LINK

<http://bot.continuum.codes/bot.html>

GROUP 11 – GROUP 11

Hack Category

Short Project Description

The project is analysing Bloxhubs different type of sensor data from the indoor environment. Based on it we make data driven decisions with providing automated information to the responsible person for breakdown or malfunction of any building system or component, thus maintaining a comfortable indoor environment.

How is the problem being addressed?

We are using open data formats rather than proprietary formats to make the data accessible, extracting BIM information for geometry using IFC and representing it in graphs for processing intelligent queries, to create an interface for geometry visualization with graphs and an alarm system.

What value does the solution generate?

Predictive analysis for breakdown of equipment. User analysis and temperature control for buildings. Maintaining healthy, comfortable and safe indoor climate. Equipment and user data analysis to make data driven decisions and analysis.

GROUP 12 – PROJECT WISDOM

Hack Category

Short Project Description

We have extracted for the last 7 months about 315 years of data from a structural engineering design software. (All actions done within that software are being recorded)

We are then using Machine Learning (ML) to extract WISDOM from the data we have collected.

Then when we extract this WISDOM we again use ML to find out when, where and to who to forward this WISDOM so that we can breach the silos within our organization and in the future the construction Industry.

How is the problem being addressed?

We are using various Machine Learning (ML) to extract WISDOM and then created a tool within the software that is able to target valuable WISDOM to the user when he needs it.

See this picture, there you see the architecture we used: https://www.linkedin.com/posts/ricardo-farinha-6852b321_aechackathon-copenhagen-bloxhub-activity-6636927053469937664-sne5

The things that are RED in the picture are the things we are/have developed in this weekend.

What value does the solution generate?

This solution allows us to convert data into WISDOM, save this WISDOM and share it throughout the silos of the construction industry, which in the long run will help us tackle the biggest problems our industry is facing for the last decades.

LINK

GROUP 13 – VXT RESEARCH

Hack Category

Short Project Description

"SDG Footprint" is a machine learning tool that helps you to discover your company's footprint of Sustainable Development Goals (SDG).

We all care about how our AEC industry contributes to sustainability. The 17 Sustainable Development Goals (SDG) capture the multidimensional nature of sustainability and provide a framework consisting of 169 different Targets and 232 Indicators to enable reporting and benchmarking by countries on a global scale. However, there is a lack of SDG transparency on local company level, because most companies don't explicitly report SDG impacts, which is a laborious task. In addition, many AEC companies may not be aware of SDGs even if they have activities related to SDGs in practice. We address the problem using data mining and machine learning.

How is the problem being addressed?

SDG Footprint mines data from news on the websites of AEC companies, and matches the news material to descriptions of SDG Targets. SDG related activities are thus automatically detected in company's news as their SDG footprint, regardless of whether the company is aware of SDGs or whether they make explicit references to SDG topics. This enables the SDG footprint of AEC companies to be automatically detected without any active reporting from the company. The SDG footprint can be aggregated company-wide, and you can thus compare the different SDG contributions between different companies to determine whether they represent your personal sustainable development values.

What value does the solution generate?

The value of our solution is that it makes SDG related activities of companies more transparent and discoverable, which otherwise would have required laborious reporting from companies. Companies can thus showcase their activities that contribute to SDGs even if they were not aware of the SDG Targets. Likewise, individuals are able to appreciate whether their companies represent their own personal sustainable development values, and further compare their own company's SDG footprint with that of other companies. All this promotes awareness and eventual adoption of SDGs.

Future possibilities include detecting SDG footprint from any textual documentation, in addition to news e.g. contracts, project archives etc. We could also implement automatic alerts if the user would like to follow a company's SDG footprint. Lastly, it would be important to encourage public authorities to consider a company's SDG footprint as a criteria for awarding of projects - this will further stimulate adoption and change towards sustainable thinking.

GROUP 14 – SAFETY HEROES

Hack Category

Short Project Description

Create safer building sites through surveillance video and machine learning. Live dashboards and direct feedback is forwarded to management and employees. Heat maps will show areas where the employees in general don't follow regulations, to advice management is redesign is needed.

How is the problem being addressed?

We are using detecto (<https://github.com/alankbi/detecto>) and building site fotos from a crane.

What value does the solution generate?

WE SAVE MONE...I MEAN LIVES!

GROUP 15 – AECCONNECTOR

Hack Category

Came with a Team and An Idea

Short Project Description

Short Description of Project: Problem Statement. Typical of any construction project, Architecture Firms and General Contractors are contractually obligated to have resources during the design and construction phases. During the design phase, the designer is required to provide a registered principal to oversee the design team. The design team includes the architect/s, project managers and drafters. Some contracts call conceptual design reviews as well as 30%, 50%, 75%, 95% and 100% construction documents reviews as well as construction administration during the construction and closeout phase. Similarly, the General Contractor assigns manpower to each element in order to meet the critical path.

How is the problem being addressed?

How is your team addressing the problem?: AECconnector weighed the common issue of assigned employees who are assigned to a particular project and who is familiar with the particular project who became sick, wants to take vacation as well as maternity, paternity leave or to simply leave for work/life balance. AECconnector took these common occurrences into consideration when developing the goals and objectives of this product. What if the designer is dedicating their resources to previous contractual obligations or if a team member is on vacation, potentially making the Design deliverables slip? How can a firm continue communications in an effective manner? This a common occurrence in the industry but an issue that building owner can not anticipate because they typically develop a single facility in their lifetime.

What value does the solution generate?

What Value does your solution generate: AEConnector is a communication tool solution that allows team members to freely enjoy their life / work balance to easily keep a project on time and within budget with peace of mind and with continued quality. AEConnector is a communication tool as easy to use as working with virtual assistants such as Alexa and Siri through voice control by returning information on the project scope, schedule, budget details as well as coordination.

GROUP 16 – REINHARD’S KIDS

Hack Category

Tool for participatory data-driven design

Short Project Description

A tool that addresses the failure of the existing means of communication between planners and citizens and the strained communication between these different stakeholders. The envisioned tool allows non-experts to simply formulate their ideas into urban design plans and instantly get performance metrics, including any project-relevant analysis and simulations.

How is the problem being addressed?

We present a tool that allows the user to define neighbourhoods by simply sketching them! We leverage computer vision algorithms to convert these sketches into zoning plans. Each zone has a simple and intuitive set of parameters that allows the citizen to shape their neighbourhood to their own vision. Furthermore, we offer a suite of performance metrics and simulations to imbue this simple sketch with a data-driven and evidence-based backbone. The entire pipeline seamlessly converts a low-fidelity sketch into a comprehensive 3d urban model.

What value does the solution generate?

- bridges the gap between planners and the community.
- provides the transparency in the decision-making process
- encourages sustainable development

GROUP 17 – DUG-OUT

Hack Category

Short Project Description

Soil Excavation is inevitable in any new construction, predicting the cost of it takes a lot of time. Challenge is to make it easier and faster to predict the cost of excavation.

How is the problem being addressed?

We don't take it all of the excavation involved in the project as of now. We tried to limit the attention towards stormwater design and its impact on total costs.

An iterative tool to best predicts the costs for the stormwater design for any new construction project.

What value does the solution generate?

A quick way to arrive at costs prices by tweaking the design - cost fit. Value for consultants to bid for project proposals.

GROUP 18 – KEA PLUG IN

Hack Category

Improving work flow in KEA

Short Project Description

We want to increase the pace of work in our classrooms and lectures and we found out the best solution to do so, is by creating this plug in, that builds a stronger bond between the lecturer and the students in class.

We've become aware that people work at drastically working at different paces, some learn things fast and some take time to understand every step, we believe that this new tool that we are creating will benefit every age group experiencing difficulties with flexibility using revit, especially for KEA.

How is the problem being addressed?

We started to brainstorm different solutions, fast and efficient solutions as Revit is used everyday of the week at KEA, especially at BIM Cafe. Our BIM lecturer shared his struggles and we shared ours, and we came to a conclusion that can be produced fast and efficient.

We looked into the shared difficulties and made a statistics on how many in one class are always struggling catching up to the lecturer , we found a solution to how we can all work on the same pace by asking every individual working on their Revit project if they're following same steps. If not we help them.

And by helping them, we created this plug in.

What value does the solution generate?

We are as fast as the slowest one.

GROUP 20 – BUILDING MOOD

Hack Category

Interaction between user and building

Short Project Description

To map activities in a building based on sensor data of indoor climate and occupant tracking.

How is the problem being addressed?

Through an interactive website.

What value does the solution generate?

Promotes closer and more intuitive interaction between building and occupant leading towards a more comfortable and useful indoor environment.

LINK

http://test.tramastudio.net/building_mood/

GROUP 21 – BCD

Hack Category

Improving collaboration

Short Project Description

The web app that allows BIM Managers to manipulate models and the information that comes along.

How is the problem being addressed?

Creation of a friendly user interface with enough tools and power to plan, generate and maintain models.

What value does the solution generate?

Time and money savings by avoiding mistakes and miscommunication in the process.

GROUP 22 – I LIKE TO MOVE IT

Hack Category

Short Project Description

This project aims to provide a platform to plan and simulate the transportation of oddly shaped large objects in construction site or existing buildings from point A to point B.

How is the problem being addressed?

We defined three main challenges:

1. How can we generate the environment from floor plans?
2. How can we digitize the object?
3. How can we plan the motion with minimum computing power?

What value does the solution generate?

We believe that our solution is innovative and solve an actual need in the AEC field. The necessary elements for a successful movement planning are not always available, and we tried providing an integrative approach covering all different cases.

GROUP 23 – OFFICE LAYOUT

Hack Category

Generation of heuristic office layout solutions

Short Project Description

We developed an algorithm that generates floor plans with door positions. Then it creates pathways for moving around and results in the free office space that can be used to locate workstations. Then a collection of furniture is used to be distributed over the area. The idea is to generate enough data based on the input floor plan and the resulting furniture distribution to train a neural network that later on can be implemented in BIM software.

How is the problem being addressed?

We created a randomized floor plan generator algorithm. For pathways, we use the shortest walk algorithm. Later on, the distribution of the furniture is performed by nesting. The input and output data are stored in a dataset.

What value does the solution generate?

It can be used for quick planning of office spaces. It by no means creates any final floor plans but rather creates a rough solution from where an architect can start instead of doing everything from scratch. The goal is to save working time for planners.