

# Urban Master Planning Process and Modeling with Infraworks

**황성철(SeongCheol Hwang)**

Urban Planner | SAMOO Architects & Engineers



# FLYING PENGUIN

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# About the speaker

## Urban Planner, SAMOO A&E

- Based in Seoul, Korea
- More than 15 years of experience in urban design & planning
- MRICS(Planning and Development)
- Engineer Urban Planning
- Specialist about CIM workflow(Civil 3D, Infracore, Revit, ...)
- E-Mail: [sc.hwang@samoo.com](mailto:sc.hwang@samoo.com)





# **About SAM00**

# Firm Profile

**SAMOO Architects & Engineers** is an architectural firm in Seoul, Korea with diversified services including architectural design, urban planning, interior design, sustainable design and engineering services.



# Design & Technology

**SAMOO** has been awarded more than a hundred architectural design awards including top 3 international design and ranked high in the global rankings.

Nat'l Library of Korea



Red Dot Award

Samsung Fire Global Campus



iF Design Award

The Presidential Archives



IDEA

Total Employees

**681**

Professional Engineer

**11**

LEED AP

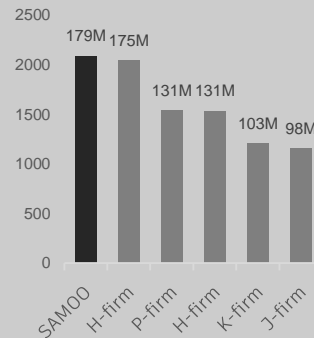
**43**

Korea Ranking

**1**

'20 Revenue(USD)

\* 금융감독원 공시정보(DART) 자료 기준



Global Ranking

**6<sup>th</sup>**

Of The Top 10 by Market  
\* Manufacturing Sector Only

**ENR**  
Engineering News-Record



# Goal & Commitment

01

## SUSTAINABILITY

Responding to climate change and pursuing goals for sustainable development.

02

## RESPONSIBILITY

Realize corporate social responsibility for high quality of life and provide solutions.

03

## COEXISTENCE

Provide a foundation for all residents to interact and work together to live.

# **AGENDA**



# Agenda

- Urban Master Planning Methodology
- Masterplan Modeling Process
- Improve Visualization



# **Urban Master Planning Methodology**

# 3 Pillars for Master Planning

01



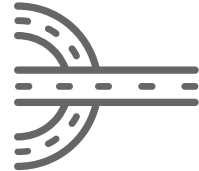
**Public Realm**

02




**Building**

03



**Transportation**

# Urban Masterplan Planning Process



```
graph TD; A[Site Survey and Analysis] --> B[Idea & Pre-Masterplan]; B --> C[Masterplan Development]; C --> D[Detailed Masterplan]; D --> E[Implementation Plan];
```

Site Survey and Analysis

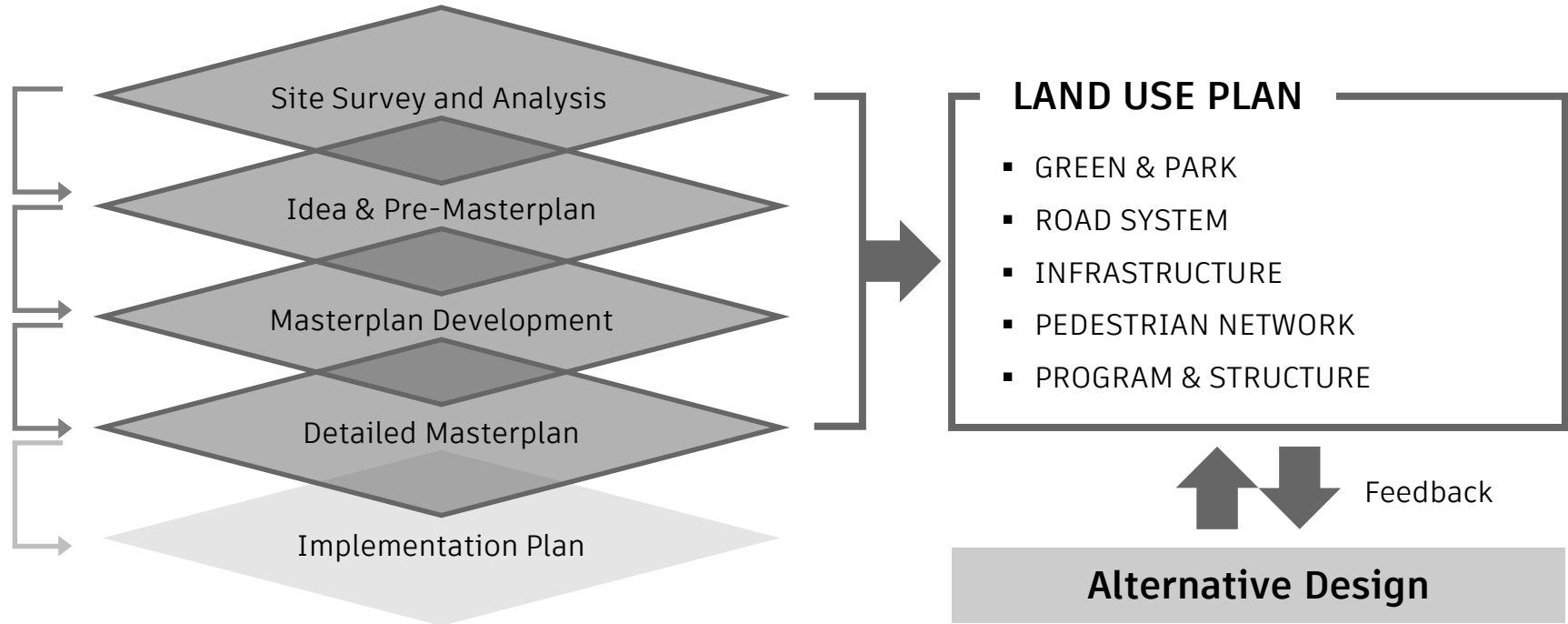
Idea & Pre-Masterplan

Masterplan Development

Detailed Masterplan

Implementation Plan

# Urban Masterplan Planning Process



# Challenges in the Current System

A woman with long blonde hair and black-rimmed glasses is smiling and holding a yellow pencil to her mouth. She is sitting at a desk with a laptop and a pencil holder containing several colored pencils. The background is a soft, out-of-focus grey.

Difficulty in quickly reflecting modeling when planning changes.

Modeling requires a lot of time and effort.

Difficulty in simulating traffic, environment, landscape, etc.

# Requirements for Master Planning

Tools to implement vision and objectives

Rapidly present alternatives

Combined with GIS and big data

Compatibility with other programs

Quick Control at City Scale



**A** AUTOCAD

**B** BIM 360

**R** REVIT

**C** CIVIL 3D

**I** INFRAWORKS

**N** NAVISWORKS

**F** FORMIT

**3** 3DS MAX

**I** INSIGHT

**A** ALIAS

**D** DYNAMO STUDIO

**R** RECAP PRO

**C** BIM COLLABORATE PRO

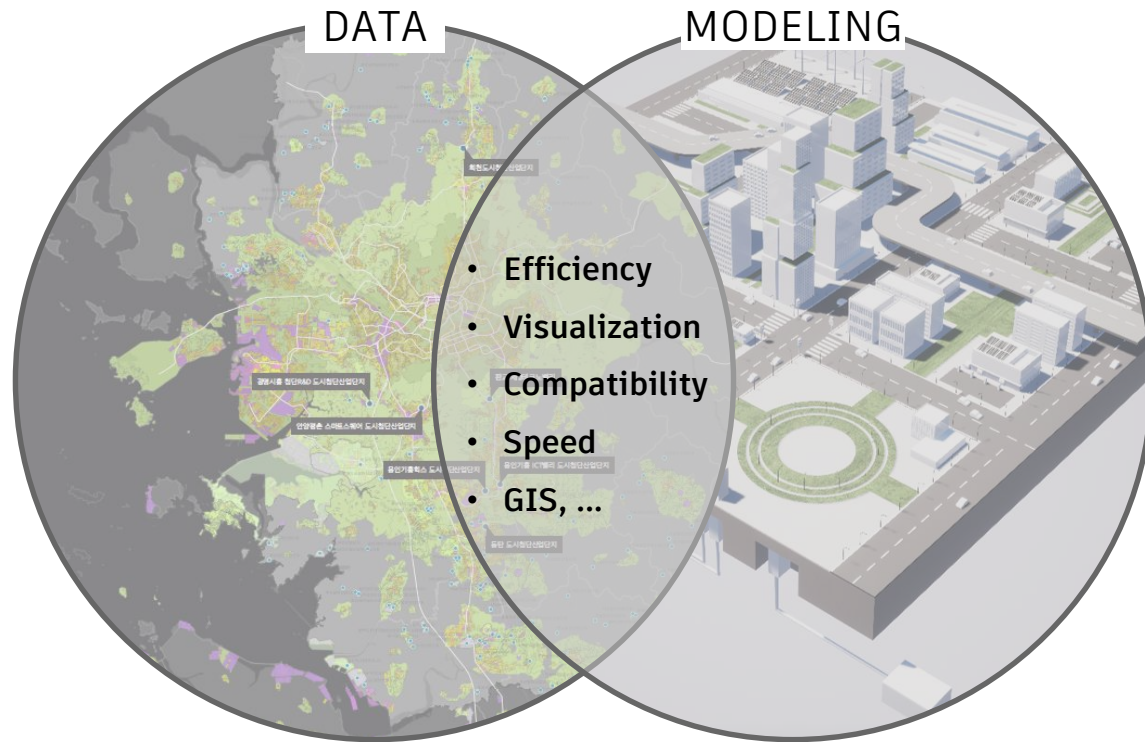
**C** AUTODESK CFD



A group of people are seated around a large conference table in a meeting room. They are looking at a large screen at the end of the table. The screen displays a presentation titled "Questions on ontology framework v1.1.6". The presentation includes a list of questions and a sidebar with a grid of small video feeds of participants. The room is dimly lit, and the people are wearing face masks. The table is cluttered with various items, including laptops, tablets, notebooks, pens, a water bottle, and a cup of coffee.

# **SAM00 developed a new methodology for urban master planning with GIS and modeling programs**

# SAM00 New Methodology for Master Plan



# SAMOO New Methodology for Master Plan

**MP**

## STEP 1

Big Data &  
Small Data

## STEP 2

City Data  
Platform

## STEP 3

New Planning  
Technology

## STEP 4

Space and  
Smart Solution

## STEP 5

Operation &  
Maintenance

GIS

Analysis of location conditions and topography

Samooworks

City data collection and processing

Planning

Land use planning & Architectural design

3D Modeling

Modeling & Visualization

Simulation

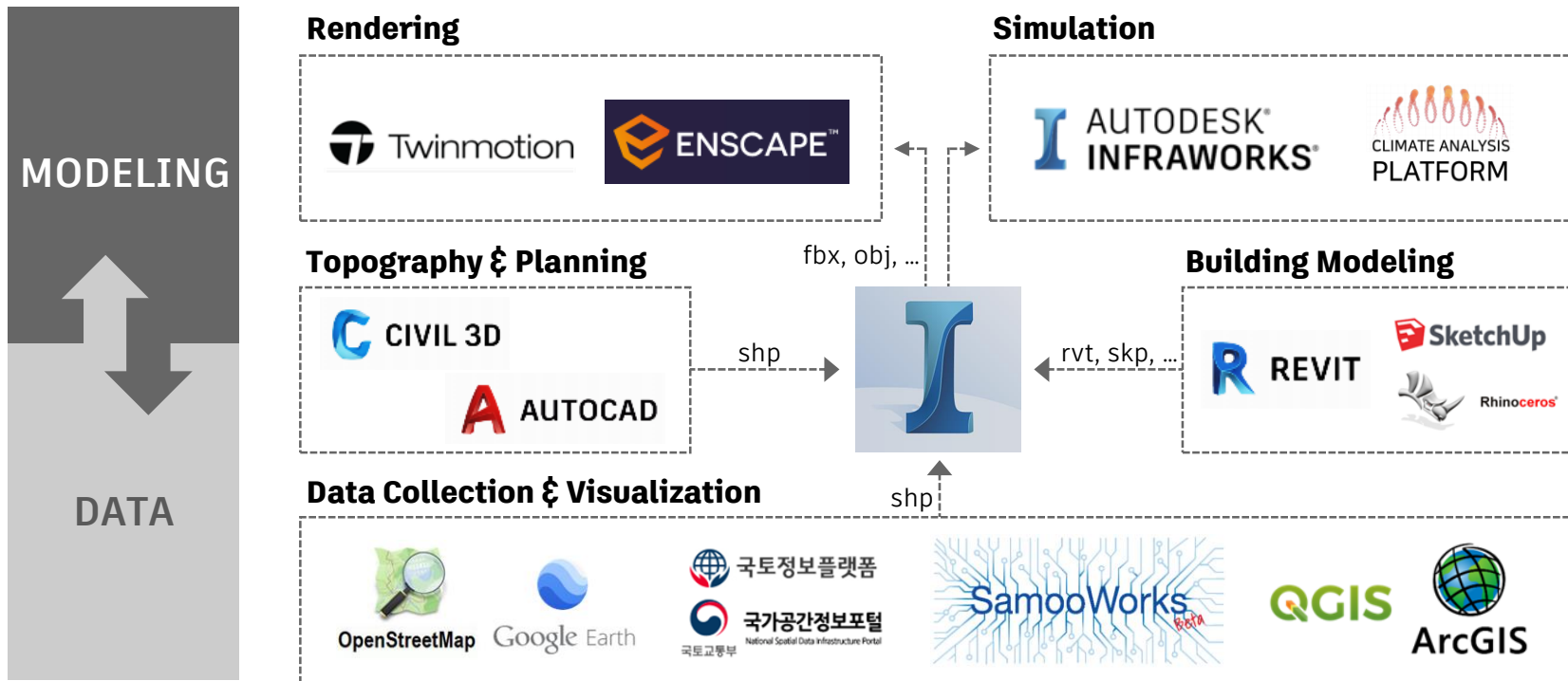
Climate/Energy/Transportation/Landscape/Environment

CIM

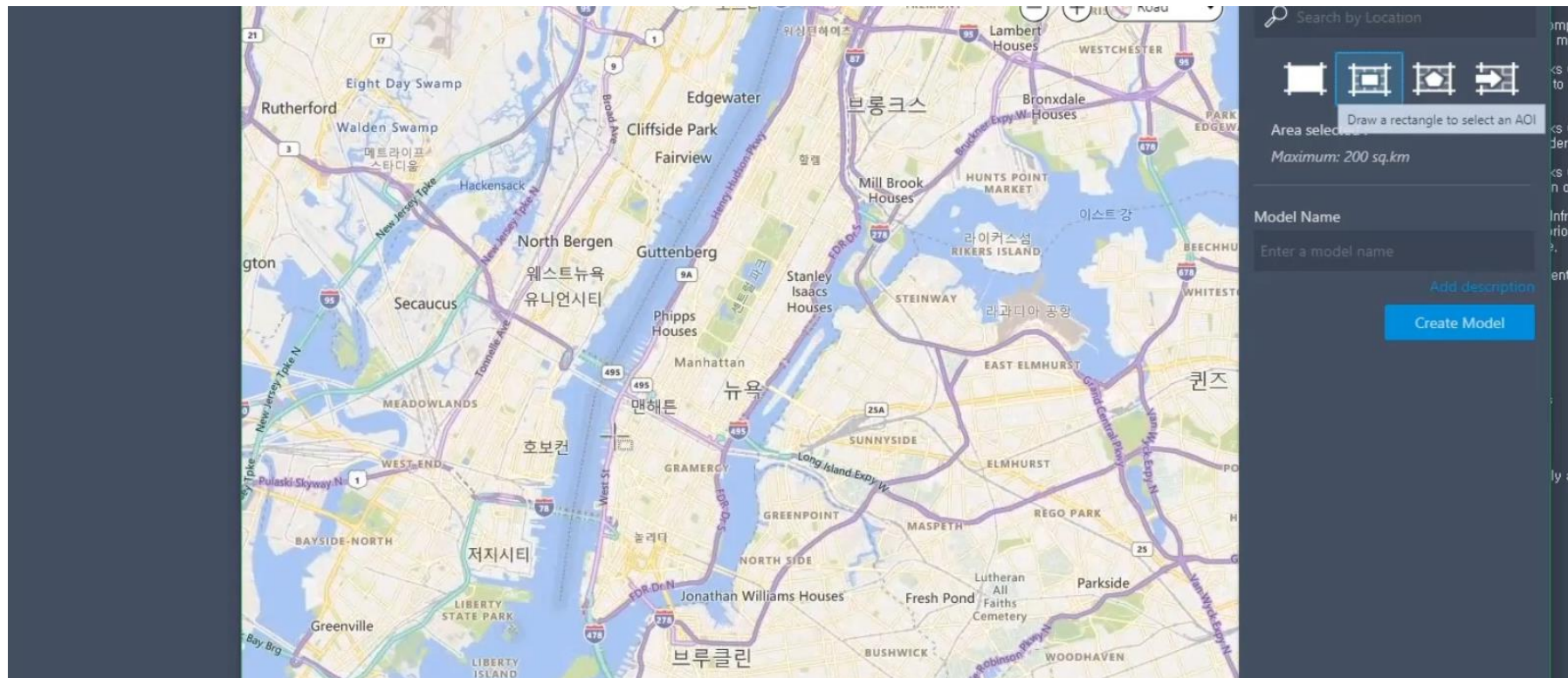
BIM modeling/Space sensing

**Architecture**

# Data Driven Urban Integrated Modeling



# Data Driven Urban Integrated Modeling



# **Master Plan Modeling Process**



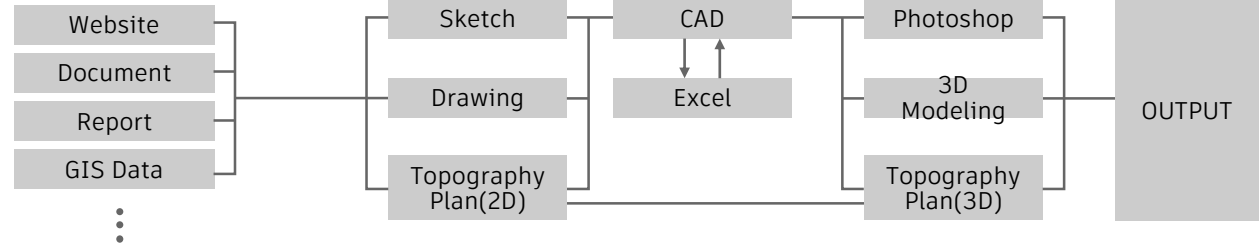
# SAMOO Master Planning Work Flow

ANALYSIS

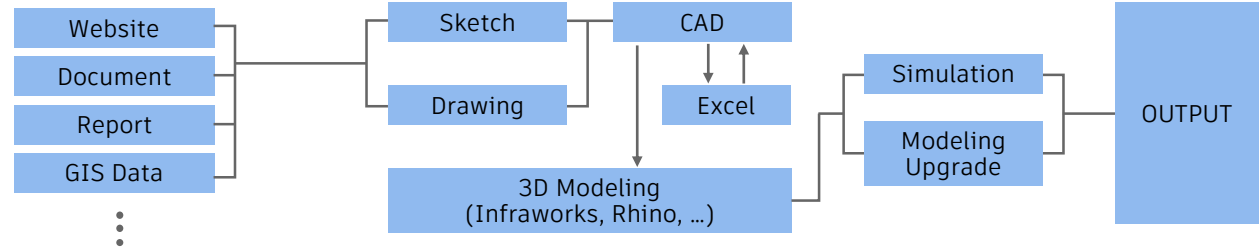
PLANNING

VISUALIZATION

**2D Based  
Work flow**



**SAMOO**





# Master Planning Work Flow

Analysis Phase

## Data Analysis and Application

### Data Collection

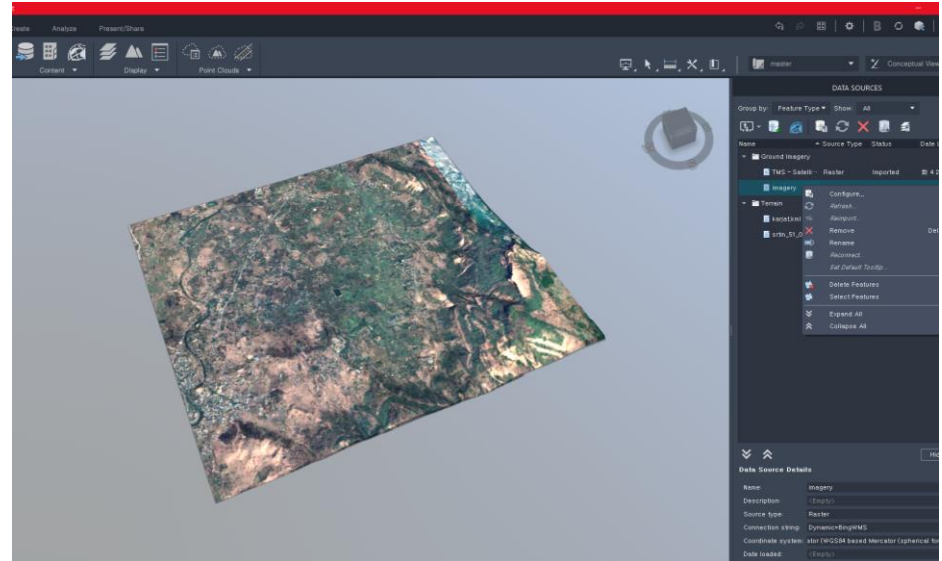
Gather geographical and coordinate systems in site

### Create Topography

Modifying data to match local conditions

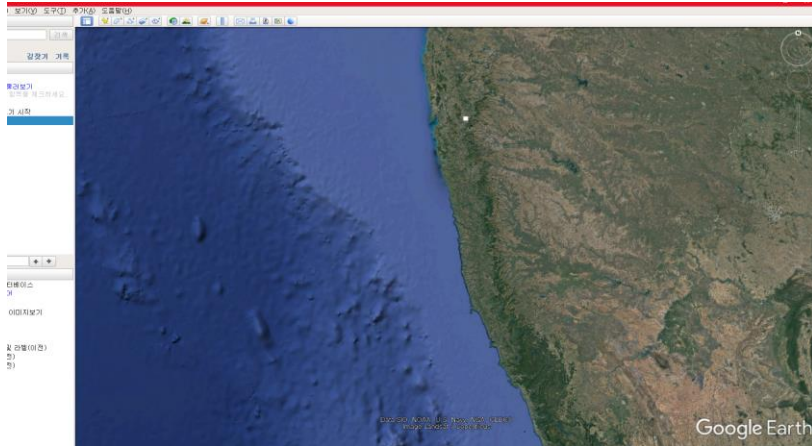
### Complete Topography Map

Use Infraworks to complete site topography

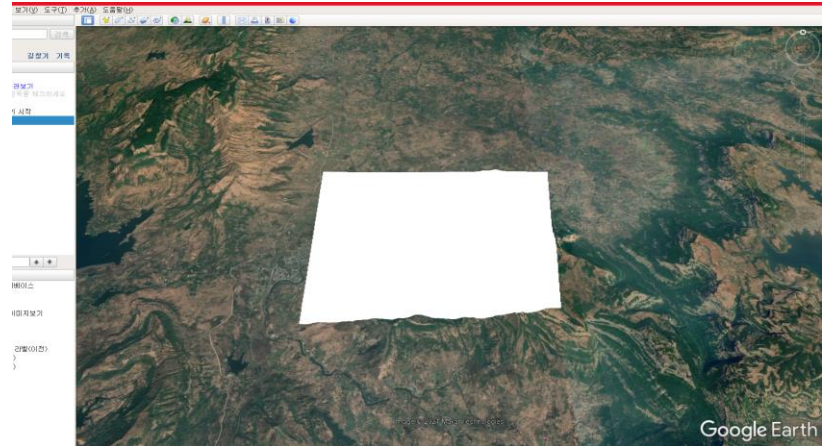


# Master Planning Work Flow

## Analysis Phase



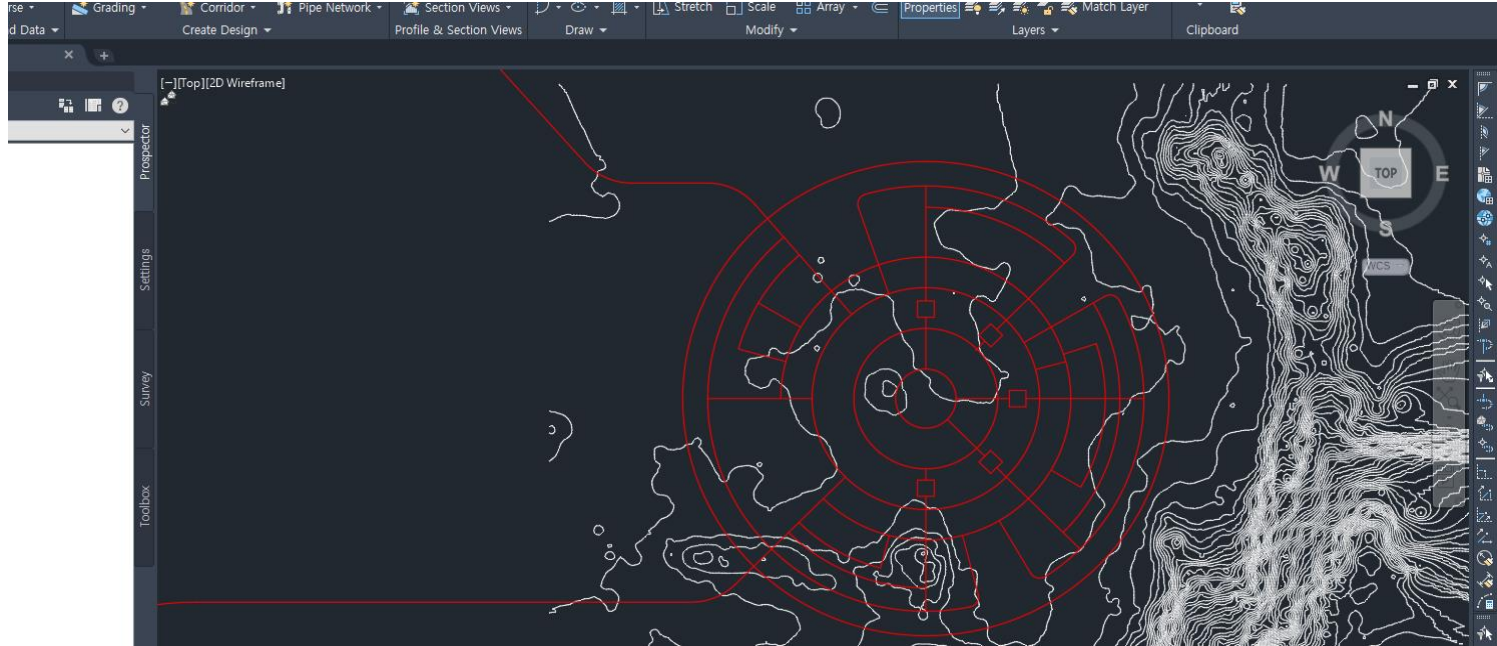
- Define a planning area to create terrain.
- Area designated by Google Earth, Geographic Information Platforms.



- GIS provides more detailed information than Infracore model builder.
- Download files such as dxf, ngi, shp with geographic information.

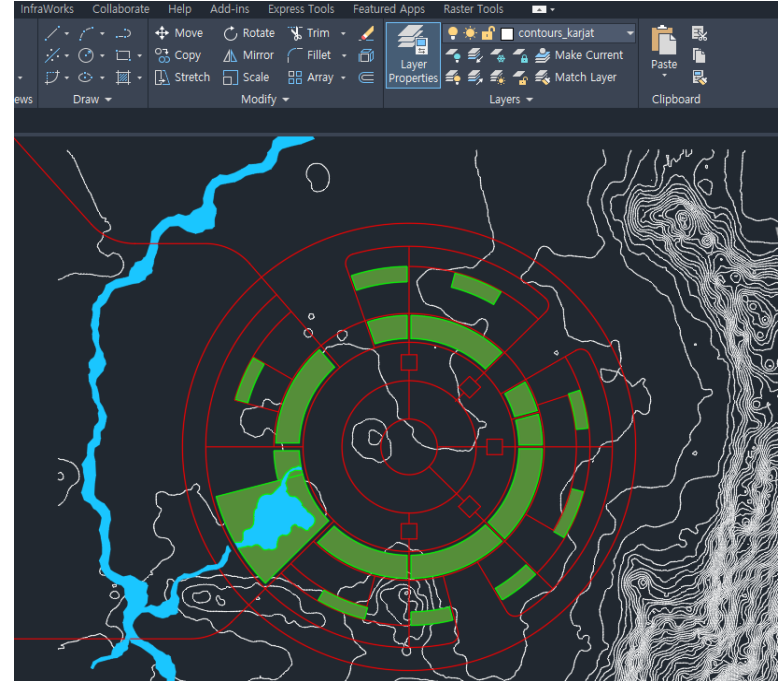
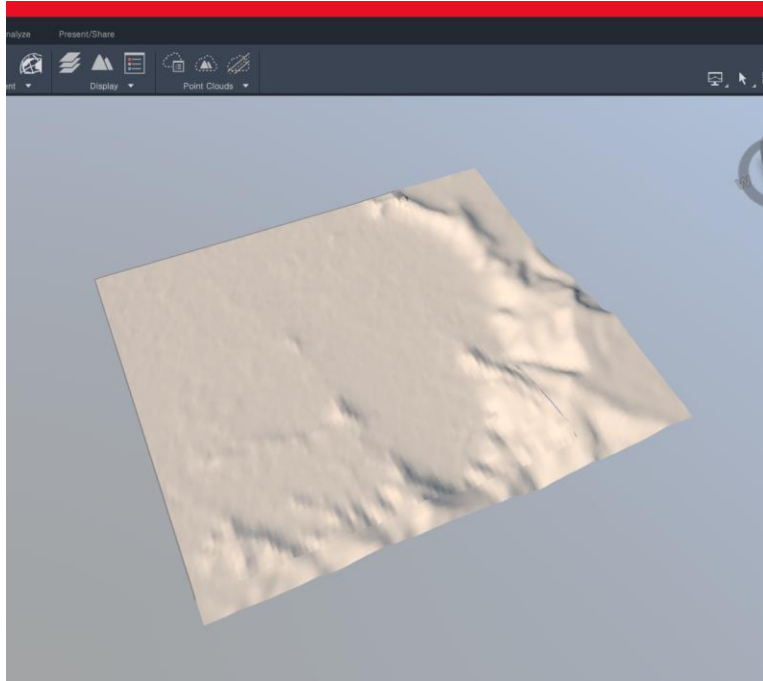
# Master Planning Work Flow

## Analysis Phase



# Master Planning Work Flow

## Analysis Phase



# Master Planning Work Flow

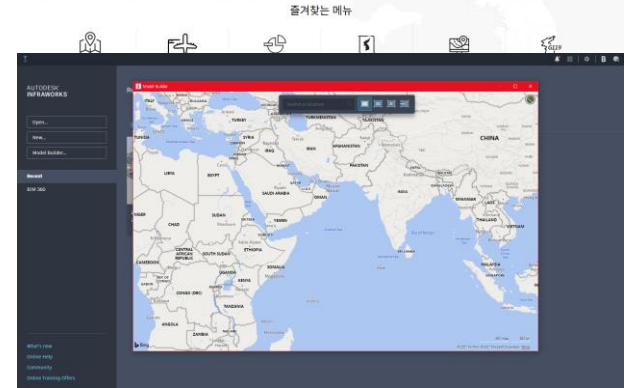
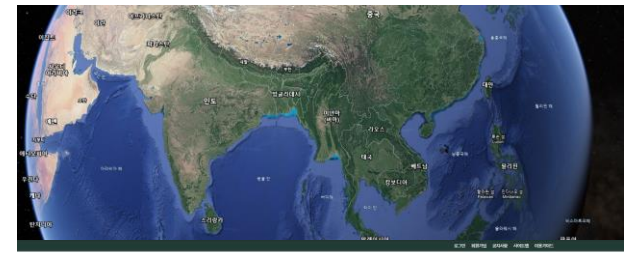
## Analysis Phase

### Strength

- For overseas projects, produce results suitable for local terrain.
- Transportation and urban landscape planning considering terrain.

### Weakness

- Deliverables level gap depending on the level of data received.
- Data update times vary by region.





# Master Planning Work Flow

Design Phase

## Land Use Planning

### Urban Spatial Structure Planning

Transportation, Community plan, Program, ...

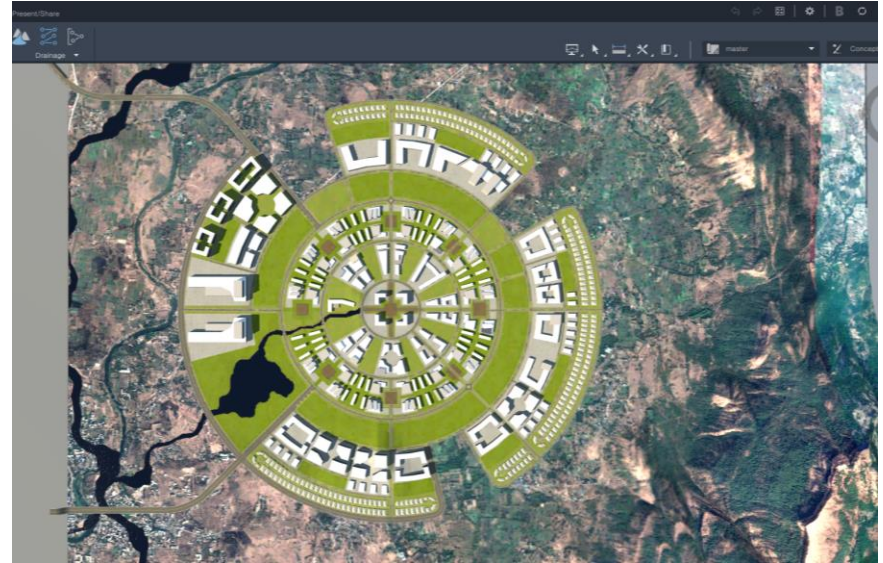
### Urban Spatial Density Layout

Building density, Specialized plan, Landscape plan, ...

### Land Use Plan Completion

Program, Building density, Block plan, ...

REVIEW



# Master Planning Work Flow

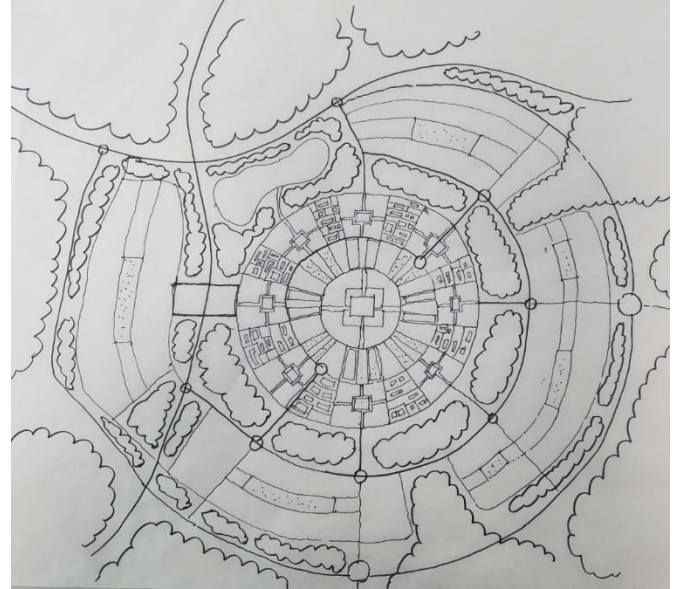
## Design Phase

Structure  
Planning

Density Layout

Plan Completion

- Steps to use sketching and drawing to plan.
- Road network system, block planning, open space layout and planning in and out of the city.
- Place green spaces in places of high conversation value based on analysis phase.





# Master Planning Work Flow

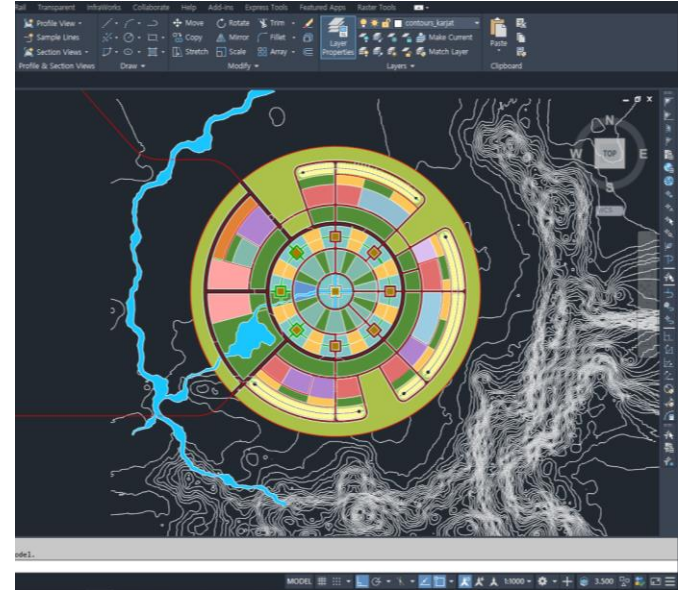
## Design Phase

Structure  
Planning

Density Layout

Plan Completion

- Steps to draw to a computer based on a sketched plan.
- Accurately apply program area, road spacing, and width to estimate area in the Civil 3D.
- Modify and supplement plans to maintain proper density.



# Master Planning Work Flow

## Design Phase

Structure  
Planning

Density Layout

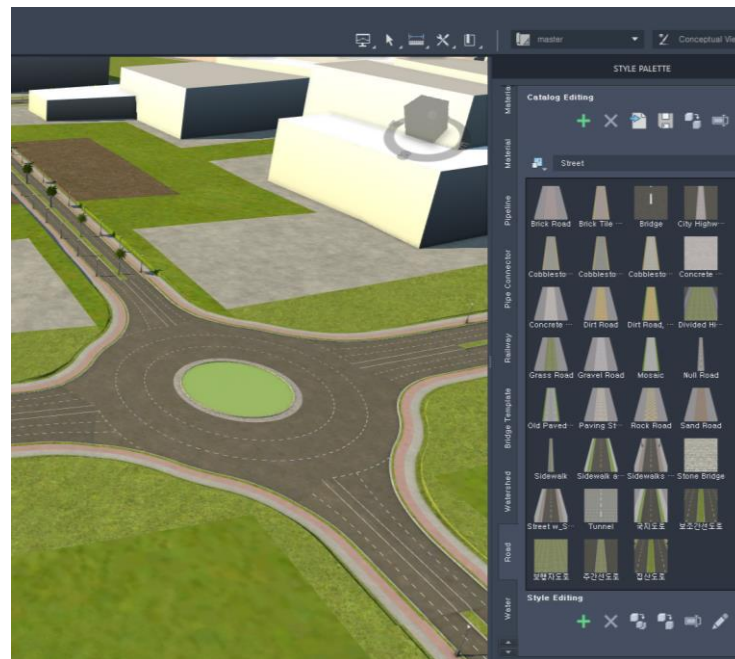
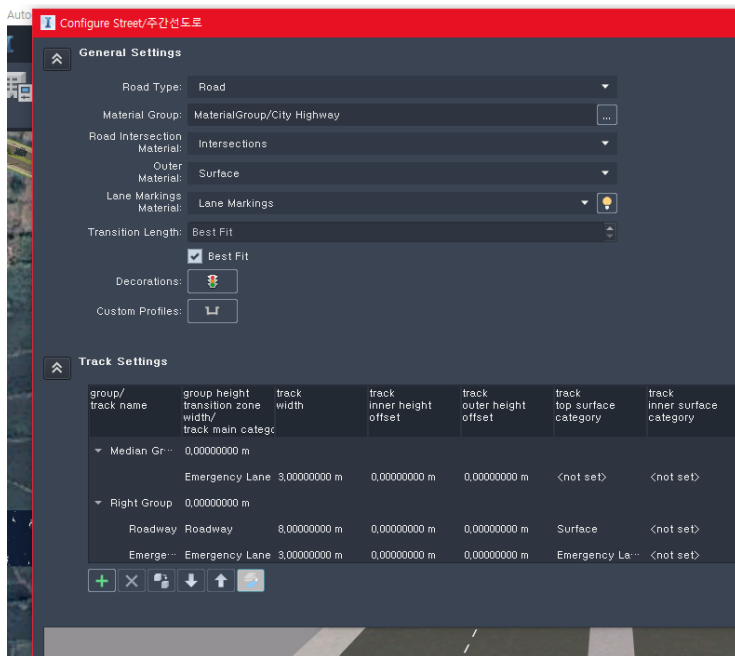
Plan Completion

- Implementation of building mass plan after completion of land use plan.
- Land use planning and building mass modeling in Infraworks.
- Modification of building density, height, and land use location in consideration of surrounding terrain and landscape.



# Master Planning Work Flow

## Design Phase



# Master Planning Work Flow

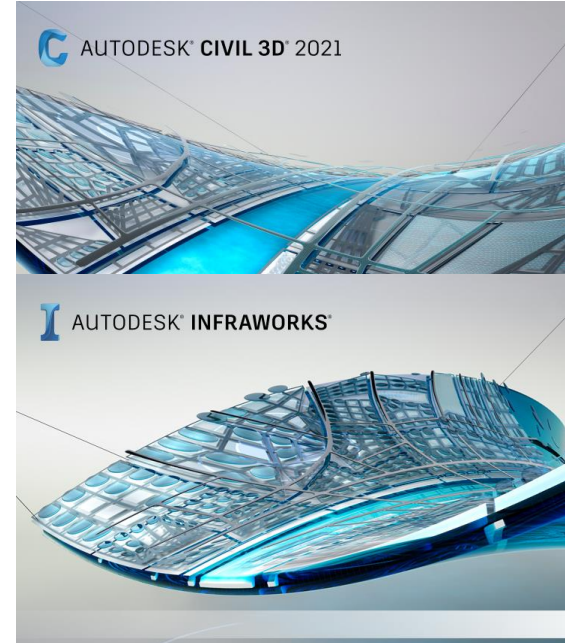
## Design Phase

### Strength

- Rapid modeling and plan modification (building height, tree, coverage, road, ...).
- Use GIS information without any other programs when planning.

### Weakness

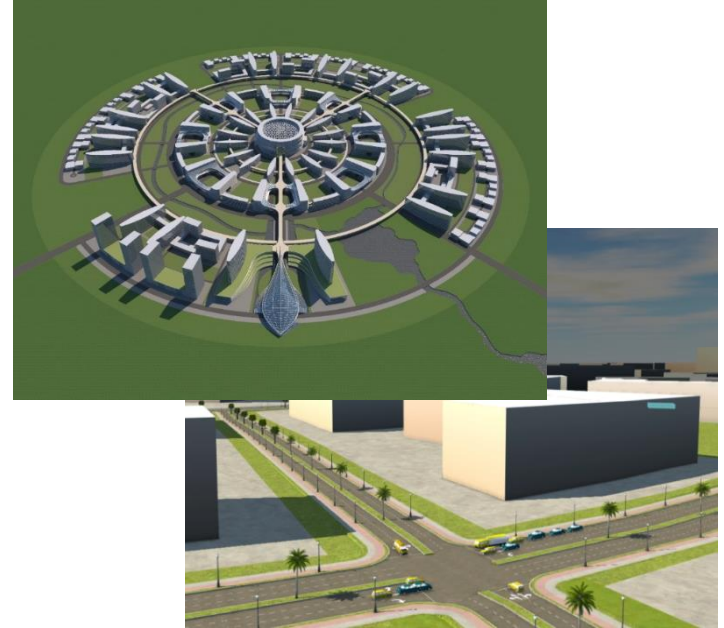
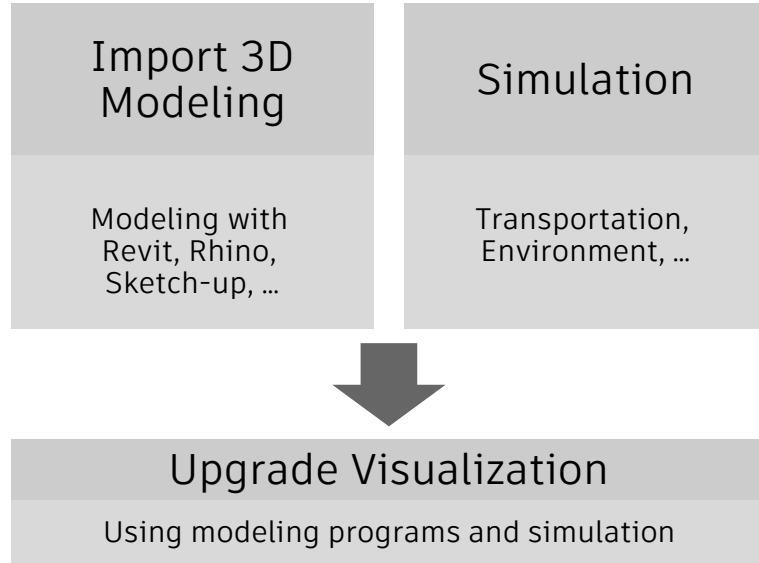
- Poor modeling output compared to other 3d modeling programs.
- Lack of libraries to produce deliverables for local environment.



# Master Planning Work Flow

Visualization Phase

## Simulation & Visualization



# Master Planning Work Flow

## Visualization Phase

### Simulation

Simulate the factors that affect the plan to identify the problem and correct the plan to solve the problem.

- Traffic, Pedestrian
- Sun & Sky
- Urban Landscape, etc.

Getting the most realistic data and libraries is key to achieving reliable results.





# Master Planning Work Flow

## Visualization Phase

### Simulation

Visualize information about changes in landscape based on building height, energy usage for each building, annual energy costs, etc.

Improves client understanding by visually showing changes.





# Master Planning Work Flow

## Visualization Phase

### Visualization

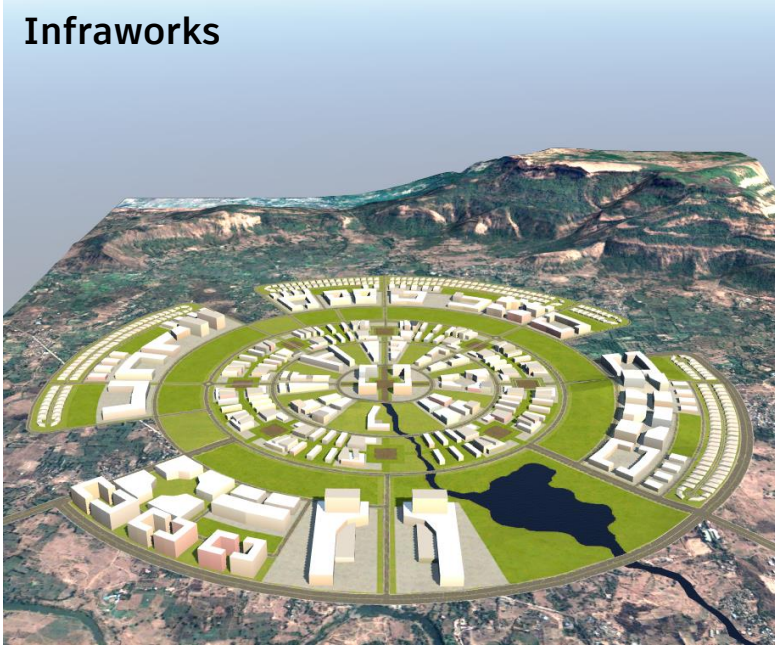
- Use modeling programs such as Revit, Rhino and Sketch-up to complement visual effects on Infracore 3D modeling.
- Upgrade modeling for density and landscape with infrastructure work-based modeling.



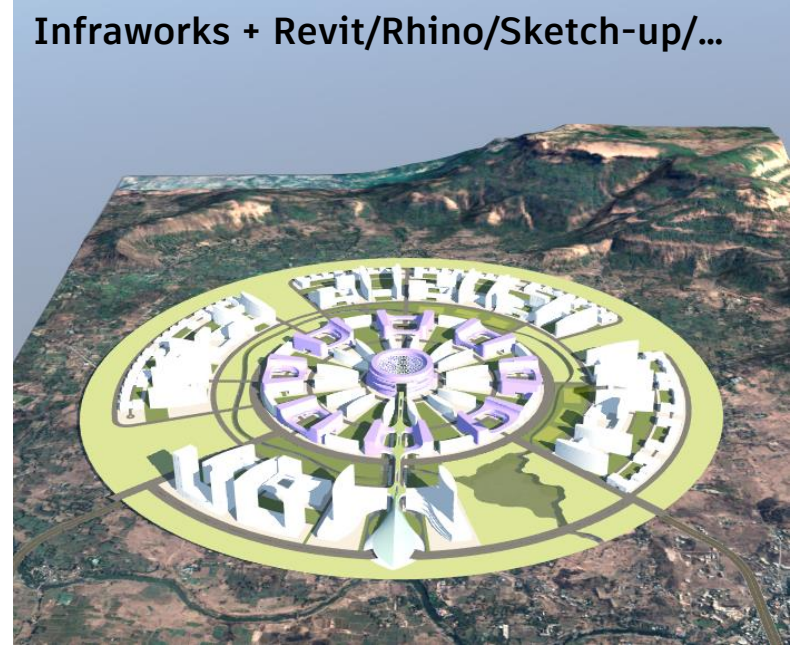
# Master Planning Work Flow

Visualization Phase

Infraworks



Infraworks + Revit/Rhino/Sketch-up/...



# Master Planning Work Flow

## Visualization Phase

### Strength

- Increase visual effects of 3D modeling and increase output levels.

### Weakness

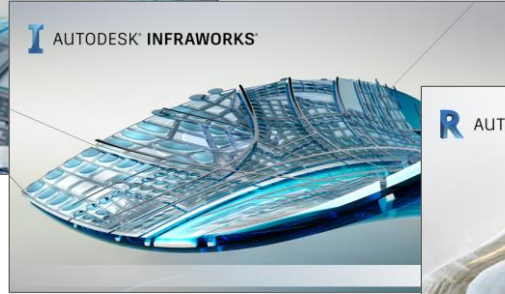
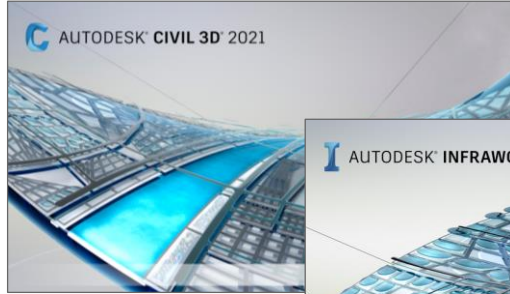
- Need time to create building modeling.
- Difficulties in fixing such as changing the height of a building within Infraworks.





**Improve Visualization**

# Improve Visualization



Low

Visualization

High



# Improve Visualization





# SAMOO

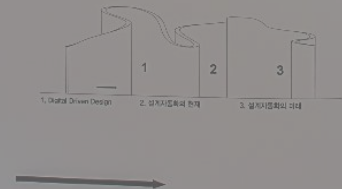
Digital  
Transformation

# What's the next step?

The world is changing rapidly. Our world is made up of visible, tangible materials. It is a very self-evident world where everything surrounding us really exists before our eyes. We have evolved over millions of years through interactions with this physical world. At some point, "data" has been appearing in this firmly established world of atoms. From objects to information, digital systems are replacing analog devices.

The technologies that we have learned throughout our lives are advancing rapidly with data, algorithms, and robotics. In particular, buildings and cities which are the actual material form we architects work with, are also being swept away by the digital wave.

Samoo has been looking at cities and buildings from an integrated and holistic perspective and creating an environment and space that are sustainable for humans and nature. With digital transformation as a standard for the whole stage of the urban construction process, the company has continued its efforts to achieve technological innovation from the planning stage to design and construction. Let's look at these efforts, achievements, and prospects of Samoo's ongoing digital transformation and find answers to the question that is the future.



# Improve Visualization



A person wearing a VR headset is shown in profile, reaching out with their right hand towards a virtual object. Another person stands behind them, smiling, with their arms crossed. The background is a simple indoor setting with a whiteboard and some equipment.

**VR**

# Improve Visualization

VR Workflow

**Infraworks**



**Real-time Rendering**



**VR**



**CIM**

- Land Use Plan & Building Modeling

**VR**

- Panorama VR Expor / User Meeting

# Improve Visualization





# Summary

Technological innovation can prevent climate disasters.

- Bill Gates -

2020 Environmental Doomsday Clock

# 9:47

Greenfund[Website]. (2021). Retrieved from <http://www.greenfund.org>





**SAMOO**

ARCHITECTS & ENGINEERS

The background features several dark, metallic-looking geometric shapes, possibly representing computer monitors or architectural elements, arranged in a way that frames the central text. These shapes have sharp edges and some reflective highlights, giving them a three-dimensional appearance.

# AUTODESK UNIVERSITY

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