Model Based Design, BIM as City Planning Technological Tools.

The March of Technology.

Project designers have access to tools with capabilities that far exceed those available in the post-World War II heyday of city planning. In the first quintile of the 21st century, the capabilities of the methods and processes of an earlier age are dwarfed by the latest generation of digital tools. The roll of technology through the design professions creates new specialists; it then commoditizes previous specialties as it produces new specialties. The birth, death and re-birth cycle continues. The balsa wood model builders still provide a limited service, the dedicated word processing staffs have disappeared, GIS once a specialty has become ubiquitous, everyone works SketchUp and elementary students produce power point presentations. And the beat goes on…

Fully Integrated Design and Construction Plans.

Today, and this may be passé upon its writing, digital tools are currently deployed by many professionals to produce design and construction plans for incredibly complex development projects. The system integrates the work of all the design professions from architecture to civil/environmental engineering to landscape architecture into a single set of plans; all "clashes" resolved. Lighting, signage, geotechnical and topographic inputs, among other project aspects, are standard parts of the package.

There are several types of digital methods and products that produce fully integrated design and construction plans for projects. The more complex the project, the more useful the method.

Citywide Application of Project-Oriented Model Based Design.
The operative word for the current application of this process is "project". The methods and processes used for individual projects have yet to be transformed into a commonly available tool for planning and designing the entire city.

Consider that future land use and zoning could be mapped with the utility system, the public safety facilities, the environmental areas, the schools, parks and the transportation system simultaneously – with all "clashes" or conflicts identified for resolution and monitored on a citywide dashboard. With "big data", widely distributed sensors and powerful computers, the day is coming. Specialists will initially run the system, but eventually, like GIS, the project planners will take over.

Model Based Design practiced by VHB described by Brent Lacy, AICP, Principal Transportation Planner.

> **"Model Based Design** is basically similar in most applications; building design, aerospace, mining/tunnels, roadway, utility systems, etc. It makes very complex systems design much easier through 3-D production from a mathematical and visual based design control program. Think pipes and plumbing, electrical wiring, air duct and exhaust ventilation, and being able to "flow" through each system as it's developed, and see conflicts, obstructions, violations or code spacing, etc., kind of like passing through the Stormwater System before it's built; identifying any and all issues from a three-dimensional perspective."

***BIM [building information modeling]* provided through Revit** as described by Matt Allen, RLA | ASLA, partner in the landscape architecture firm of Foster Conant and Associates.

> *"It [Model Based Design] has become popular in the last decade. In our world [landscape architecture], we [FCA] use **Revit** as our collaborative BIM software. It allows us to model in 3D all of our elements and share our model with other disciplines. We can model a retaining wall and make sure that the foundation doesn't conflict with underground storm pipes, etc. I used this modeling process extensively on the coaster project. We, as a design team, were cramming so much into such a limited space that we had to be certain that there wouldn't be any unforeseen surprises in the field. Not only clash detection between underground storm, sanitary and electrical with underground foundations of the coaster, but also the reach envelope of the ride with above ground components like tree canopies, trellises, signage, etc. There is only so much coordination that can happen in 2D – often times the third dimension is inadvertently ignored. With model-based design, you are essentially building the entire project in 3D to significantly cut down on RFI's and field changes. The thought is that it is cheaper to pay the additional soft cost fees to have everything modeled and clash detected, than it is to make field changes and deal with change orders during construction, which can then greatly affect construction schedules. Not always perfect, but it is pretty amazing – the disasters which you can avoid."*

More Technological Enhancements are on the Way. The literature is full of talk about the blockchain, augmented reality, artificial intelligence, the metaverse and more. Initial versions of each are in beta and beyond. At some point, cities and city planners will be confronted with this new way of organizing data, designing physical and virtual spaces and managing the municipal systems.

CT.org Envisions the Metaverse…*Free Guy* is a 2021 action comedy film directed and produced by Shawn Levy from a screenplay by Matt Lieberman and Zak Penn, and a story by Lieberman. It stars Ryan Reynolds as Guy, a bank teller who discovers he is actually a non-player character in a massively multiplayer online video game and becomes the hero of the story, trying to save his friends from deletion by the game's owner.
LINK: https://en.wikipedia.org/wiki/Free_Guy

Snow Crash, 2000 by Neal Stephenson provided the first mention of the metaverse. **LINK:** https://www.amazon.com/Snow-Crash-Neal-Stephenson/dp/0553380958

The Challenge to City Planners is to adapt project-related tools to citywide opportunities. Planners can, as they say, lead, follow or get out of the way. Since planners are one of the few professionals who have the capacity to visualize the entire city and yet appreciate its many details and nuances, planners will need to learn the new ways, the new methods and the new processes. Schools will need to teach the requisite skills with the same vigor it grasped GIS and commoditized it. Cities and professional firms will have to inculcate constant learning into their daily routines. New challenges are constantly bombarding cities; and new means and methods are constantly evolving to meet these challenges.