

A Modest Challenge To the Field

One of the distinguishing aspects of the architecture, engineering and construction is a lack of research. We lack a thorough understanding of so many aspects of our work- how buildings enhance or detract from our work experience and how buildings might actually enhance the environment as opposed to degrading it.

CIDCI Board members Zig Rubel and Renee Chang, joined by John Haymaker from Perkins and Will, recently brainstormed a list research topics for the industry (listed below.)

What do you think of this list? What might you add to the list?

2030 RESEARCH GOALS FOR THE AEC?

By 2030, Buildings will:

- 1) **Enhance Human Experience:** Buildings will shape human experience to be positive and restorative
 - a) Indoor environments will be able to sense the number of occupants, their body temperatures, their location, their circulation patterns through the use of sensor technology.
 - b) Buildings Automation Systems will have Artificial Intelligence to understand what is desirable for a building occupant and how to adjust the building systems to achieve those settings in more than 98% of all spaces
 - c) Building circulation patterns will be able to be improved to meet an occupant need through technologically advanced wayfinding and physical manipulation of the spaces.
 - d) (Optional) Related books or people that can be reference for the objective
 - e) (Optional) Expertise needed to address the issue (preliminary)

- 2) **Respond to the Environment:** Buildings will respond to conventional external environmental factors
 - a) Buildings will be able to grow, shrink or stay static by more than 10% of their base point, depending on their specific needs
 - b) Independent to size or composition, the use of a building will be dynamic as defined as 50% of its use can be adapted or completely changed
 - c) At least 50% of components can be exchanged or interchanged to something better.
 - d) 90% of all building components will provide continuous sensor feedback, form their smart building components.

- e) (Optional) Related books or people that can be reference for the objective
- f) (Optional) Expertise needed to address the issue (preliminary)

3) **Restore the Environment:** Building will restore the environment (Formerly, no buildings will cause harm)

- a) 50% of all commercial buildings will either remove carbon from the environment or not contribute to it.
- b) 50% of all residential buildings will not need to be connected to a water utility through the use of rainwater capture systems and filtration system. The other 50% will reduce their demand and discharge by $\frac{2}{3}$.
- c) 50% of all buildings will use materials that can be returned to the source or be re-used in a non-wasted approach
- d) (Optional) Related books or people that can be reference for the objective
- e) (Optional) Expertise needed to address the issue (preliminary)

4) **Resilient to the Environment:** Buildings and communities of buildings will be resilient to extreme environmental factors

- f) 50% of new adjacent buildings will be codependent so that they can withstand the elements and swap different functions in the case of disaster.
- g) 25% of coastal municipalities will have Geographic Information Systems to assess building infrastructure criteria and be able to quick assess alternatives in the event of a natural disaster when building stock is destroyed or made uninhabitable.
- h) 50% of all new buildings will be able to withstand 90% of known natural disaster impacts to their environment.
- i) (Optional) Related books or people that can be reference for the objective
- j) (Optional) Expertise needed to address the issue (preliminary)

5) **Common Language of Buildings:** The built environment will have a standardized dataset for all information that flows through it.

- a. 80% or greater of physical elements within a building can be noted objectively and be machine readable
- b. 80% or greater of physical elements have a corresponding user data set to incorporate building performance and experience to the occupant
- c. 80% or greater of project teams deliver a data model to the building user to leverage for the operations and maintenance of the building in its lifecycle
- d. (Optional) Related books or people that can be reference for the objective
- e. (Optional) Expertise needed to address the issue (preliminary)

- 6) A Generative Process:** A ubiquitous AEC primary building element shape grammar will define our world
- a. 80% or greater of the shape grammar definitions are mathematical to eliminate the need for lingual translation
 - b. 80% or greater of the shape grammar definitions use both physical and performance notation of the object
 - c. Use of the shape grammar approach can automatically generate at least three different valid solutions, using computation alone
 - d. (Optional) Related books or people that can be reference for the objective
 - e. (Optional) Expertise needed to address the issue (preliminary)
- 7) Aligned Incentives:** AEC stakeholders will redefine a future paradigm where a relational value system is the basis of compensation from the benefits created before 2030.
- a. 25% of non-residential projects worked on will use this approach
 - b. Compensation tied to milestone performance and not hours spent
 - c. Project achievement financial rewards given for going beyond required performance measures by more than 10%
 - d. (Optional) Related books or people that can be reference for the objective
 - e. (Optional) Expertise needed to address the issue (preliminary)