

A WICKED PRIMER

“By the pricking of my thumbs,
Something wicked this way comes”



With this phrase, the witch tending the cauldron in Act 4, Scene 1 of *Macbeth* foretells the entrance of the title character. As a collaborative consultant, I often feel that pricking of my thumbs when helping form, train, and deploy integrated teams to plan, design, construct, operate, and maintain facilities. The timely and successful creation of an integrated team to complete construction projects requires resolution of a series of wicked problems.

WHAT ARE WICKED PROBLEMS?

“Wicked problem” is a term of art in the collaborative consulting arena coined by Horst Rittel¹ that accurately describes a typical commercial construction project. Six key characteristics of a wicked problem are listed below.

1. Evolving definitions. The definition of a wicked problem evolves, triggering solutions that, in turn, change the definition of the problem. Linear thinking fails to solve wicked problems because the problem evolves as solutions emerge. Wicked construction project problems manifest themselves

in the dichotomy of design where the problem of what is needed (i.e., what the owner wants) clashes with the solution (i.e., what can be built given the available resources).

2. Continuous solution cycle. Because the definition of the problem continues to evolve, solutions emerge continuously. Wicked problem solving efforts end only when problem solvers run out of time, energy, money, or some other limiting resource.
3. Perfect solutions prove elusive. Evolving solutions, tied to the subjective reality as perceived by stakeholders with varying interests, ensure that no objective or “perfect” solution emerges. At best, solutions to wicked problems fall on a scale of best to worst or acceptable to unacceptable. Objective criteria rarely carry the day.
4. “One off” problems. No two projects are alike and no two wicked problems are the same. Customized solutions by key stakeholders characterize wicked problems and their real world manifestations on construction projects.
5. One-shot solutions. Wicked problems feature one-shot solutions. Attempts to solve the problem impact the problem and everything the problem touches. Few opportunities exist to game plan real-world solutions, though virtual construction and design processes—i.e., Building Information Modeling (BIM)—tend to mitigate the impact of this factor on BIM-enabled projects.
6. Creativity and judgment drive solutions. Wicked problems may never be solved, may be subject to numerous alternative solutions and may be susceptible to a variety of solutions never considered. Pursuit and implementation of solutions depends on the creativity and judgment of the stakeholders.

The list gives the reader a sense of what constitutes a wicked problem, but only hints at the myriad levels of “wickedness” encountered by integrated team members tasked with solving them.

Social complexity and fragmentation of the interests of key stakeholders contribute to the “wickedness” of the problems we face in the BUILT environment when planning, designing, constructing, operating, and maintaining a facility and or supporting infrastructure.

Wicked problems occur and are solved in a social context where the diversity of interests held by key stakeholders—and the fragmentation of interests, business processes, and services—magnify the wickedness of the problems.

Virtually all construction projects involve wicked problems in every phase—from planning and site selection through design, construction, operations, and maintenance. Disparate interests, business processes and services pursued and delivered by a complex array of entities and individuals adds multiple layers of social complexity to the mix, overwhelming and derailing tradi-

tional project-delivery methods and traditional problem-solving techniques. Comprehensive and effective solutions to the wicked problems that manifest themselves in the lifecycle of a construction project can only be tackled with wicked tools.

WHAT ARE WICKED TOOLS?

Wicked tools enable creation of a shared understanding and instill a shared sense of commitment to resolving issues—i.e., solving wicked problems—throughout the lifecycle of a project. BIM and other virtual design and construction software programs, integrated legal agreements, integrated project delivery, lean supply chain plans, lean logistics, the Last Planner System, BIM implementation plans, BIM addenda, BIM protocols, BIM guidelines, and a number of other best-in-class wicked tools empower integrated teams to solve wicked problems. These qualify as wicked tools because they encourage integrated teams to solve wicked problems collaboratively, enabling team members to quickly leverage disparate knowledge bases on a cross-disciplinary basis. More importantly, wicked tools incentivize the wicked to play nice in the collaborative sandbox.





WHAT ARE WICKED SOLUTIONS?

Wicked solutions provide stakeholders involved in solving wicked problems with a platform from which wicked tools can be deployed. Construction projects require such platforms to support a legal framework, lean business processes, innovative technologies, and a shared understanding of the nature and scope of the problem being addressed. The foregoing must be marshaled by an integrated team with a shared commitment to solving the wicked problems manifesting themselves on the project.

A common feature of wicked solutions is the use of powerful collaborative mechanisms designed to align the interests of key stakeholders involved in the effort to solve wicked problems.² Effective wicked solutions incorporate toolboxes full of wicked tools that can be deployed against wicked problems. Wicked solutions empower stakeholders to master voluminous compilations of facts, data, studies, and reports about a wicked problem, to access the right data at the right moment in time and to build a shared commitment to a durable solution. Understanding a wicked problem is about collectively making sense of the situation and coming to a shared understanding about who wants what and why, and what resources can be used to achieve the preferred solution.

DEPLOYING WICKED SOLUTIONS

Open and honest communication among diverse stakeholders on a cross-disciplinary basis throughout every phase of the project is facilitated by, and facilitates, the use of wicked solutions. Instead of a negative reinforcement loop, wicked solutions produce positive reinforcement loops leading to higher levels of buy-in by key stakeholders and better solutions. Collaboratively crafting, negotiating, and implementing integrated agreements provides integrated teams with the legal structure necessary to tackle wicked problems in every phase of a facility's lifecycle. Built from wicked tools such as BIM and virtual design tools on the one hand, and lean business processes on the other, integrated agreements

and the wide array of addenda, protocols, and other supporting documents associated with them, become wicked solutions to wicked problems.

A FEW WICKED THOUGHTS

Institutional stakeholders with a vested interest in managing wickedness lack substantial incentives to deploy wicked tools, wicked solutions, or to resolve wicked problems. Entire business models revolve around the management, but not the resolution, of wicked problems. Large portions of the legal profession, finance and accounting industry, insurance industry, and others, receive their daily bread from monies paid by entities tiptoeing through minefields filled with wicked problems. The wasted time, energy, and resources dedicated to the management of wicked problems appears immense. Unfortunately, the waste visible at the surface is likely only the tip of the iceberg.

CONCLUSION

The BUILT – BIM to FM section of *AUGIWorld* serves, in a sense, as a platform for a conversation regarding a particularly virulent class of wicked problems. Accurately capturing, transferring, and leveraging data to make better decisions, and doing so throughout the lifecycle of a facility, constitutes a herculean task best defined as a wicked problem. The myriad stakeholders processing an imposing array of convergent, and divergent, interests adds a toxic brew of fragmented social complexity to the task that renders it truly daunting. Compartmentalized linear solutions prove woefully inadequate for problems at this level of wickedness.

Wicked problems require wicked tools and wicked solutions.



James L. Salmon is President of Collaborative Construction Resources, LLC, Cincinnati, Ohio, USA.

¹ Rittel, Horst, and Melvin Webber; "Dilemmas in a General Theory of Planning," pp. 155–169, Policy Sciences, Vol. 4, Elsevier Scientific Publishing Company, Inc., Amsterdam, 1973. [Reprinted in N. Cross (ed.), *Developments in Design Methodology*, J. Wiley & Sons, Chichester, 1984, pp. 135–144.]

² Specific examples of wicked solutions include Collaborative Construction's IPD in 3DTM, the BUILT System, the Onuma Planning System and Phi Cubed's CATIA based Project Lifecycle Management program.