

Front to Rear: Architecture and Planning during World War II

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System Theories: Science, War, Construction

This paper will examine the confluence of information and systems theory and the production of architectural building systems. The two are interrelated around the adaptation of pre-WWII techniques and knowledge that became transformed during the years leading up to, during, and in the immediate postwar period. Much of the progress regarding the evolution of computation is attributed to the large scale deployment of highly acute mathematical minds to the problem of interpreting the encrypted messages sent from Axis command centers to the troops on land, on the sea and in the air. Known as the "code breakers" these individuals were crucial in the advancement of computation, cybernetics and systems theory. After laying out the theoretical implications of systems theory, this paper analyzes two case studies of wartime building systems. In one case, a wartime factory was retooled for peacetime housing production, and in the other pipe factories were retooled to produce bomb casings.

Case 1: Packaged House System. At the end of 1941, Konrad Wachsmann and Walter Gropius, German emigrés to the U.S. began to collaborate on a project for industrialized modular housing, which became known as the "PACKAGED HOUSE". Wachsmann designed a "universal Joint" that would give great structural stability to the joining of prefabricated panels. The JOINTING SYSTEM was based on 2-, 3-, and 4-way connections between panels. All surfaces were conceived to be used from the same panels: exterior walls, interior partitions, floors, ceilings and the roof. In February of 1942, the National Housing Agency allocated \$153 million for the housing of displaced defense workers. By May 1945 with the end of WWII, the house was still not in production, despite enthusiasm for the project. But the house could have a second chance, in the enormous postwar demand for returning GI's and their families. The General Panel Corporation raised funds to be able to take over the former Lockheed Factory in Burbank, California, which had been built to build wartime aircraft for government contracts. And it was a classic example of using factories that made armaments could be retooled to make houses.

Case 2: *Tubi Innocenti*: scaffolding system. Ferdinando Innocenti, born 1891, experimented with iron pipe and tubes and started producing tube scaffolding in 1933, with a rapid system of mounting and dismantling a combination of tubes and a mechanical fastener. During the war years the Innocenti plants supplied bodies for 150 and 250 kg airplane bombs, for which cut down tubes were used, and also produced 15% of all bullets produced in Italy. After the war, Innocenti continued to make scaffolding and all other types of pipe and tubes for industry and then developed a scooter: the Lambretta. The idea came from vehicles dropped in Rome by the British paratroopers.

Alicia Imperiale has taught architectural design and theory at the Southern California Institute of Architecture, Pratt Institute, Columbia University, Cornell University, and Parsons School of Design. Her work focuses on the impact of digital technologies on art, architecture, representation, and fabrication. She is author of *New Flatness: Surface Tension in Digital Architecture* (Birkhauser, 2000). She has an essay "digital skins: architecture of surface" in *SKIN: Surface, Substance and Design* (Princeton Architectural Press, 2002). Other published essays include "Smooth Bodies," "Fluid Alliances: Architecture, Politics and Fetish Post 9/11," "Seminal Space: Getting under the Digital Skin," in *RE: SKIN*, ed. Mary Flanagan, MIT Press, 2006 and *Territories of Protest*, *LOG* 13/14, 2008. She is completing her dissertation, *Crescita e Forma: The Tissue of Structure* at Princeton University. Her dissertation is based on the theoretical projects of the Italian architect Rinaldo Semino (1937-), which contextualizes Semino's prefabricated building systems in a larger milieu of megastructural design, cybernetic studies, early computation and systems theory, and radical political events in Italy from 1960-1973. In relation to her work on the politics of the 1960s, Imperiale is a co-curator of the exhibit *Clip, Stamp, Fold: The Architecture of Little Magazines 196X-197X*.

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