ON FUNCTIONAL ANALYSIS AND MODULAR SYNTHESIS

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In engineering, functional/system analysis (systems are usually described primarily by their roles and functions - therefore functional and system analysis are synonymous) and modular synthesis are indispensable. Those who solely engage in analysis (functional/systemic or otherwise) are visionaries who have no opportunity to revolutionize the world. The world requires physical alteration. To accomplish this, it's vital that certain constructs/products/modules commence embodying the functional components of the system, meaning they are physically assembled to initiate interaction. Typically, such determinations concerning the allocation of structural components of the system to role/functional components are made by the design engineer, relying on the principles of dividing the system into structural components and describing the connection of these structural parts, which is prepared by the architectural engineer (this constitutes the primary aspect of creating the system concept - assigning affordance constructs to subsystem roles). Hence, the analyst is merely a fraction of the design engineer and a fraction of the architectural engineer.

"Functional analysis" and "modular synthesis" represent just two facets of system delineation. In engineering (be it a target system, individual, enterprise, or community), throughout analysis and synthesis, one must contend with all principal (four or even five) facets, and potentially numerous others, as well - for alongside the primary ones, additional facets may exist. Systems thinking revolves around discovering a suboptimal synthesis solution (serving as a function to execute a design, somehow organized in space and with costs no greater than those external design roles are willing to pay, alongside tasks feasible with available resources within foreseeable deadlines) that satisfies all project roles.

Even in synthesis, attaining the optimum remains elusive; there are always numerous suboptimal solutions of comparable quality grounded in state-of-the-art ideas (remember the issues stemming from conflicts between systems at varying levels), necessitating the consideration of at least some suboptimal solutions and the selection of one. The judicious selection of a design solution among those proposed during synthesis is often dubbed "analysis", while there exists a resource constraint on this choice for synthesis - evading analysis paralysis.

System/modular synthesis invariably entails multicriteria optimization occurring across multiple system levels simultaneously; it hinges on conjectures/hypotheses/inventions substantiated through numerous justifications. If one manages to intricately align all descriptions for all principal types of partitions of the designed system, and even introduce additional types, there exists a substantial likelihood of achieving (albeit temporary, confined to the present moment) success compared to competitors who consider descriptions on fewer facets.