of the functional design process; and an automated transformation based on the token flow network that generates simulation models to answer specific analysis questions about the functional design.

With analysis tools such as discrete event simulation accessible throughout the design process, this research demonstrates a method to integrating those tools into the design workflow itself. Even with simple analyses, such as flow rate analysis, the engineer can effectively integrate that information to improve the system design and can support an iterative design process.

Throughout this paper, we have been careful to avoid suggesting that this methodology will make design decisions and automate the design process. While many aspect of the design process remain an art, we contend that having instantaneous access to performance and behavioral information can improve the design process and the design itself. This suggests two closely related extensions for future research

One promising extension of this research would be to integrate the access to analytics presented here with the empirically-based design approach presented in [5]. The most appealing aspect to integrate would be their usage of matrix solution guides. Whereas their approach asks the designer to analyze key parameters and then look up the empirically optimal technology solution in a matrix, our methodology provides automated access to the required analysis.

Another possible path would be to incorporate design principles into the reference architecture as constraints, and then automate the usage of patterns and constraints from the reference architecture to specify and search the design space. Since we design our systems and analysis components for modularity, an intuitive extension would be to design a methodology that is intended to assemble these components into meaningful systems. These methods are used extensively in platform-based engineering and product line design, which are analogous to mass customization in the manufacturing world.

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