

The empirical research in OR/IE/OM: A theory- and data-based journey through service systems

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I shall describe a personal research journey through service systems (e.g. telephone and chat centers, hospitals, banks,...). I view these systems through OR/OM/IE lenses, often more specifically as a queueing scientist (e.g. “enjoying” congestion and flows), and sometimes using operational characteristics as surrogates for financial, psychological and clinical performance. The theory of queueing is ideally suitable for capturing the operational tradeoff that is at the core of any service: quality vs. efficiency. Three cases in point are the Erlang-A, -R and -S models: the first has become a common call center model, by accommodating the choice that customers enjoy, namely wait for service or abandon; the second arose from emergency departments, in which returns to service are prevalent; and the third captures operational symmetry between servers and customers. All three models, or their (asymptotic) fluid or diffusion counterparts, parsimoniously yet valuably portray complex realities. Here value is tested against real service systems, which is in contrast to prevalent OR/OM/IE practice. (In that practice, models are often remote from data, and the value of fluid/diffusion models is judged by its accuracy relative to alternative models.) The ultimate goal of my research is an automatic creation, in real-time, of data-based models for service operations—analytical and simulation. The latter will serve as a validation ground for the former, and both will be universally accessible for applications by researchers, students and practitioners. Prerequisites include, first and foremost, measurements of individual events (e.g. patient-physician transactions), which then support inference of model primitives, structure and protocols. The above goal has been pursued at the Technion IE&M, with data-support by its SEE Laboratory (SEE = Service Enterprise Engineering).