

Chapter 1

The Interdisciplinary Fields of Political Engineering, Public Policy Engineering, Computational Politics, and Computational Public Policy

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ABSTRACT

This chapter describes four interdisciplinary fields originated and defined by Ashu M. G. Solo in 2011 called political engineering, public policy engineering, computational politics, and computational public policy. Political engineering is the application of engineering, computer science, mathematics, or natural science to solving problems in politics. Computational politics is the application of computer science or mathematics to solving problems in politics. Political engineering and computational politics include, but are not limited to, principles and methods for political decision-making, analysis, modeling, optimization, forecasting, simulation, and expression. Public policy engineering is the application of engineering, computer science, mathematics, or natural science to solving problems in public policy. Computational public policy is the application of computer science or mathematics to solving problems in public policy. Public policy engineering and computational public policy include, but are not limited to, principles and methods for public policy formulation, decision-making, analysis, modeling, optimization, forecasting, and simulation. The chapter describes the scope of research and development in these fields, provides examples of research and development in these fields, and provides possible university curricula for academic programs in these fields.

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INTRODUCTION

In this chapter, the author, Ashu M. G. Solo, defines four new closely related fields that he has initiated called *political engineering*, *public policy engineering*, *computational politics*, and *computational public policy*. These fields were first originated and defined by Solo in Solo (2011). Then Solo wrote further research papers on these fields (Solo, 2014a; Solo, 2014b; Solo, 2017a; Solo, 2017b).

Basic and advanced methods in engineering, computer science, mathematics, or natural science can be used for political decision making, analysis, modeling, optimization, forecasting, simulation, and expression. This will lead to greatly improved political decision making. For example, politicians often determine how to spend limited campaign funds on advertising in certain geographic areas based on their best guesses rather than on a rigorous mathematical and computational analysis of how funds should be allocated for the greatest benefit to their campaigns.

Basic and advanced methods in engineering, computer science, mathematics, or natural science can be used for public policy formulation, decision making, analysis, modeling, optimization, forecasting, and simulation. This will lead to greatly improved public policy. For example, legislators usually determine spending priorities and budget allocations based on passions of the moment, special interest lobbying, parochial interests, ignorant public opinion, or their own ideological biases rather than on a rigorous mathematical and computational analysis of how spending priorities and budget allocations can be made for the greatest public benefit.

POLITICAL ENGINEERING AND COMPUTATIONAL POLITICS

The term *political engineering* (Wikipedia, 2011) has been previously used to refer to designing political institutions. This is a poor usage of the term and an abuse of the word *engineering*.

Engineering consists of theoretical engineering and applied engineering. Theoretical engineering is the creative development of mathematics, natural science, technical principles, or technical methods for usage in the development, analysis, characterization, modeling, control, automation, optimization, forecasting, simulation, or visualization of devices, algorithms, components, systems, machines, apparatuses, structures, processes, operations, or materials. Applied engineering is the creative application of mathematics, natural science, technical principles, or technical methods for the development, analysis, characterization, modeling, control, automation, optimization, forecasting, simulation, or visualization of devices, algorithms, components, systems, machines, apparatuses, structures, processes, operations, or materials. These definitions of engineering, theoretical engineering, and applied engineering are by the author of this chapter.

As it has been previously used, the term *political engineering* does not require the creative application or development of mathematics, natural science, technical principles, or technical methods for the development, analysis, characterization, modeling, control, automation, optimization, forecasting, simulation, or visualization of devices, algorithms, components, systems, machines, apparatuses, structures, processes, operations, or materials. Therefore, the author of this chapter is giving a new and more appropriate definition to the term *political engineering*. Just like many terms in the dictionary have multiple meanings, the term *political engineering* can have multiple meanings.

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