Languages for Smart and Computable Contracts

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8th April 2021

Abstract

Smart Contracts use computer technology to automate the performance of aspects of commercial agreements. Yet how can there be confidence that the computer code is faithful to the intentions of the parties? To understand the depth and subtlety of this question requires an exploration of natural and computer languages, of the semantics of expressions in those languages, and of the gap that exists between the disciplines of law and computer science. Here we provide a perspective on some of the key issues, explore some current research directions, and explain the importance of language design in the development of reliable Smart Contracts, including the specific methodology of Computable Contracts.

Keywords: Smart Legal Contracts, Computable Contracts, Domain Specific Languages, Controlled Natural Language

Introduction

The field of Smart Contracts is broad, with multiple and sometimes contradictory definitions of what is considered to be a Smart Contract. Various factors have contributed to this complexity, including a technical divergence that occurred when the term was used to describe stored procedures in the Ethereum blockchain,[1] which conflicted with the original definition (pre-dating Ethereum by 17 years) that aimed to automate commercial agreements in general, regardless of technology platform.[2] Significant research has been, and continues to be, conducted on general Smart Contracts that are not necessarily linked to blockchains. Another factor is the broad range of disciplines involved, including computer science, law, logic and linguistics.

Moreover, there is a fundamental conflict inherent in the term 'Smart Contract', which brings together the two disparate and highly specialised disciplines of computer science ('Smart', as in 'smart phone') and law ('Contracts'). Although there may be a surface similarity between a written contract and a computer program (both of which are carefully structured and may contain *inter alia* definitions, descriptions of actions to be taken, and conditional logic), there are substantial differences between the language, culture and perspective of lawyers and computer scientists.

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[1] *Buterin, V. (2013) A Next Generation Smart Contract & Decentralized Application Platform. Whitepaper. Ethereum Foundation.*
[2] *Szabo, N. (1996). Smart contracts: building blocks for digital markets. EXTROPY: The Journal of Transhumanist Thought,(16), 18, 2.*