
Back to the Future: Revisiting Winograd And Flores in the Context of Smart Contracts

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Abstract

Winograd and Flores discussed the notion of organizations as networks of commitments, articulated primarily from promises and requests. The system they developed at that time, however, received several complaints from users because most of the coordination tasks depended on human intervention.

In the age of blockchain, a similar experiment can be conducted, this time using smart contracts and cryptocurrency. We argue that current technology may profit from Winograd and Flores's ideas while reducing the pitfalls of their solution.

Blockchain technology allows both parties to agree to a "contract" system that will track and avoid repudiation. Such technology may provide broader visibility to commitments, while avoiding one-sided changes and reducing the risk of communication problems.

Author Keywords

Blockchain; smart contracts.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

Understanding computers and cognition [8] created a new field of study on creating, combining, monitoring and controlling commitments based on human speech [2].

Winograd and Flores [8] emphasize the communication aspects of computation, claiming that "computers were about communication, not computation" [2]. Moreover, "...managers appear to be absorbed in many short interactions, most of them lasting between two and twenty minutes" ([8], p.151). They call those short interactions conversation for possibilities, and describe them as follows:

"The key aspect of conversations for possibilities is the asking the questions 'What is it possible to do?' and 'What will be the domain of actions in which we will engage?' This requires a continuing reinterpretation of past activity, seen not as a collection of past requests, promises, and deeds in action conversations, but as interpretations of the whole situation-interpretations that carry a pre-orientation to new possibilities for the future" (p. 151)

Computer-based decision support systems can aid managers in processes raised by the conversations for possibilities. Those systems should support, rather than replace, semi-structured tasks involved in managerial judgement, and improve the effectiveness of the decision making rather than its efficiency [4].

We argue that blockchain technologies can improve both the effectiveness and the efficiency in managing smart contracts.

Smart Contracts

Nick Szabo coined the term "smart contract" in 1994 as "...a set of promises, specified in digital form, including protocols within which the parties perform on these promises." [9]

Szabo anticipated the need for carefully designing the support for smart contracts: "Without user interfaces smart contracts are largely invisible, like the electronics in newer car engines. This is both a blessing - counterparties don't have to feel like they're dealing with user-hostile computers - and a curse - the 'smart fine print' problem of hidden actions." [6]

There are several implementations of smart contracts on public blockchains for instance Bitcoin [5,10], Ethereum [11], DubaiCoin [12] and Dash [13].

Cross organization workflow

As proposed by Fridgen et al., the use of blockchain technology with process management can provide several benefits to enterprises, like increased transparency and non repudiation [3]. It can also minimize "blindness problems", since the code of the contract is public for both parties and it is formally defined.

The use of workflow to manage process as described by [1,7] is not new, and has been used to track process evolution step by step. But the major gain by using the blockchain technology lies in cross-organizational processes, where there is a chance of some party hacking the system.

There is no major gain in using a blockchain in a secure or trustworthy environment, inside a single company,

because the main problem solved by the blockchain is the ability to work well in an unsecured, unreliable environment.

Winograd and Flores's Coordinator System

Winograd and Flores proposed that a coordinator system should embody conversation for action (see Figure 1).

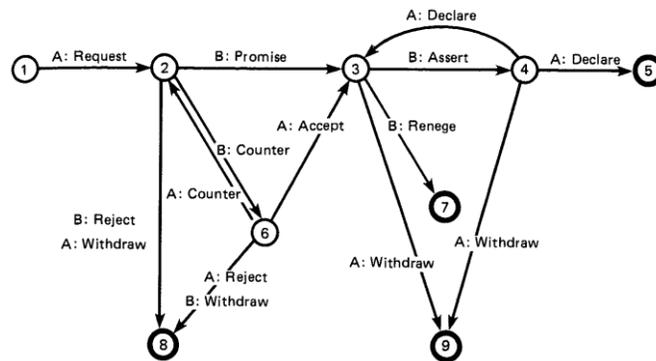


Figure 1. The basic conversation for action [8] (p.65)

In their view, such a system may influence people's tasks in several ways, as follows:

- **orientation to choosing:** the system influences what the manager chooses to do
- **assumption of relevance:** people assume that the system deals with the most relevant things that concern managers
- **unintended transfer of power:** the system designer is invisibly empowered to code how the system will work, inserting his or her own biases in the system

- **unanticipated effects:** as with any technological advance, designers cannot anticipate all potential breakdowns
- **obscuring responsibility:** people assume that the system itself (and not its designers) is an expert responsible for its own decisions and actions; therefore, they are reluctant to take a different position than the one provided by the system and fail to discuss its potential shortcomings
- **false belief in objectivity:** system users may wrongfully assume that the system output is objective, although the system was coded by humans and therefore reflects their biases

Winograd and Flores conceive a theory of management and conversation, whose main points are as follows [8] (p. 157):

1. Organization processes involve networks of *directives* (orders, requests, consultations, and offers) and *comissives* (promises, acceptances, and rejections)
2. Organizations need to be prepared to cope with unanticipated breakdowns, which in turn require their own processes
3. People in organizations participate in those processes by performing linguistic acts, i.e., issuing utterances that may result in real-world effects

A coordinator system should thus support the following operations: speech act origination, monitoring completion, keeping temporal relations, examination of the network, automated application of recurrence, and recurrence of a propositional content [8] (pp.159-162).

Discussion

When two organizations bind themselves to a commitment, they celebrate a contract, where each organization states its own rights and duties. These contracts are generally conceived and written by lawyers.

In the digital era, a new form of contract is emerging, following the seminal definition of smart contracts provided by Szabo [6,9]. Those contracts are generally written by programmers who, following the specifications of the lawyers, encode an appropriate sequence of instructions to support the formal contract specification.

Those contracts can support automated tasks execution, role definition and task attribution, in the same way a general workflow system would support roles and permission control. After deployment, those contracts cannot be modified, for better or worse.

Depending on the blockchain technology used, the interactions of those contracts with other contracts or individuals are logged and visible to whomever has access to the blockchain, allowing audit.

If the contract is used to pay for a service or product, automated additional tasks can be programmed such as tax collection over selling or buying, supplier payment, etc. In some blockchains, it is possible to define recurrent contracts, such as a rent or an annual tax payment.

It is also possible to define roles and permissions for a contract allowing a third party to approve/reject the

submitted artifacts, as well as to validate and enter the information in the blockchain.

As smart contracts can be seen as special cases of conversational systems, we believe that revisiting Winograd and Flores's work (and the research that has derived from it since) can be valuable for designing the HCI support around this new technology.

Experience

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