

# Chapter 5

## A Brief History of Blockchain

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### ABSTRACT

*This chapter reviews the history of blockchain from its ideation in the early 1990s to the widespread development efforts of private enterprise and governments two decades into the 21st century. The chapter covers the early developments in securing the digital record; the origins of the immutable, decentralized ledger; and trustless digital transactions. The key people in blockchain's development are addressed including the pseudonymous Satoshi Nakamoto, developer of the first cryptocurrency, Bitcoin, which became for a while synonymous with blockchain. The successes and failures of blockchain are covered in this history as well as its status and the problems that need to be solved for blockchain to have a global economic and cultural impact.*

### A BRIEF HISTORY OF BLOCKCHAIN

#### The Origins of Blockchain

During the 1980's more and more of the world's data was being digitized. The age of computing in all facets of business and daily living was being fully launched. The question of how to ensure that the integrity and authenticity of that data was maintained in perpetuity was a concern of a young research scientist and doctoral student at Stanford University named W. Scott Stornetta. While finishing his doctorate in the late 80's, Scott worked at Xerox Parc (**Palo Alto Research Center**) where his adviser had a joint appointment. This placed him at one of the business centers at the forefront of adopting digital record keeping. Scott became obsessed with the idea of securing the digital record from manipulation to maintain its integrity for

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future generations. He wanted to know if there was a way to create an immutable record that didn't rely upon a human, trusted third party, especially as it related to business financial transactions. (Stornetta W. S., 2018)

After receiving his Ph.D. in Physics from Stanford, Scott started working at Bellcore (Bell Communications Research) in 1989 shortly after the breakup of communications giant AT&T. The corporate culture at Bellcore encouraged new hires to determine what they thought were going to be important problems and to work on solving those problems. Scott's "big problem" and continued interest and focus was on how to create an immutable record with evidence that it had not been changed, but also without the need for a trusted third party institution or individuals in the process. Scott approached a colleague named Stuart Haber in the Cryptography group at Bellcore. He had met Stuart during his Bellcore interview process. Scott explained the concerns he had about creating an immutable record of digitized data and Stuart agreed to work with him on finding a solution. The two began to collaborate on how to create a system where digital data could be preserved during or after the digitization process. (Stornetta W. S., 2018)

The two colleagues worked closely for several weeks looking at various scenarios. None of the scenarios led to the conclusion they desired for an immutable record, where information could not be changed, unless everyone involved became aware of the change. There was always an opportunity for collusion between one or more parties without others being informed that a change had been made to a specific record. Stuart, two years senior to Scott eventually told Scott that he did not think it could be accomplished. Regrettably, all the various iterations of the process and systems they could think of led to the need for a trusted third party. Stuart, not wanting to abandon all the work they had put into the project and wanting to get something published from their research, suggested to Scott that they should instead prove that an immutable record *could not* be created. (Stornetta W. S., 2018)

They worked on creating a proof that a trusted third party had to be part of an immutable record system. In looking at the problem from this standpoint they ultimately had a breakthrough. (Stornetta W. S., 2018) According to Scott's wife, his eureka moment came while he was at a Friendly's restaurant in Morristown, NJ. (Stornetta M. F., 2019) They came to the realization that instead of looking to an individual person or entity for trust, if data or documents could be identified as having been created at a specific time and date with an identifying cryptographic "time stamp" that time stamps could be used to insure that the record could never be changed. Further to the "fingerprint" as it was described by Haber, distributing the fingerprint to as many parties as possible would be the method to remove the need for one individual or entity to be the trusted third party, as that single entity could be the single point of failure for the system. (Stornetta W. S., 2018) (Talks, 2019)

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