Bridging the Gap

Adapting Blockchain Systems for Industry-Specific Challenges

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Agenda

Blockchain Basics

Which features of blockchain systems work well (or don't) for the oil and gas context?

Key Challenges

What are the key challenges holding back blockchain adoption in the O&G space?

Bridging the Gap

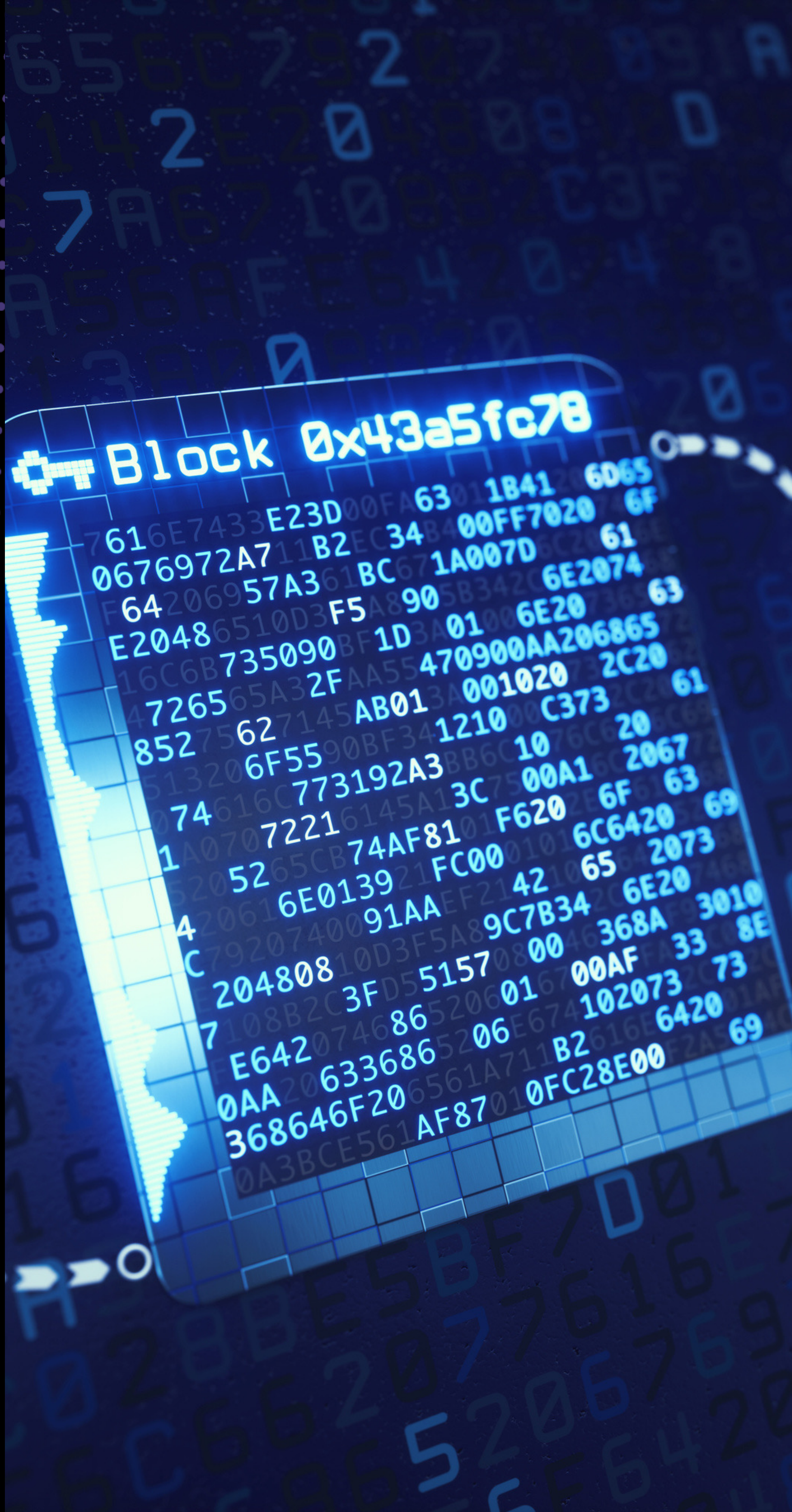
How can we mitigate these problems to unlock blockchain's potential?

Blockchain Basics: Transparency

All nodes can authenticate, validate, view, or keep copies of data stored on chain.

Blockchain Basics: Immutability

Once data is stored on the chain and agreed upon, it cannot be altered or changed later on.



New Features, or

Key Challenges?

Data Privacy

Often, two parties want to exchange information in a **secure, nonrepudiable** way.

Blockchains solve this use case very well.

However, if we need to keep this information **private from third parties**...

Data Cleanliness

Preserving records in a **durable and resilient** way ensures consistent availability.

Blockchains solve this use case very well.

However, existing processes often rely on **error-prone data entry** methods...

Data Privacy: An Example

PROVING RECEIPT OF AN ORDER

A drilling platform requests a new shipment of lifeboats. Providers who can fill the order must be able to bid, but public knowledge is not needed. Once awarded, the details of the contract should be private to the two parties.

How can this situation be resolved under blockchain's assumption of radical transparency?

Encryption vs Validation

In blockchains, nodes must be able to check the contents of transactions to ensure that they are valid.

Is such checking necessary, and if so, how can it be accomplished?

Potential Solutions

Data privacy via encryption may not be suitable, but other approaches remain viable.

On-Chain Commitment

Rather than storing all data publicly on-chain, only the digital signature of the data would be needed to prove its contents.

Blockchain Data Escrow

Data on the chain could be "locked" until a specified condition comes to pass, even the passage of time, then later revealed.

Zero Knowledge Proofs

More complex than digital signatures, ZKPs leverage mathematical properties that allow proving information without revealing it explicitly, even to the other party.

Data Cleanliness

Blockchains are very good at checking and enforcing that the data it stores has not changed or been corrupted.

But what should be done when it was incorrectly entered from the beginning?

A common example is **field tickets**, where missing, incorrect, or incomplete information needs to be found, checked, and corrected.

Standards as Validation

Checking if data complies with a standard can be seen as a type of validation. Can standards be extended to support validation as well?

Missing Data

Fields may or may not be required depending on use case. Missing required data should not pass validation.

Types/Units of Data

Different fields of data may use different units or types of information, which could be checked and enforced.

Implausible Data

The hardest case to catch -- what can be done to catch human error in data entry?

Sensors In-the-Loop

The easiest way to mitigate human error is to remove the data entry step entirely.

Instead of entering data, it can be read directly from devices and sensors.

However, sometimes sensors are misconfigured or fail, with no humans to catch any mistaken readings.

Outlier Detection

Often, mistakes fail the "common sense" test, off the expected value by >10x.

Machine learning models can learn what "normal" looks like, and flag mistakes.

This can fail to detect mistakes that look like normal, expected variations, however.

Conclusion

We need to **bridge the gap** between O&G processes and blockchain capabilities.

Data privacy and cleanliness are **surmountable** challenges.

Blockchains can serve as an important **communication layer** for O&G transactions.

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Questions?