تشریح عناصر کالبدی CDE و نحوه استقرار آن در سازمان با نگاهی به آینده به کارگیری BLOCKCHAIN در BIM

سجاد جعفریان

رئیس هیئت مدیره شرکت ایما

What is BIM?

BIM or Building Information Modelling is a process for creating and managing information on a construction project across the project lifecycle. One of the key outputs of this process is the Building Information Model, the digital description of every aspect of the built asset. This model draws on information assembled collaboratively and updated at key stages of a project. Creating a digital Building Information Model enables those who interact with the building to optimize their actions, resulting in a greater whole life value for the asset.

NBS

BIM "is a digital representation of physical and functional characteristics of a facility. As such, it serves as a shared knowledge resource for information about a facility, forming a reliable basis for decisions during its life cycle from inception onward."

National BIM Standard-United States® (NBIMS-US™)

Building Information Modeling (BIM) is an intelligent 3D model-based process that gives architecture, engineering, and construction (AEC) professionals the insight and tools to more efficiently plan, design, construct, and manage buildings and infrastructure.

Autodesk, Inc

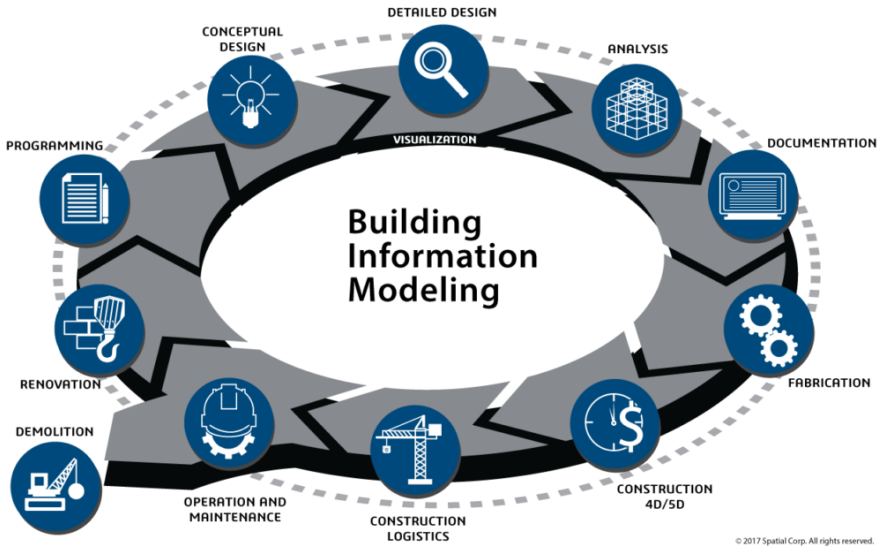
The “I” in BIM!

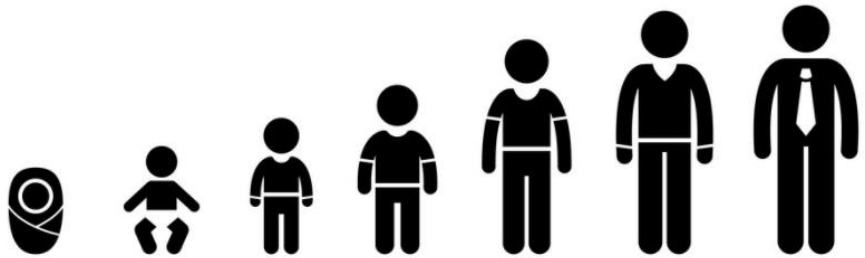
The I in BIM

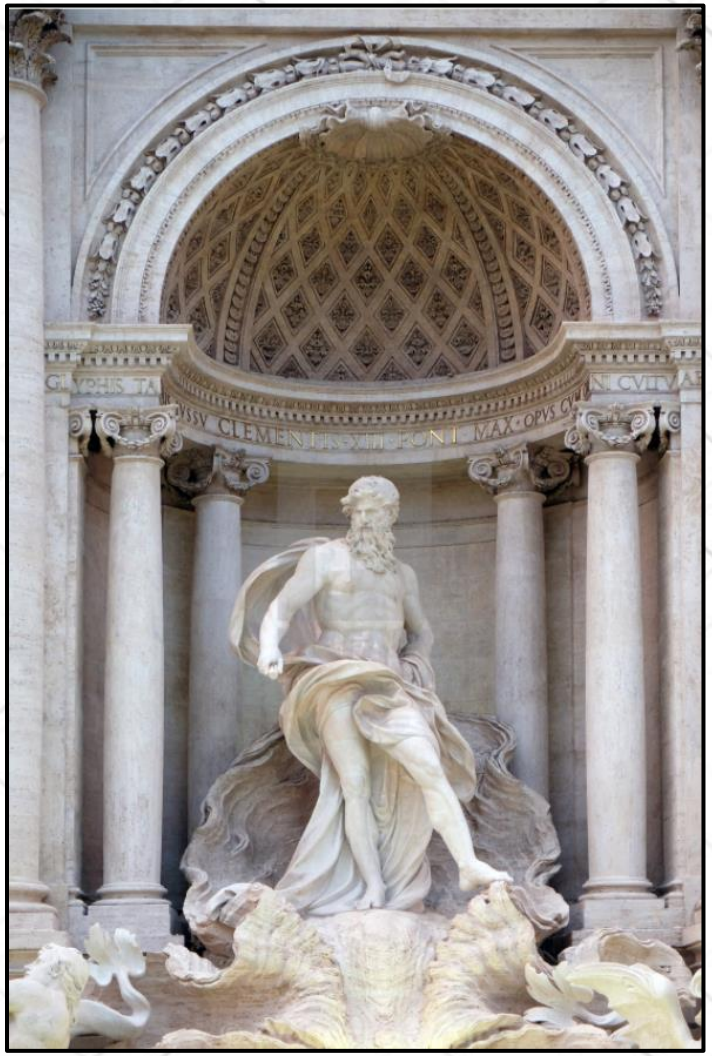
So we've determined that a successful BIM project is one that is rich with information. To achieve that level of information requires collaboration at every stage from design through to operation. It requires manufacturers providing information in a structured digital format so that their objects can be easily added to the model.

And, it requires software interoperability. The end result of all of this is better design, better construction coordination, more accurate and complete information at handover, and the financial rewards that goes with all of those things.

NBS







The information in BIM like blood in body

What is CDE?

The common data environment (CDE) is a central repository where construction project information is housed. The contents of the CDE are not limited to assets created in a 'BIM environment' and it will therefore include documentation, graphical model and non-graphical assets. In using a single source of information collaboration between project members should be enhanced, mistakes reduced and duplication avoided

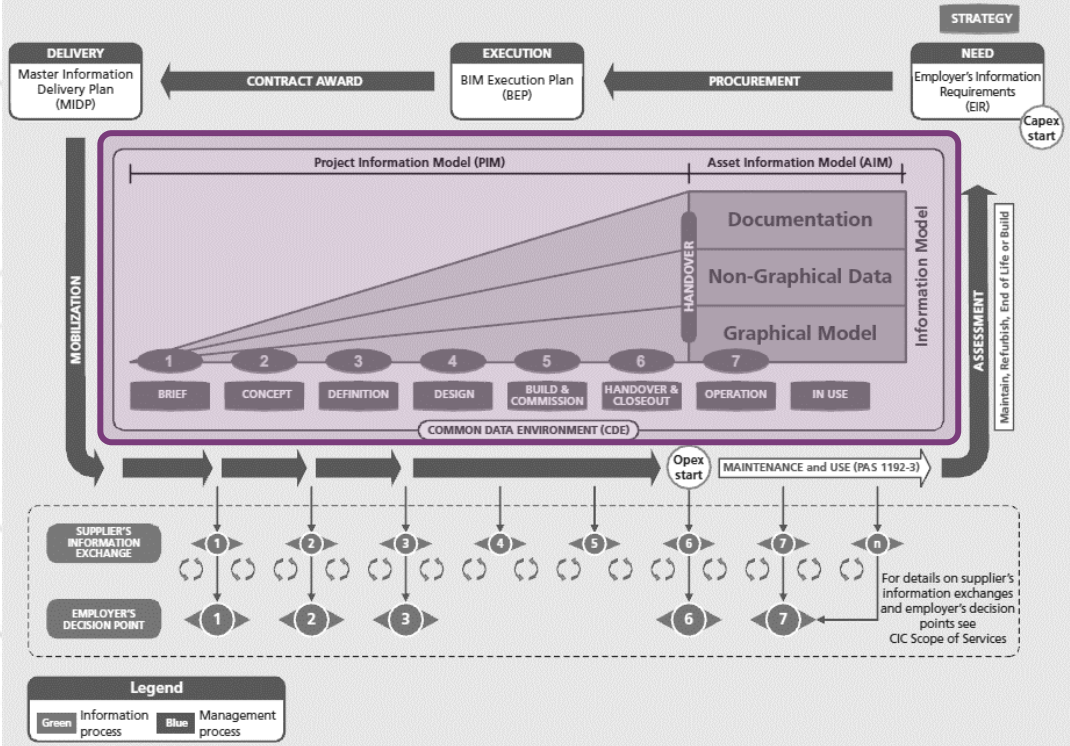
NBS

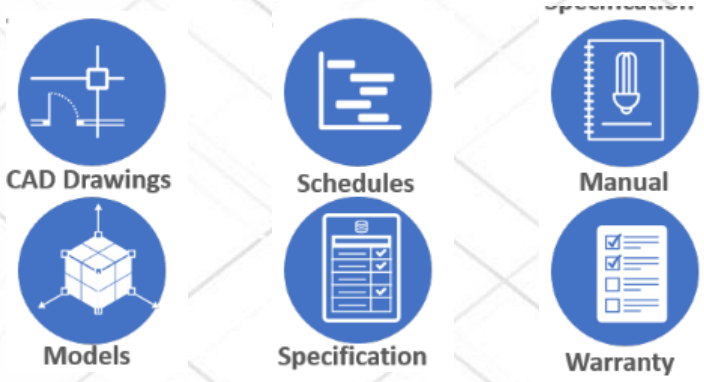
Common Data Environments is a central database that securely manages construction project information

DIN SPEC 91391-1:2019-04

The CDE is a means of providing a collaborative environment for sharing work and can be implemented in a number of ways. For the development of various forms of collaboration within organizations and across project teams

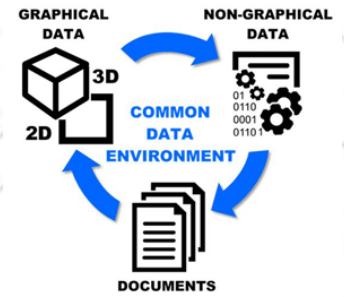
BS 11000-1
PAS 1192-2:2013

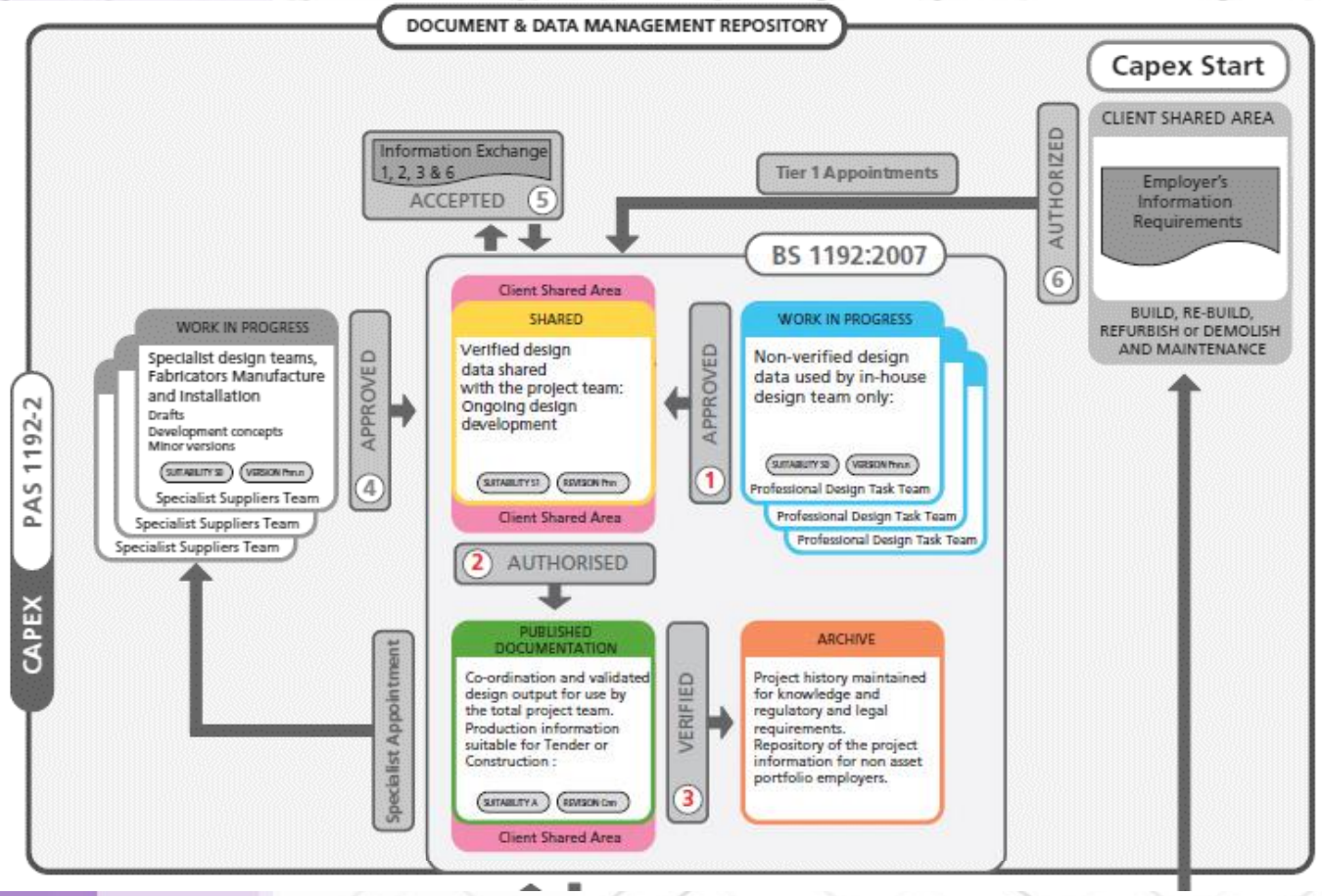




Data within a CDE is finely granulated and structured to ease its re-use. It provides the ability to produce traditional drawings or documents as views of multi authored.

PAS 1192-2:2013





Work in Progress

Area of the CDE where team carries out their own work using their organization's software systems. Non-verified design data used by in-house design team only

Shared

Area of the CDE where the team shares verified design data with other members of the project team.

Published

Area of the CDE for coordination and validated design output for use by the Completion of the project phase

Archived

Area of the CDE for project history maintained for knowledge and regulatory and legal requirements. It is also a repository of the project information for non-asset portfolio employers.

Spreadsheets vs Database

Database

is a logically organized collection of information, designed in such a way that the information within can be accessed for later use by a computer program.
a database is way to track and organize information in a highly flexible structure. That structure allows you to do more with your data.
A database can be displayed in a tabular structure similar to a spreadsheet. But it can also contain relational data: data that can be connected across more than one table.

Spreadsheet

is a digital ledger that stores data in cells displayed in rows and columns—what's known as tabular format. If the "data" in question is numeric, spreadsheets let you apply formulas to the cells to perform preset functions, like addition or multiplication.
At its core, a spreadsheet is a two-dimensional document designed for data storage and calculation.

Critical Differences

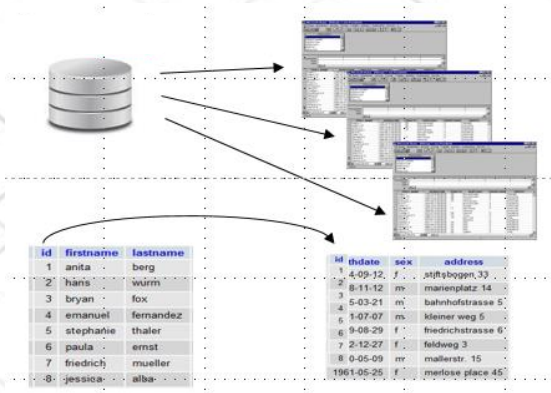
The main technical difference between a spreadsheet and a database comes down to the way they store data. In a spreadsheet, data is stored in a cell, and can be formatted, edited, and manipulated within that cell.
In a database, cells contain records that come from external tables. This differentiation means that spreadsheets are static documents, while databases can be relational. That means if you upload, edit, or delete a piece of data in one place, the change will be made in every other place that references that data.

Spreadsheet

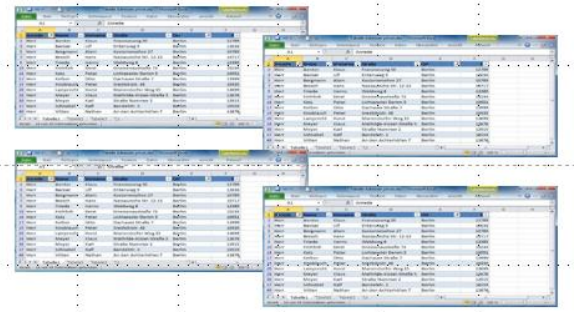
Data can go in any cell
Easy to copy anything to anywhere
Rows and columns are not logically connected

Database

Rows and columns have meaning
Rows are “entities”
Columns are “attributes”
Organizes related data



Structure → Content



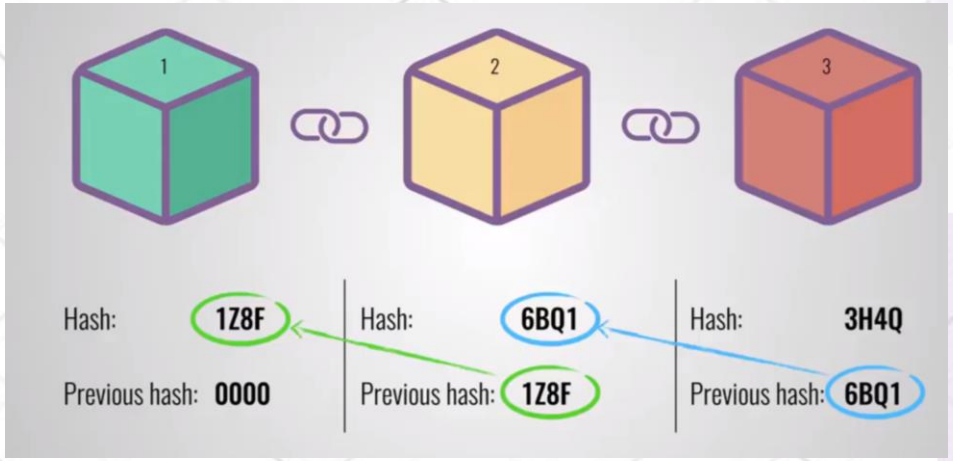
Content → Structure

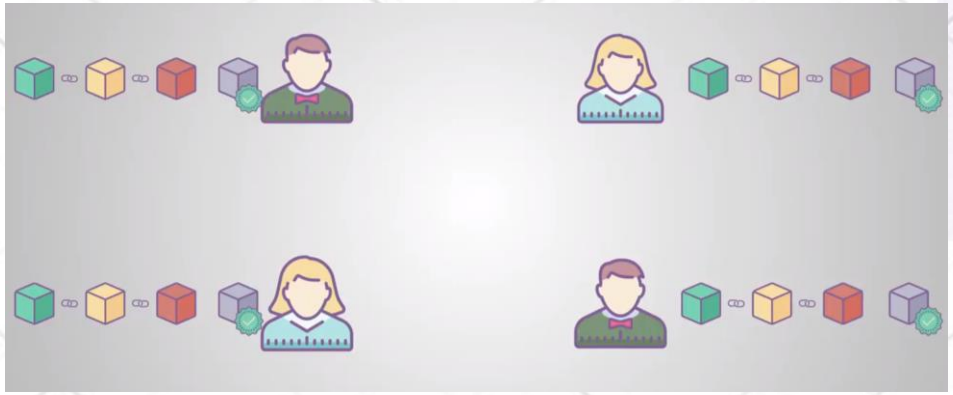
CDE is a Spreadsheets or a Database?

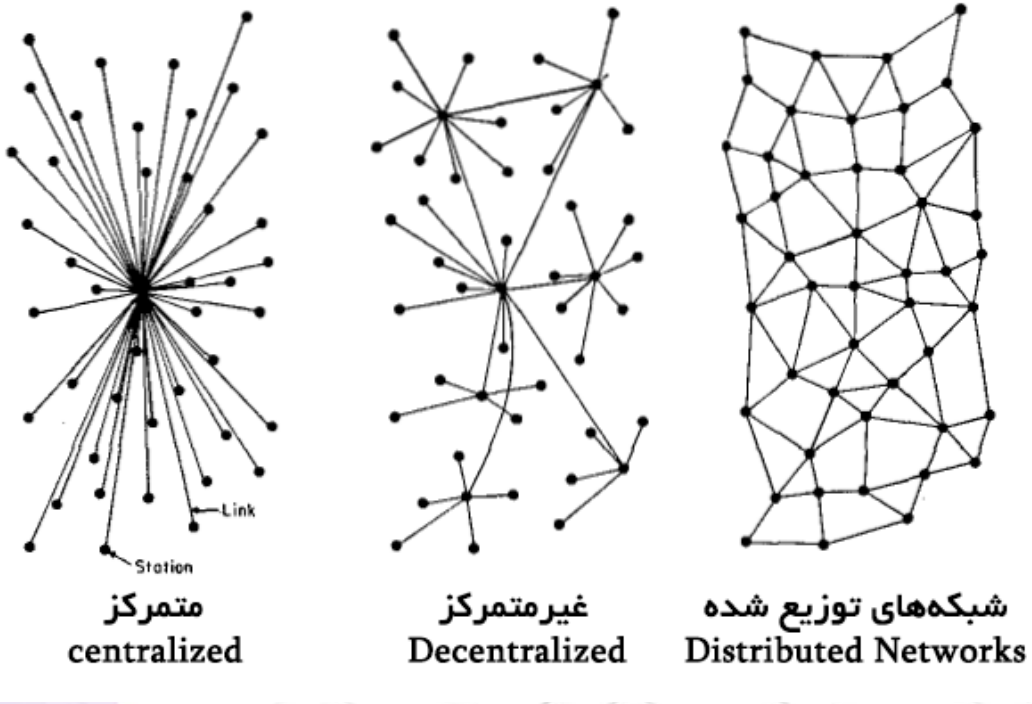
What is BLOCKCHAIN ?

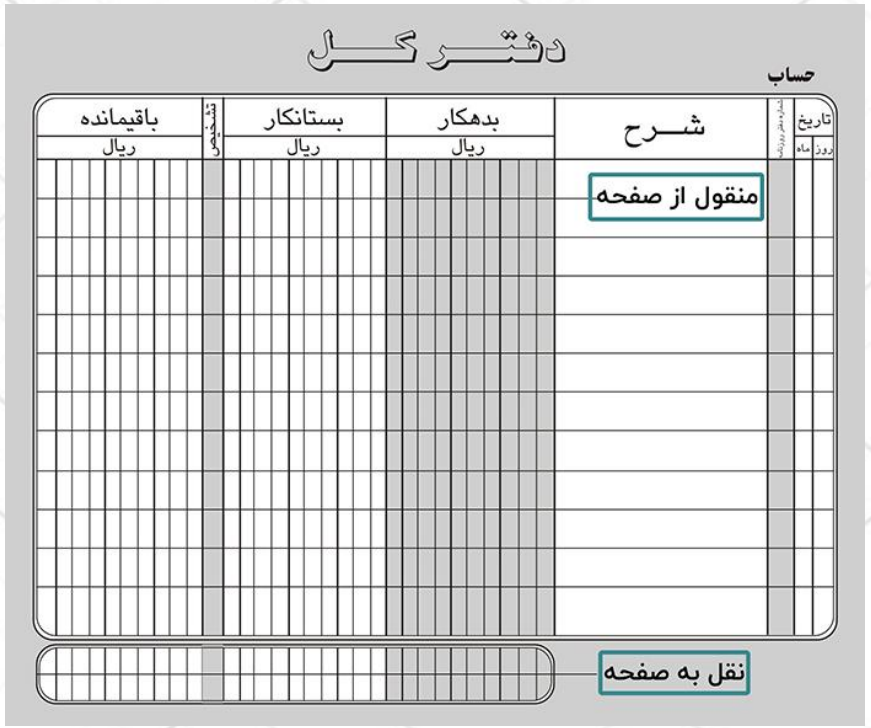
BLOCKCHAIN

- is a specific type of database.
- It differs from a typical database in the way it stores information; blockchains store data in blocks that are then chained together.
- As new data comes in it is entered into a fresh block. Once the block is filled with data it is chained onto the previous block, which makes the data chained together in chronological order.
- Different types of information can be stored on a blockchain but the most common use so far has been as a ledger for transactions.
- Decentralized blockchains are immutable, which means that the data entered is irreversible. For Bitcoin, this means that transactions are permanently recorded and viewable to anyone






Link
Station
متمرکز
centralized
غیرمتمرکز
Decentralized
شبکه‌های توزیع شده
Distributed Networks

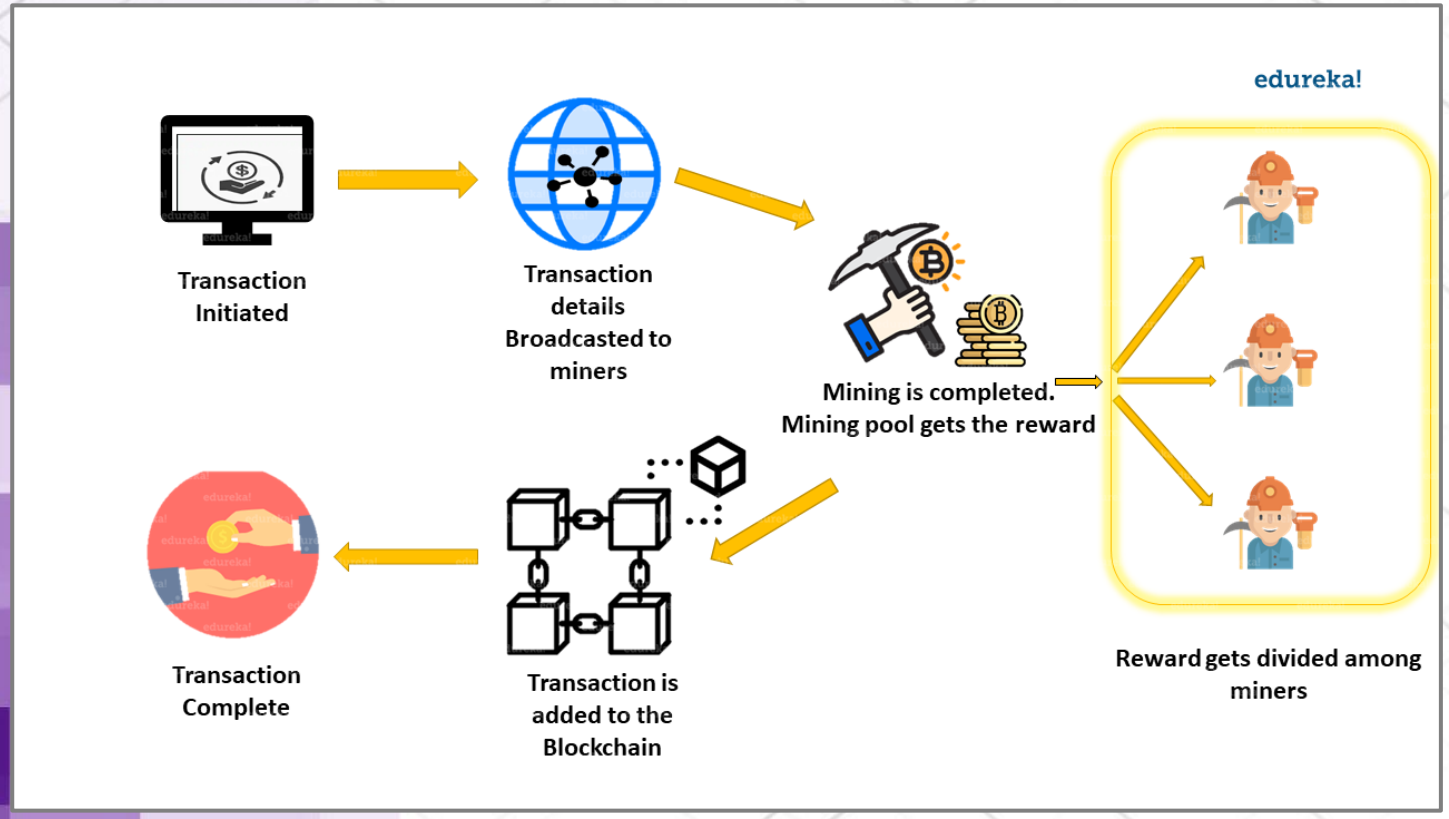

دفتر کل
حساب
تاریخ
روز
ماه
شماره سند پرونده
شرح
بدهکار
ریال
بستانکار
ریال
تشخیص
باقیمانده
ریال
منقول از صفحه
نقل به صفحه

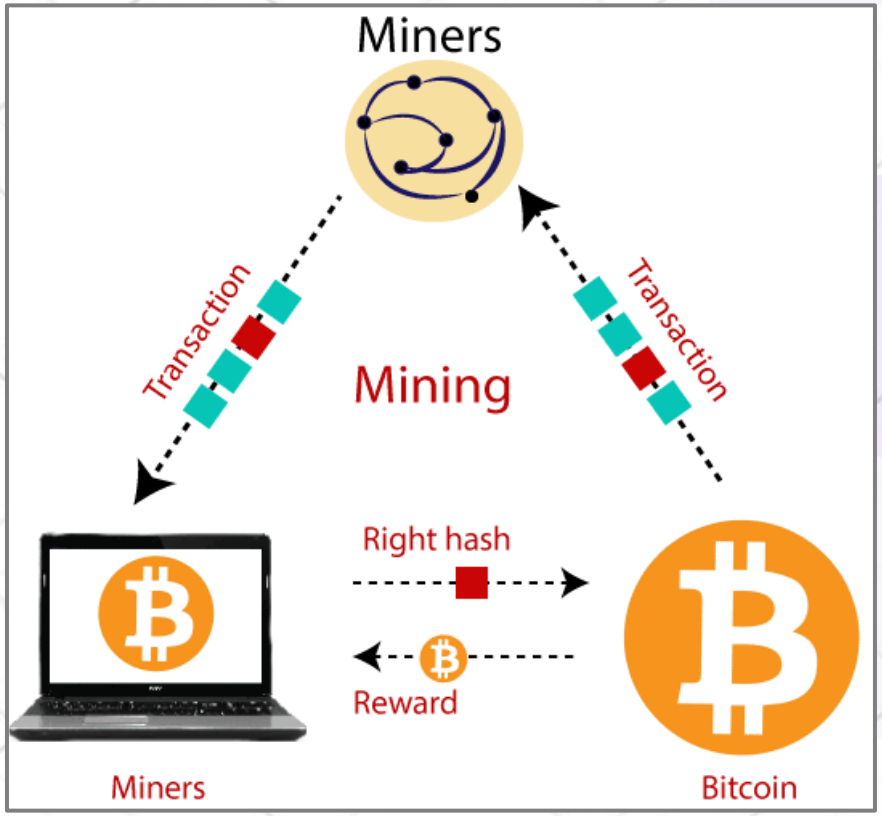
Blockchain vs. Bitcoins

- Blockchain is a technology and many cryptocurrencies like bitcoin using blockchain for secure and anonymous transactions.
- Blockchain is a transparent mechanism, whereas bitcoins operate on anonymity.
- Blockchain has a much more extensive use, while bitcoin is only restricted to exchange in digital currencies.
- Bitcoin is only used to transfer digital currencies, while blockchain transfers proprietary information, digital assets, rights, etc.

اینترنت، فناوری ویژه‌ای برای اشتراک‌گذاری اطلاعات است.
موتورهای جستجو یکی از محبوب‌ترین و شناخته‌شده‌ترین راه‌های استفاده از فناوری اینترنت به شمار می‌روند.
گوگل، یکی از معروف‌ترین و قدیمی‌ترین موتورهای جستجو است.

بلاک چین فناوری ویژه‌ای است که برای ثبت اطلاعات به‌صورت غیرمتمرکز به کار گرفته می‌شود.
ارزهای دیجیتال یکی از محبوب‌ترین و شناخته‌شده‌ترین راه‌های استفاده از فناوری بلاک چین به شمار می‌روند.
بیت کوین به‌نوبه خود، اولین و شناخته‌شده‌ترین نمونه یک ارز دیجیتال است.


edureka!
Transaction Initiated
Transaction details Broadcasted to miners
Mining is completed. Mining pool gets the reward
Reward gets divided among miners
Transaction is added to the Blockchain
Transaction Complete

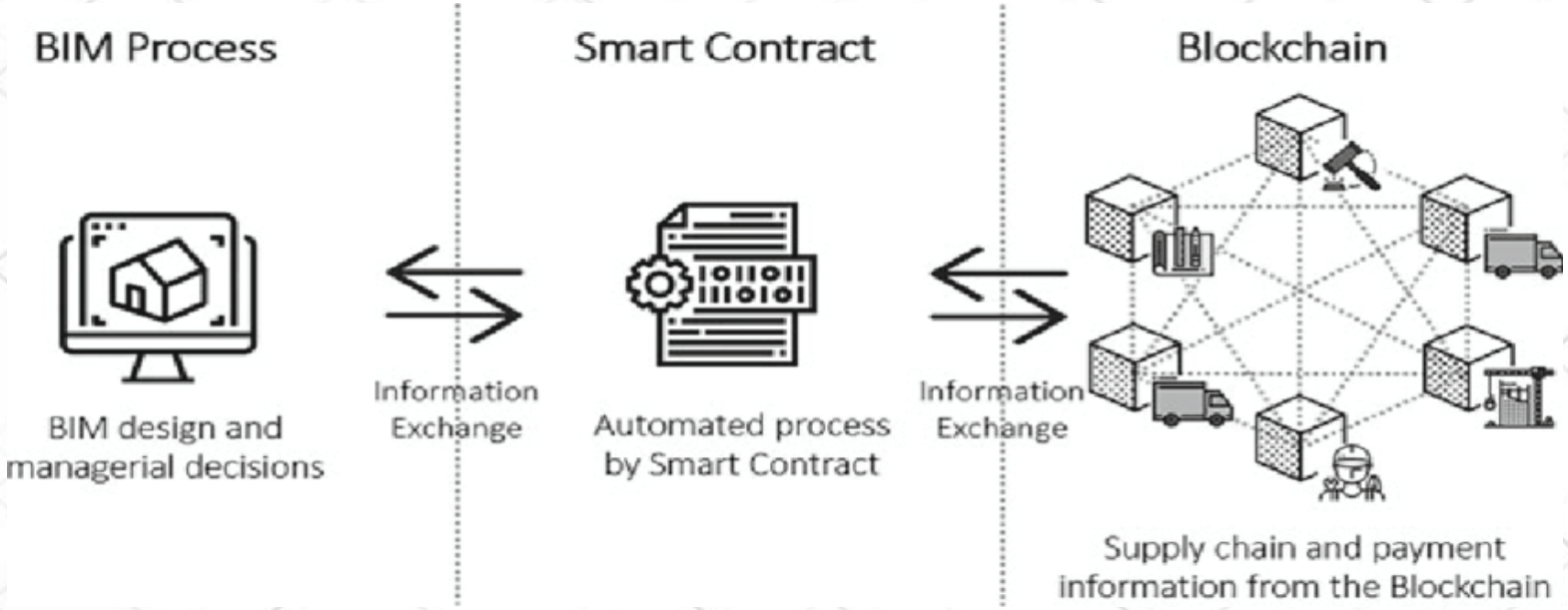

Miners
Transaction
Transaction
Mining
Right hash
Reward
Miners
Bitcoin

BIM & BLOCKCHAIN ?

Smart Contract

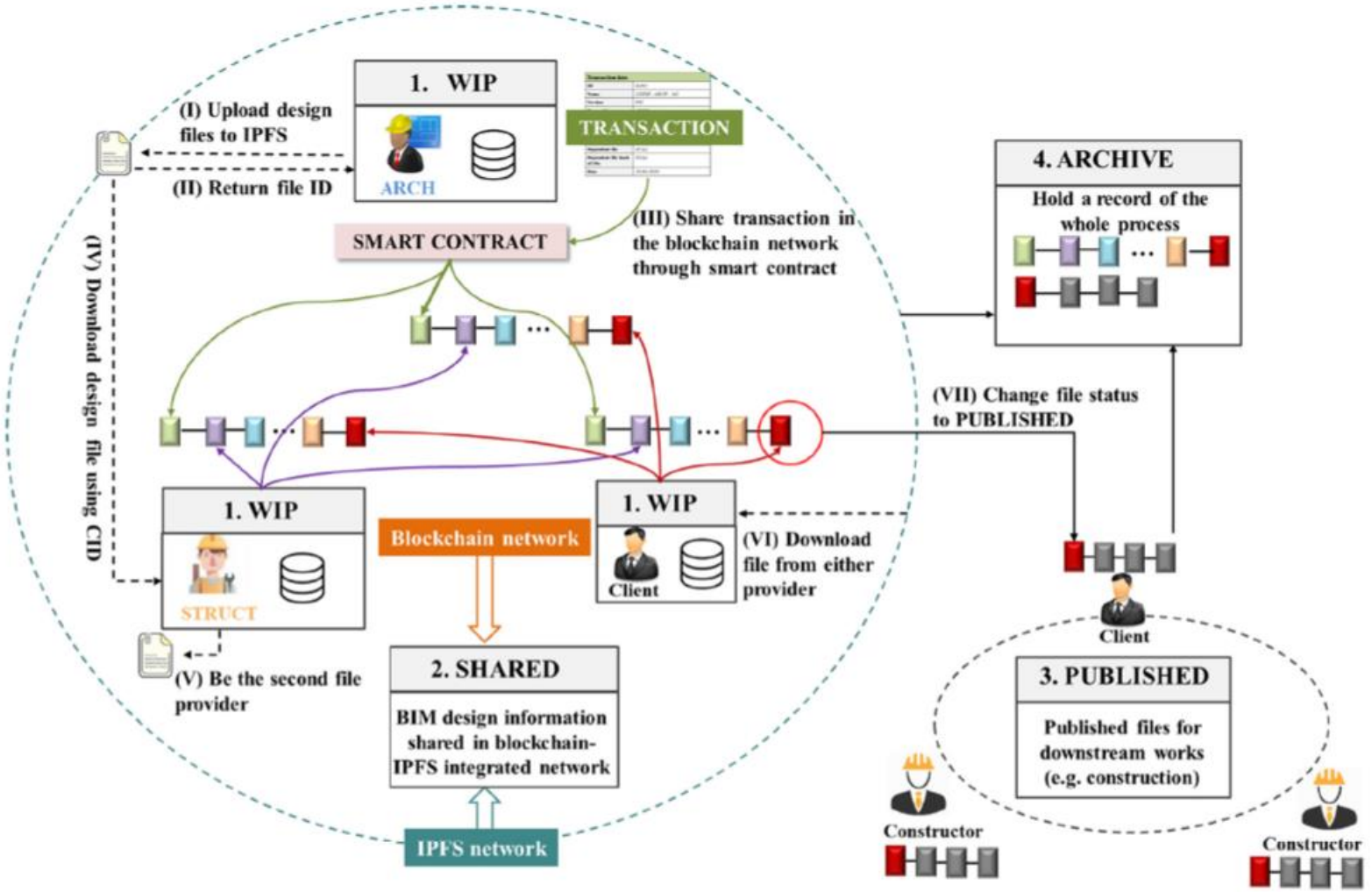
What if you never had to submit an invoice again, but still got paid, instantly, the minute you finished your next job? That’s the kind of promise blockchain technology holds for the AEC industry.
For example, if a steel fabricator is ready to ship the steel components to the job site, he would log this information in the BIM software. The smart contract is linked to the BIM model and the project account is funded by the owner. Once the components have been delivered to the job site, the project manager would confirm having received the component within BIM. Automatically funds would get transferred from the project account to the steel fabricator’s account

تصور کنید در خیابان هستید و قصد دارید سوار تاکسی شوید؛ از تاکسی اینترنتی یک خودرو درخواست می‌کنید و یک ماشین خودران (بدون راننده) شما را سوار می‌کند. تاکسی شما را به یک پمپ بنزین می‌برد و هزینه سوخت را هم از پولی که از مسافرهای قبلی دریافت کرده، پرداخت می‌کند. سپس شما را به مقصدتان می‌رساند و کرایه سفرتان هم از کیف پول الکترونیکی شما پرداخت می‌شود. در زمانی که تاکسی در حال رساندن شما به مقصد است، به صورت خودکار هزینه بیمه سالیانه و بدهی ماهانه مالک خود را هم می‌پردازد. بعد از اینکه شما را پیاده می‌کند به یک تعمیرگاه می‌رود تا عیب‌های احتمالی را هم تعمیر کند.

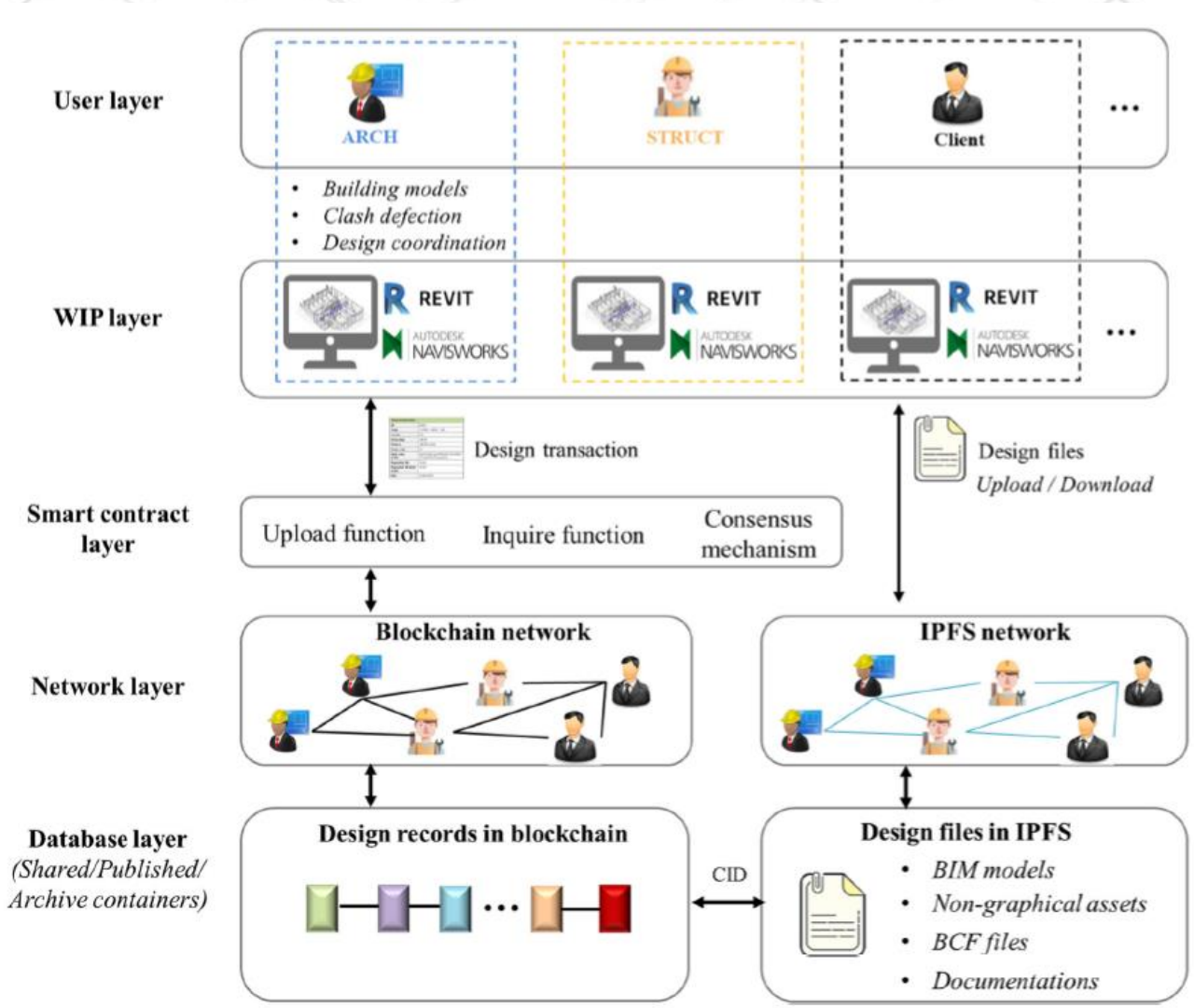


blockchain can provide a trustworthy infrastructure for information management during all building life-cycle stages. Even if building information modelling (BIM) is used, which assumes a centralized building information model, there is a role for blockchain to manage information on who did what and when and thus provide a basis for any legal arguments that might occur.

The project schedule becomes hundreds of smart contracts in a Common Data Environment (CDE), visible to all.
Each smart contract has a value.
Completion and verification of a smart contract triggers an automatic payment from one wallet to another.
The project receives its next 'block' of information which updates the BIM model with completed work and project spend



Distributed common data environment (DCDE) framework.



Architecture of DCDE framework.

Questions?