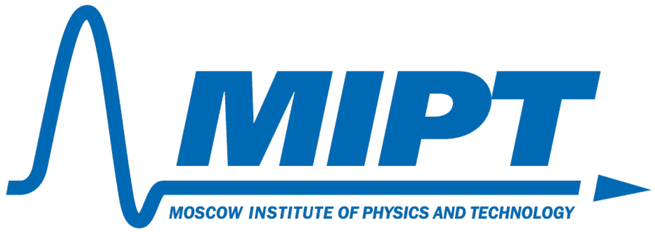
ANTON KARAZEEV — 18.08.20

BLOCKCHAIN & SMART CONTRACTS

DIGITAL CAPABILITIES FOR BUSINESS
Future skills competition inspired by 1C Company

ACKNOWLEDGMENTS



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   - General Overview
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INTRODUCTION TO BLOCKCHAIN

GENERAL OVERVIEW

- **Blockchain** is a list of records that are linked together using cryptography. Each block contains a **cryptographic hash** of the previous block, a **timestamp**, and **transaction data**

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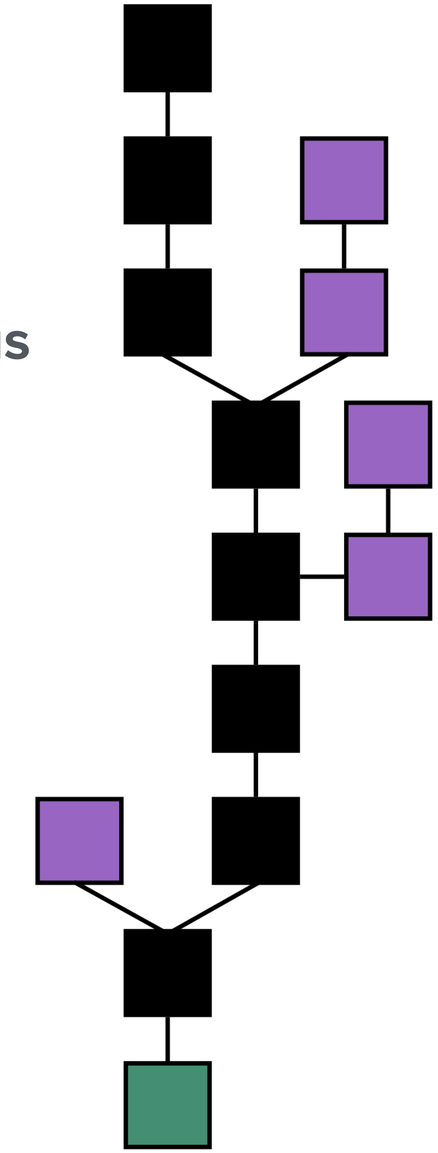
- Blockchain formation:
  - **Black** - main chain
  - **Green** - genesis block
  - **Purple** - orphan blocks



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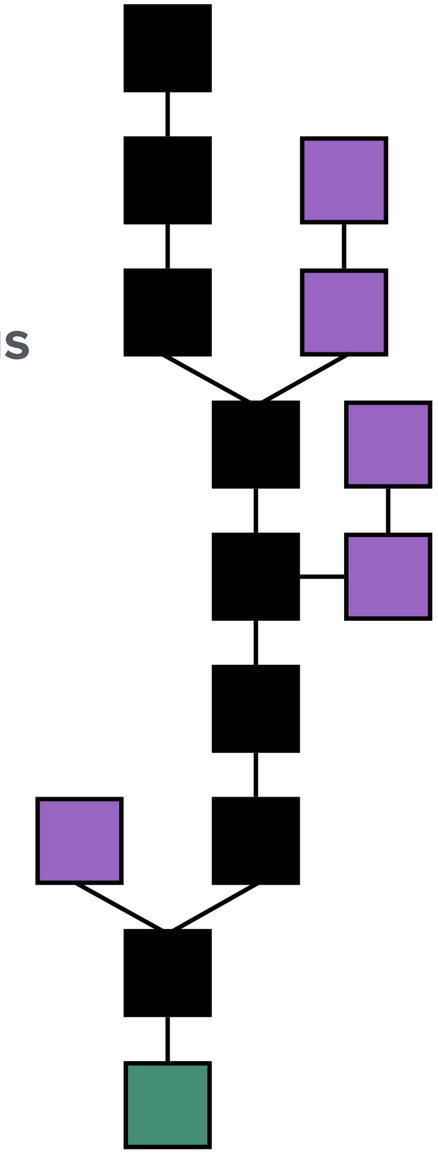
- By design, a **Blockchain** is resistant to modification of the data. It is an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way



GENERAL OVERVIEW

- Blockchain is widely used in logistics due to its security properties
- Popular public Blockchains: Bitcoin, Ethereum, Hyperledger
- The full cycle of the "product life" can be recorded in a Blockchain system:
  - Ordering goods from a supplier to a warehouse
  - Delivering goods to the customer
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- The following objects can be digitized, transferred to the blockchain:
  - Customer order
  - Logistic order
  - Waybills
  - Movement history

INTRODUCTION TO SMART CONTRACTS

GENERAL OVERVIEW

- **Smart Contract** is transaction protocol which is intended to **automatically execute**, **control** or **document** legally relevant events and actions according to the terms of a contract or an agreement
- Vending machines are the oldest piece of technology equivalent to smart contract implementation

GENERAL OVERVIEW

- Smart Contract is transaction protocol which is intended to automatically execute, control or document legally relevant events and actions according to the terms of a contract or an agreement
- Vending machines are the oldest piece of technology equivalent to smart contract implementation
- At some stages, smart contracts can be used for automation payment process (counter-party settlements)

GENERAL OVERVIEW

- Elements of a smart contract:
  - Parties to the contract
  - Subject of the contract (for example - a transaction to the courier's wallet upon completion of delivery, the contract is triggered by the digital signature of the buyer)
  - Conditions of the contract
  - Environment (decentralized platform)

EXAMPLE OF SMART CONTRACT

Seller Organization

ORG1

```
application:

seller = ORG1;
buyer = ORG2;
transfer(CAR1, seller, buyer);
```

```
car contract:

 query(car):
  get(car);
  return car;

 transfer(car, buyer, seller):
  get(car);
  car.owner = buyer;
  put(car);
  return car;

 update(car, properties):
  get(car);
  car.colour = properties.colour;
  put(car);
  return car;
```

Buyer Organization

ORG2

```
application:

seller = ORG2;
buyer = ORG1;
transfer(CAR2, seller, buyer);
```

Image source: https://hyperledger-fabric.readthedocs.io/en/release-2.2/smartcontract/smartcontract.html

SUPPLY CHAIN

Seller > Blockchain > Producer > Logistic company > International carrier > Local carrier > Customer

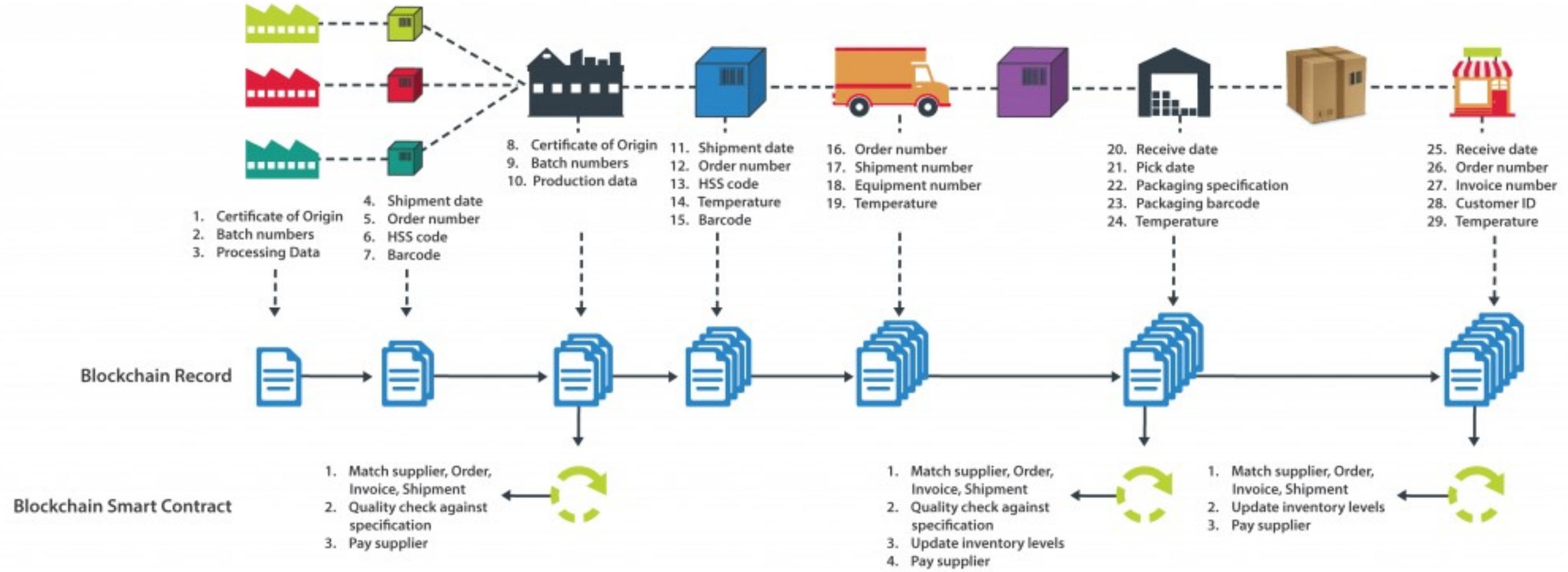


Image source: https://www.ablcompany.ru/news/blokcheyn-kak-tehnologiya-budushchego-budet-ispolzovana-v-logistike

THE TASK

WHAT WE PROPOSE

- Small online-store
- Customer submits an Order > Sales Manager > Warehouse for picking > > Delivery (Courier, appointed by Delivery Manager) > Customer
- Implement an app that automates such a process
- Main points:
  - Sales Manager
  - Delivery Manager
  - Warehouse Worker
  - Plus: Mobile App for the Courier
- Blockchain for orders & Smart Contracts for contractors

DATA THAT CAN BE SAVED IN BLOCKCHAIN

- Orders submitted by customers
- Changes of order status
- Information about items stored in warehouses:

```
{
  "warehouse": "SVO",
  "serial_no": "978-0-7923-0225-4",
  "shipping_date": "2019-07-25T15:03:26",
  "category_id": “2”,
  ...
}
```

TO IMPLEMENT

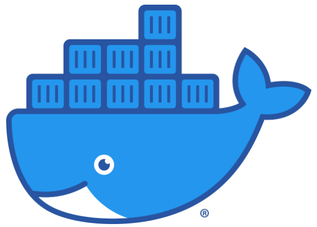
- Storage of the order and its status in Blockchain
  - Store status change of the order
  - Fix initiator of the order status change
- Smart Contracts for the following contractors:
  - Sales Manager
  - Warehouse Worker
  - Delivery Manager
  - Courier
- Interface to display entire history of orders and status changes stored in Blockchain

TECHNOLOGIES: HYPERLEDGER FABRIC

HYPERLEDGER FABRIC FOR PYTHON

- Hyperledger Fabric is a blockchain infrastructure, originally contributed by IBM and Digital Asset. Was founded in December 2015
- Hyperledger Fabric SDK: https://github.com/hyperledger/fabric-sdk-py
  All the information regarding installation and getting-started can be found in the documentation: https://fabric-sdk-py.readthedocs.io/en/latest/tutorial.html
- But first... You will need to install Docker: https://www.docker.com
  It will greatly help you in setting up of Hyperledger environment





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DIGITAL CAPABILITIES FOR BUSINESS

GOOD LUCK AND HAVE A GOOD TIME!