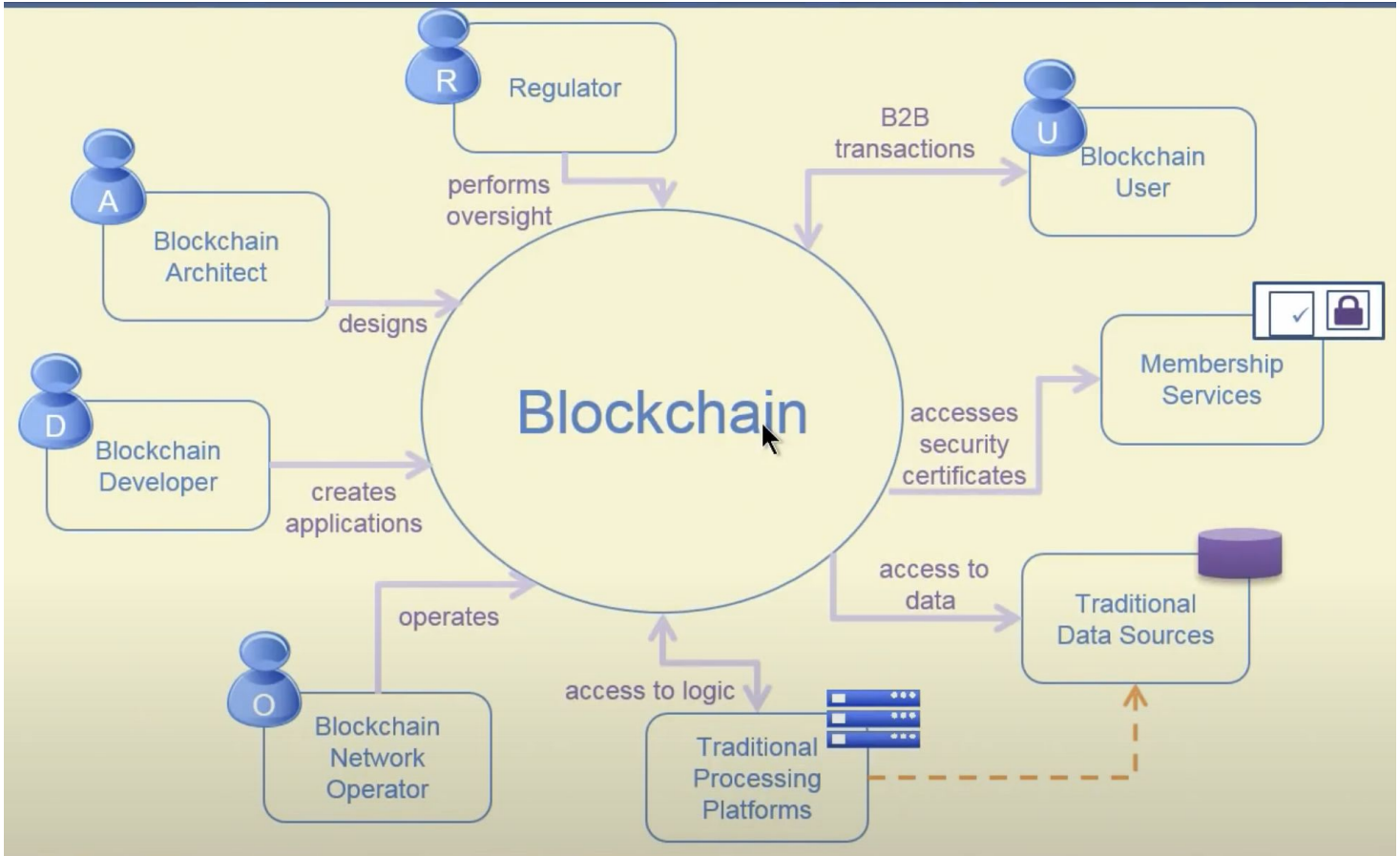
Blockchain Components and Concepts

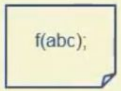
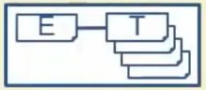
21CSPH0 Blockchain Technology and Applications

Actors in a Blockchain Framework

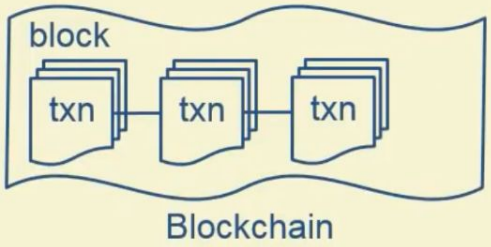


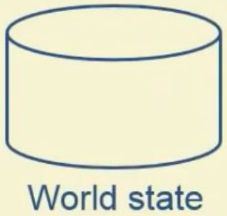
Blockchain Architect		Responsible for the architecture and design of the blockchain solution
Blockchain User		The business user, operating in a business network. This role interacts with the Blockchain using an application. They are not aware of the Blockchain.
Blockchain Regulator		The overall authority in a business network. Specifically, regulators may require broad access to the ledger's contents.
Blockchain Developer		The developer of applications and smart contracts that interact with the Blockchain and are used by Blockchain users.
Blockchain Operator		Manages and monitors the Blockchain network. Each business in the network has a Blockchain Network operator.
Membership Services		Manages the different types of certificates required to run a permissioned Blockchain.
Traditional Processing Platform		An existing computer system which may be used by the Blockchain to augment processing. This system may also need to initiate requests into the Blockchain.
Traditional Data Sources		An existing data system which may provide data to influence the behavior of smart contracts.

Components

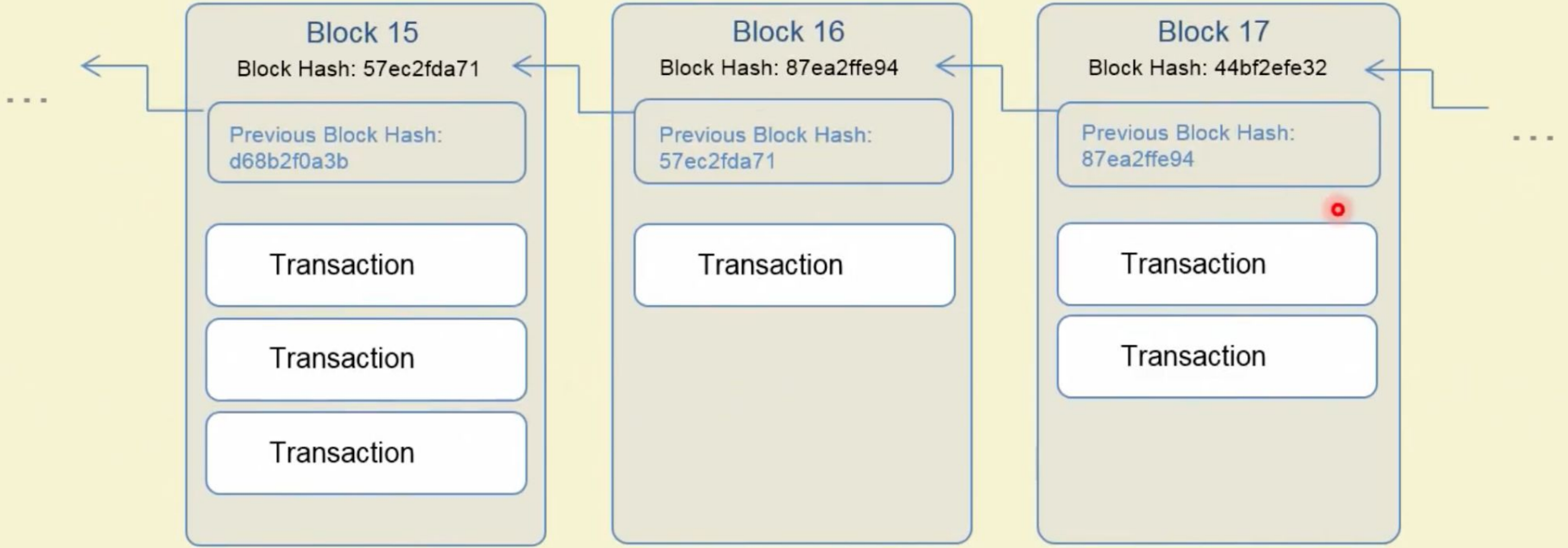
Ledger		A ledger is a channel's chain and current state data which is maintained by each peer on the channel.
Smart Contract		Software running on a ledger, to encode assets and the transaction instructions (business logic for modifying the assets.
Peer Network		A broader term overarching the entire transactional flow, which serves to generate an agreeme on the order and to confirm the correctness of the set of transactions constituting a block.
Membership		Membership Services authenticates, authorizes, and manages identities on a permissioned blockchain network.
Events		Creates notifications of significant operations on the blockchain (e.g. a new block), as well as notifications related to smart contracts.
Systems Management		Provides the ability to create, change and monitor blockchain components
Wallet		Securely manages a user's security credentials
Systems Integration		Responsible for integrating Blockchain bi-directionally with external systems. Not part of blockchain, but used with it.

A ledger often consists of two data structures



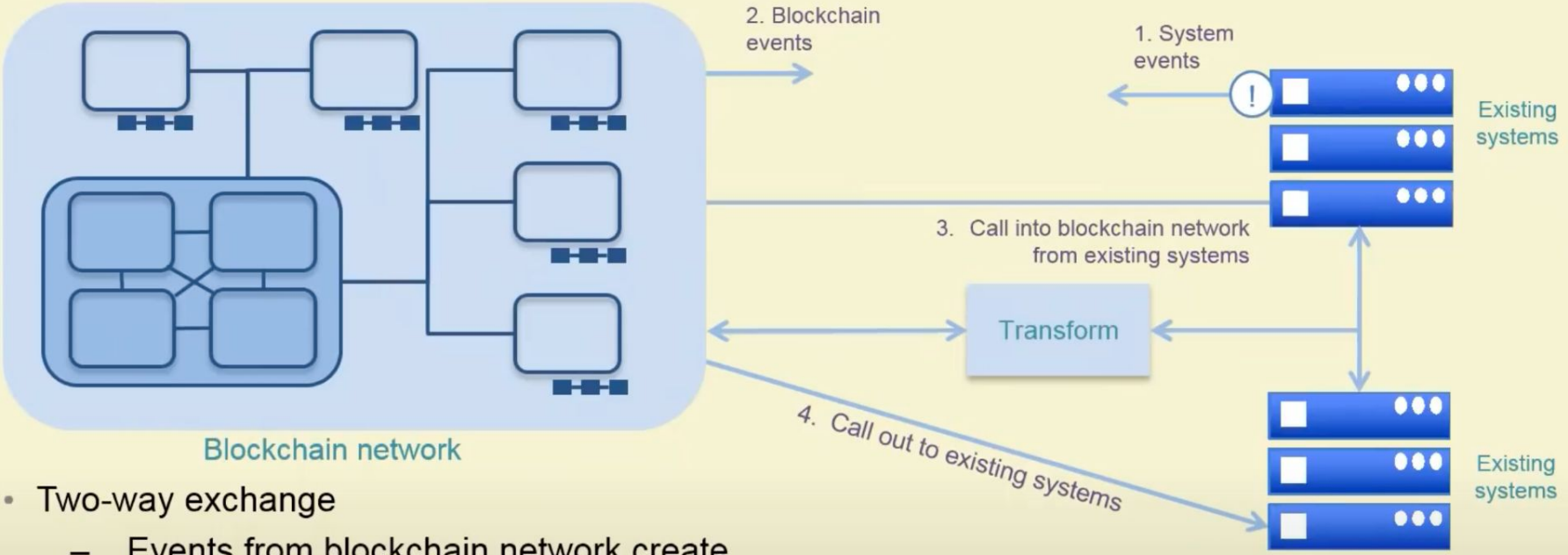


- Blockchain
  - A linked list of blocks (a hashchain)
  - Each block describes a set of transactions (e.g. the inputs to a smart contract invocation, output, identities/certs)
  - Immutable – blocks cannot be tampered
- World State
  - Stores the most recent state of smart contracts / output of transactions
  - Stored in a traditional database (e.g. key-value store)
  - Data elements can been added, modified, deleted, all recorded as transactions on blockchain



- A blockchain is made up of a series of blocks with new blocks always added to the end
- Each block contains zero or more transactions and some additional metadata
- Blocks achieve immutability by including the result of a hash function of the previous block
- The first block is known as the “genesis” block

Integrating with Existing Systems – Possibilities



- Two-way exchange
  - Events from blockchain network create actions in existing systems
  - Cumulative actions in existing systems result in blockchain interaction
- Transformation between blockchain and existing systems' formats