Modeling supply chain of the european PDO Olive Oil with the *-Chain Framework

STEFANO BISTARELLI
FRANCESCO FALOCI
PAOLO MORI

The *-Chain Framework

Main Goal

- help to design and development the blockchain-based Supply Chain Management System for PDO Olive Oil

PDO Olive Oil

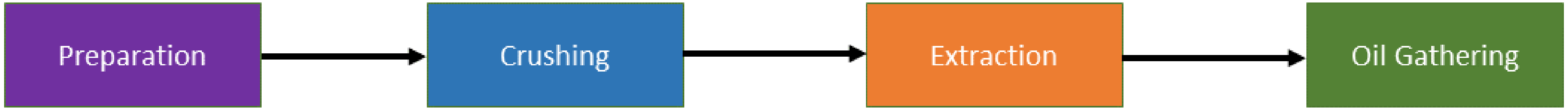
- PDO directive schema

Framework Components

- Domain-Specific Graphical Language
- Graphic design interface
- Model Translator
- Interfaces builder

The *-Chain Framework

PDO directive schema (1)

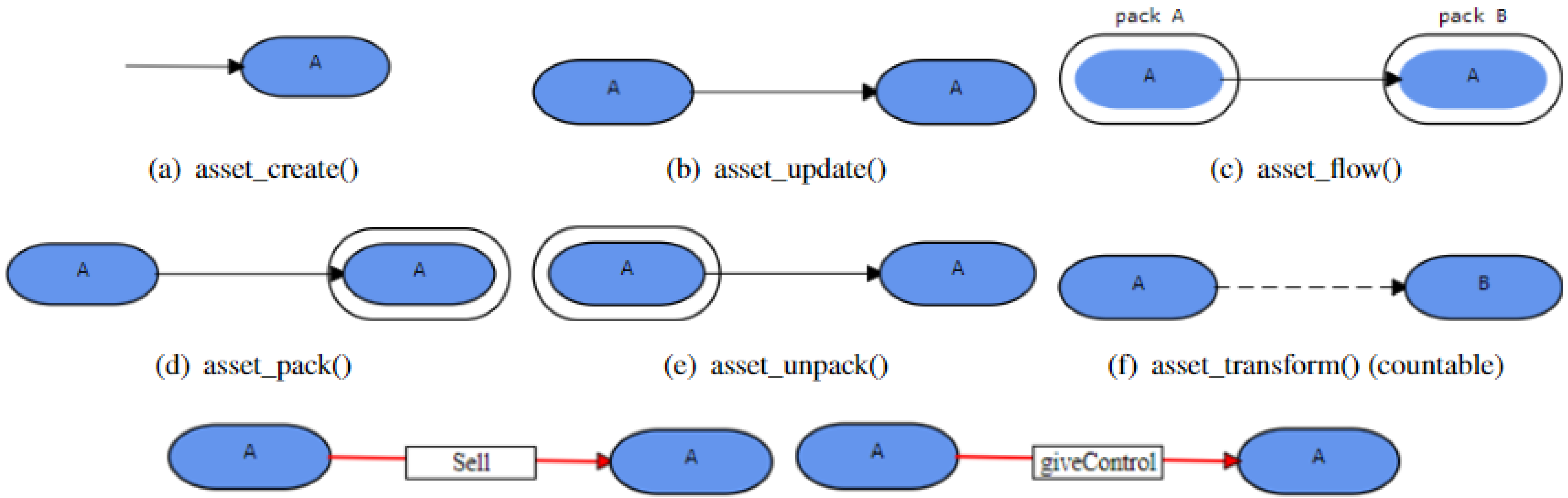


Preparation → Crushing → Extraction → Oil Gathering

(1) Conte L, Bendini A, Valli E, et al. Olive oil quality and authenticity: A review of current EU legislation, standards, relevant methods of analyses, their drawbacks and recommendations for the future. Trends in Food Science & Technology 2020; 105: 483-493.

The *-Chain Framework

Domain-Specific Graphical Language



(a) asset_create()

(b) asset_update()

(c) asset_flow()

(d) asset_pack()

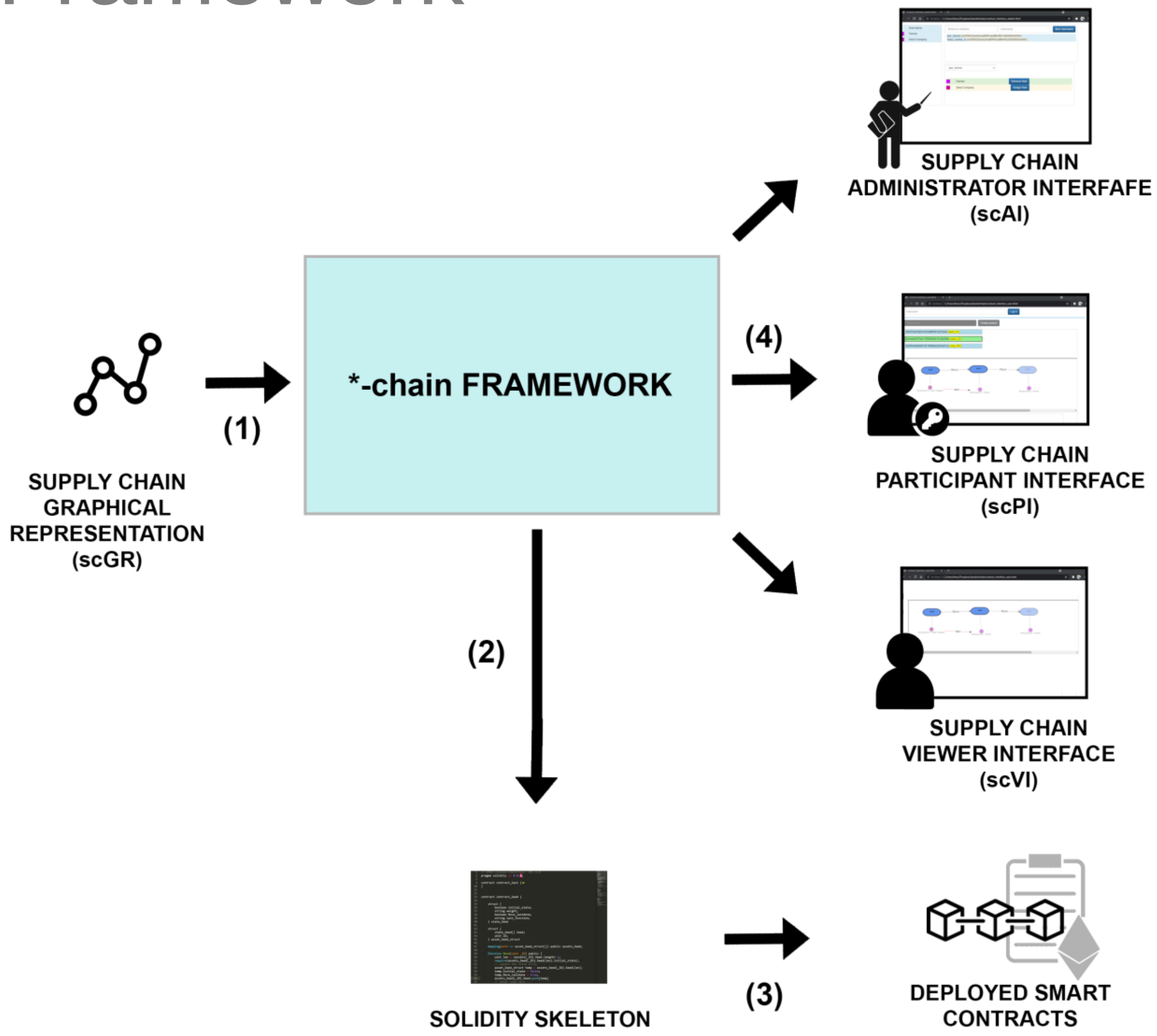
(e) asset_unpack()

(f) asset_transform() (countable)

(g) asset_sell()

(h) asset_giveControl()

The *-Chain Framework



SUPPLY CHAIN GRAPHICAL REPRESENTATION (scGR)

(1)

*-chain FRAMEWORK

(2)

SOLIDITY SKELETON

(3)

DEPLOYED SMART CONTRACTS

(4)

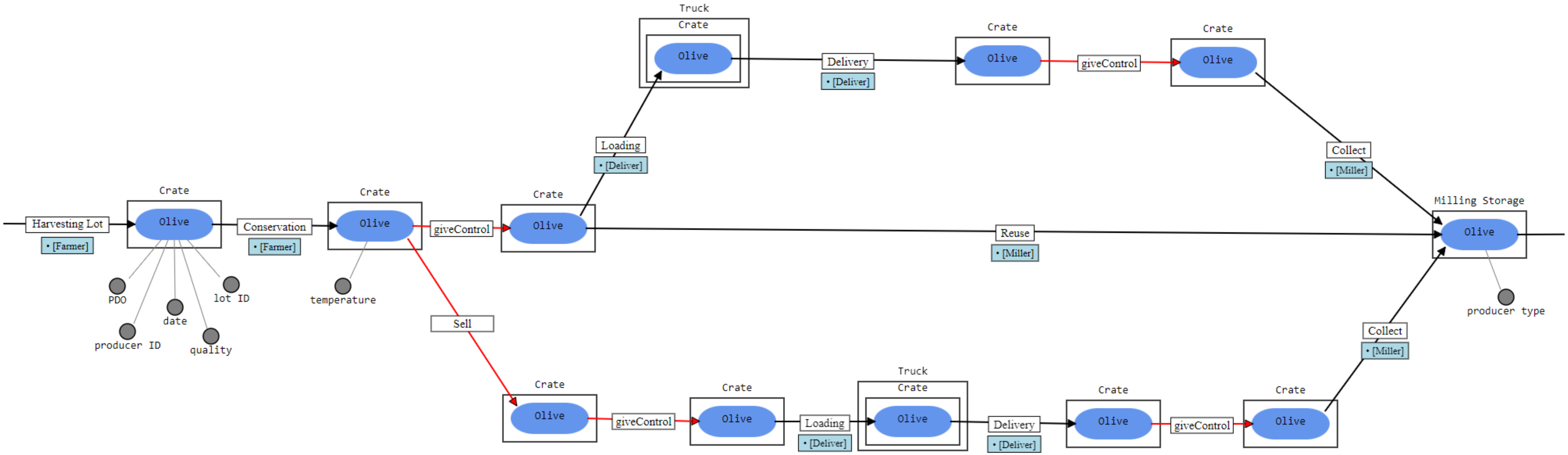
SUPPLY CHAIN ADMINISTRATOR INTERFAFE (scAI)

SUPPLY CHAIN PARTICIPANT INTERFACE (scPI)

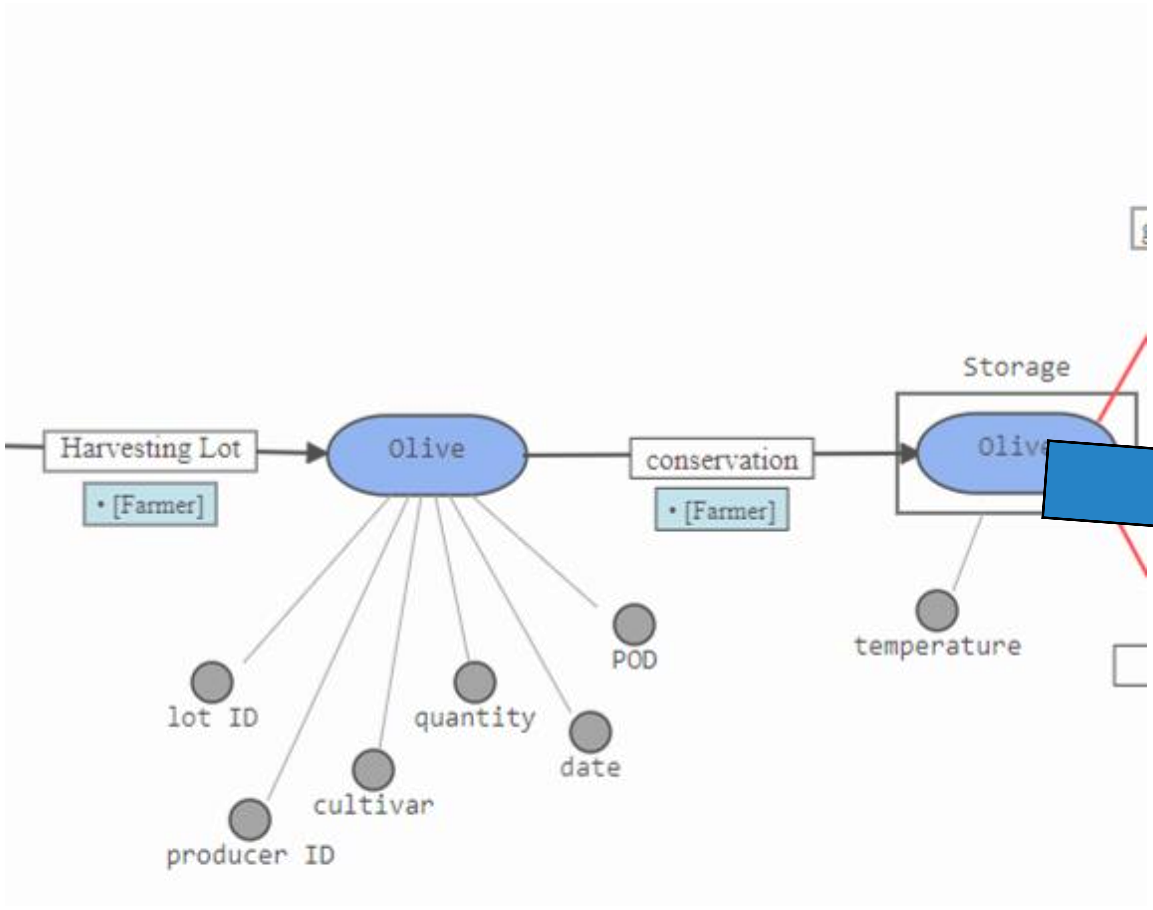
SUPPLY CHAIN VIEWER INTERFACE (scVI)

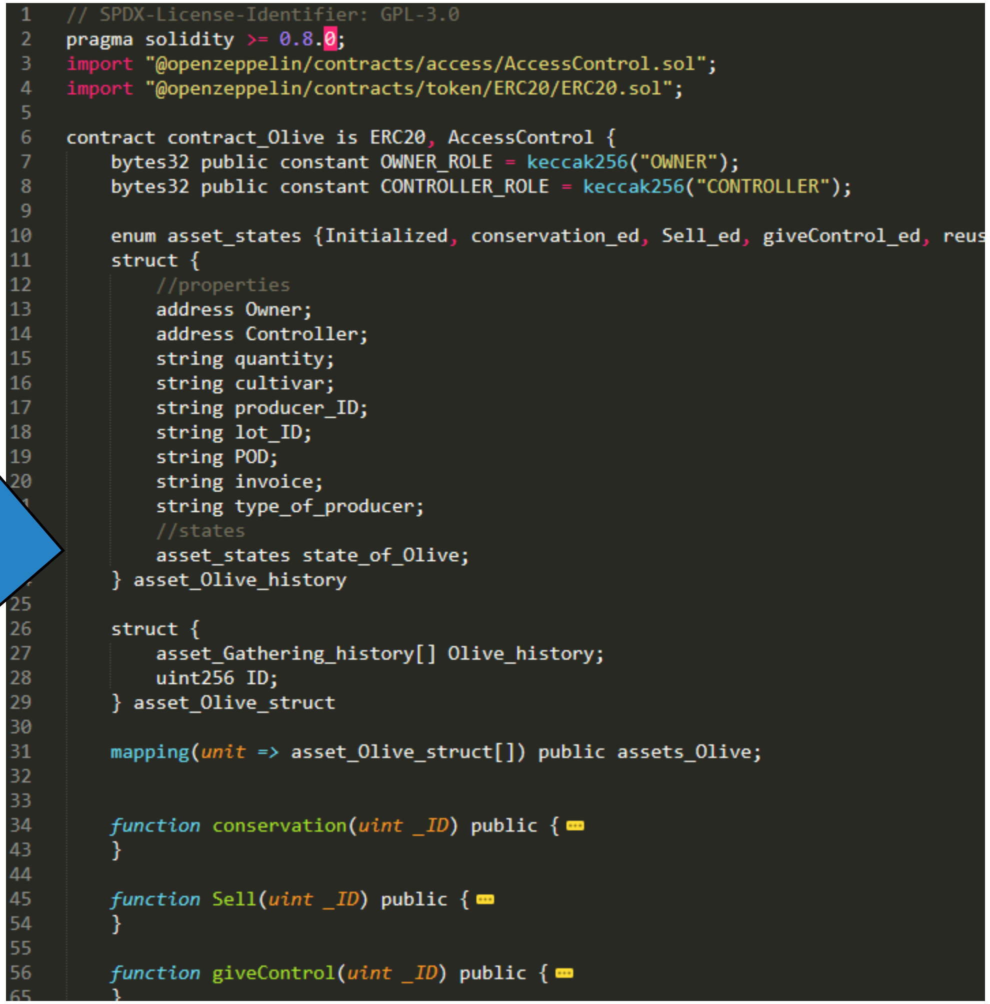
Generated Solidity Code

Preparation phase



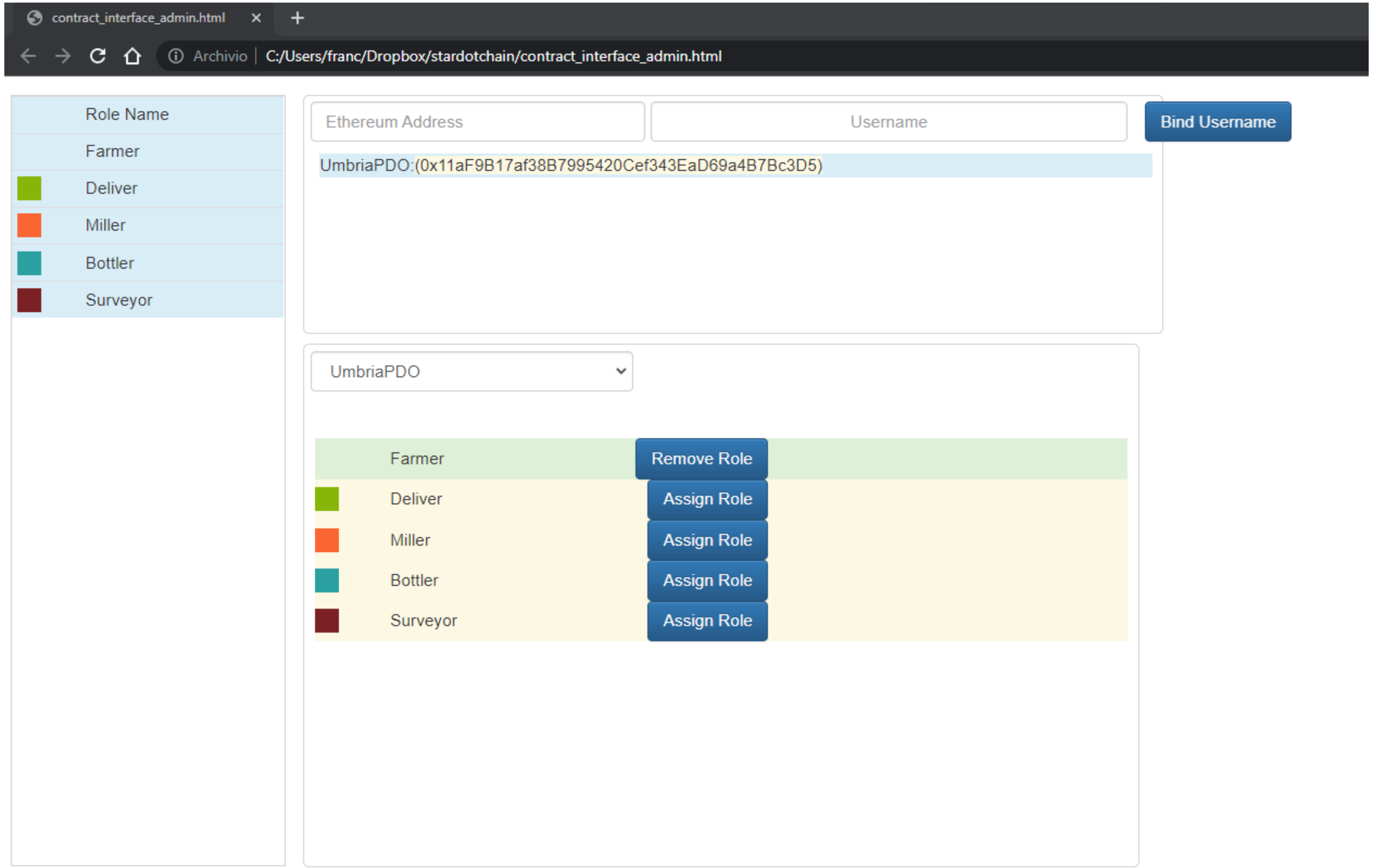
Generated Solidity Code





```
// SPDX-License-Identifier: GPL-3.0
pragma solidity >= 0.8.0;
import "@openzeppelin/contracts/access/AccessControl.sol";
import "@openzeppelin/contracts/token/ERC20/ERC20.sol";

contract contract_Olive is ERC20, AccessControl {
    bytes32 public constant OWNER_ROLE = keccak256("OWNER");
    bytes32 public constant CONTROLLER_ROLE = keccak256("CONTROLLER");

    enum asset_states {Initialized, conservation_ed, Sell_ed, giveControl_ed, reus
    struct {
        //properties
        address Owner;
        address Controller;
        string quantity;
        string cultivar;
        string producer_ID;
        string lot_ID;
        string POD;
        string invoice;
        string type_of_producer;
        //states
        asset_states state_of_Olive;
    } asset_Olive_history

    struct {
        asset_Gathering_history[] Olive_history;
        uint256 ID;
    } asset_Olive_struct

    mapping(unit => asset_Olive_struct[]) public assets_Olive;


    function conservation(uint _ID) public {…
    }

    function Sell(uint _ID) public {…
    }

    function giveControl(uint _ID) public {…
    }
```

Admin Interface



contract_interface_admin.html

Archivio | C:/Users/franc/Dropbox/stardotchain/contract_interface_admin.html

	Role Name
	Farmer
🟩	Deliver
🟧	Miller
🟦	Bottler
🟥	Surveyor

Ethereum Address

Username

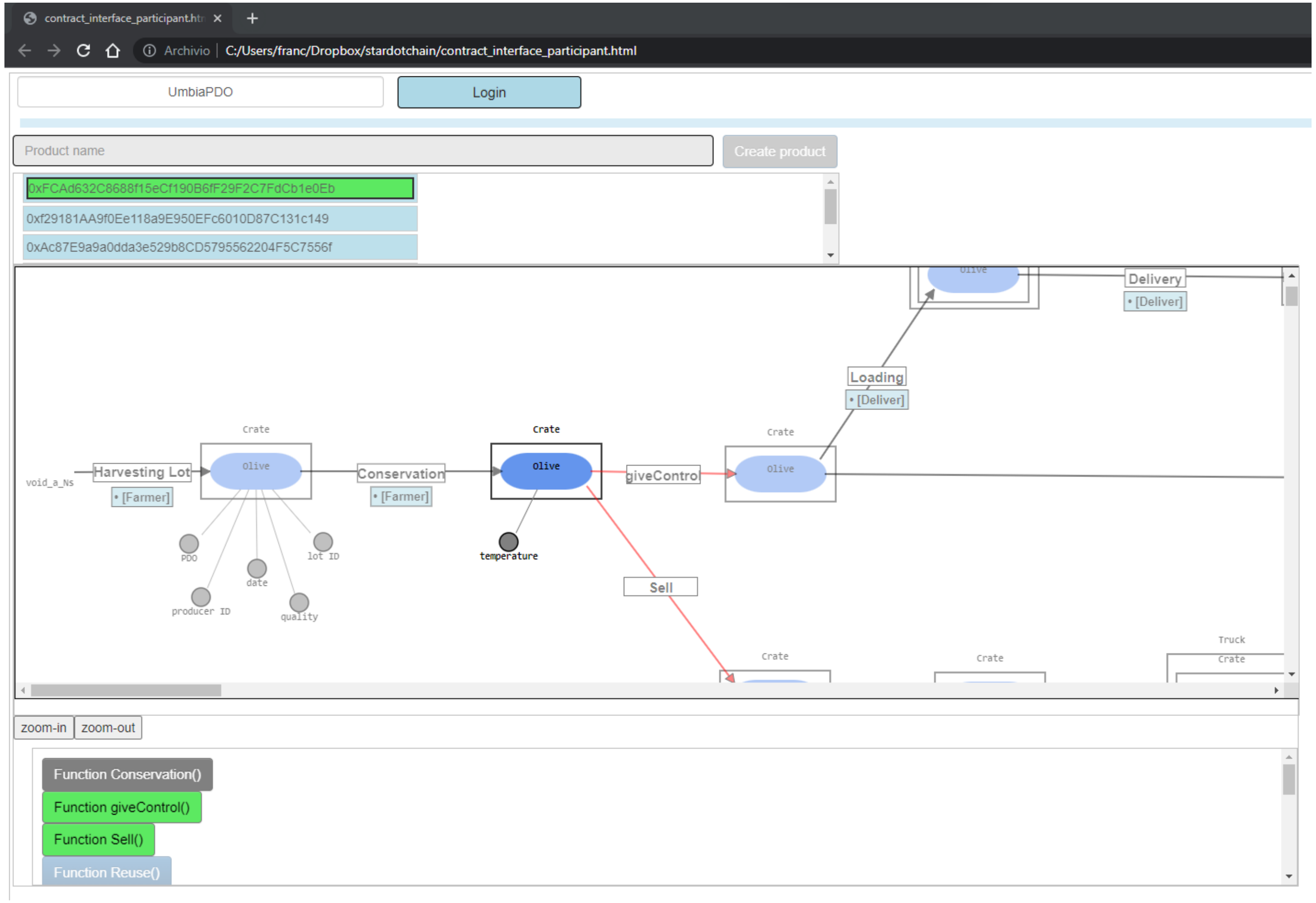
Bind Username

UmbriaPDO:(0x11aF9B17af38B7995420Cef343EaD69a4B7Bc3D5)

UmbriaPDO

	Farmer	Remove Role
🟩	Deliver	Assign Role
🟧	Miller	Assign Role
🟦	Bottler	Assign Role
🟥	Surveyor	Assign Role

Participant Interface



contract_interface_participant.htm

Archivio | C:/Users/franc/Dropbox/stardotchain/contract_interface_participant.html

UmbiaPDO

Login

Product name

Create product

0xFCAd632C8688f15eCf190B6fF29F2C7FdCb1e0Eb

0xf29181AA9f0Ee118a9E950EFc6010D87C131c149

0xAc87E9a9a0dda3e529b8CD5795562204F5C7556f

zoom-in zoom-out

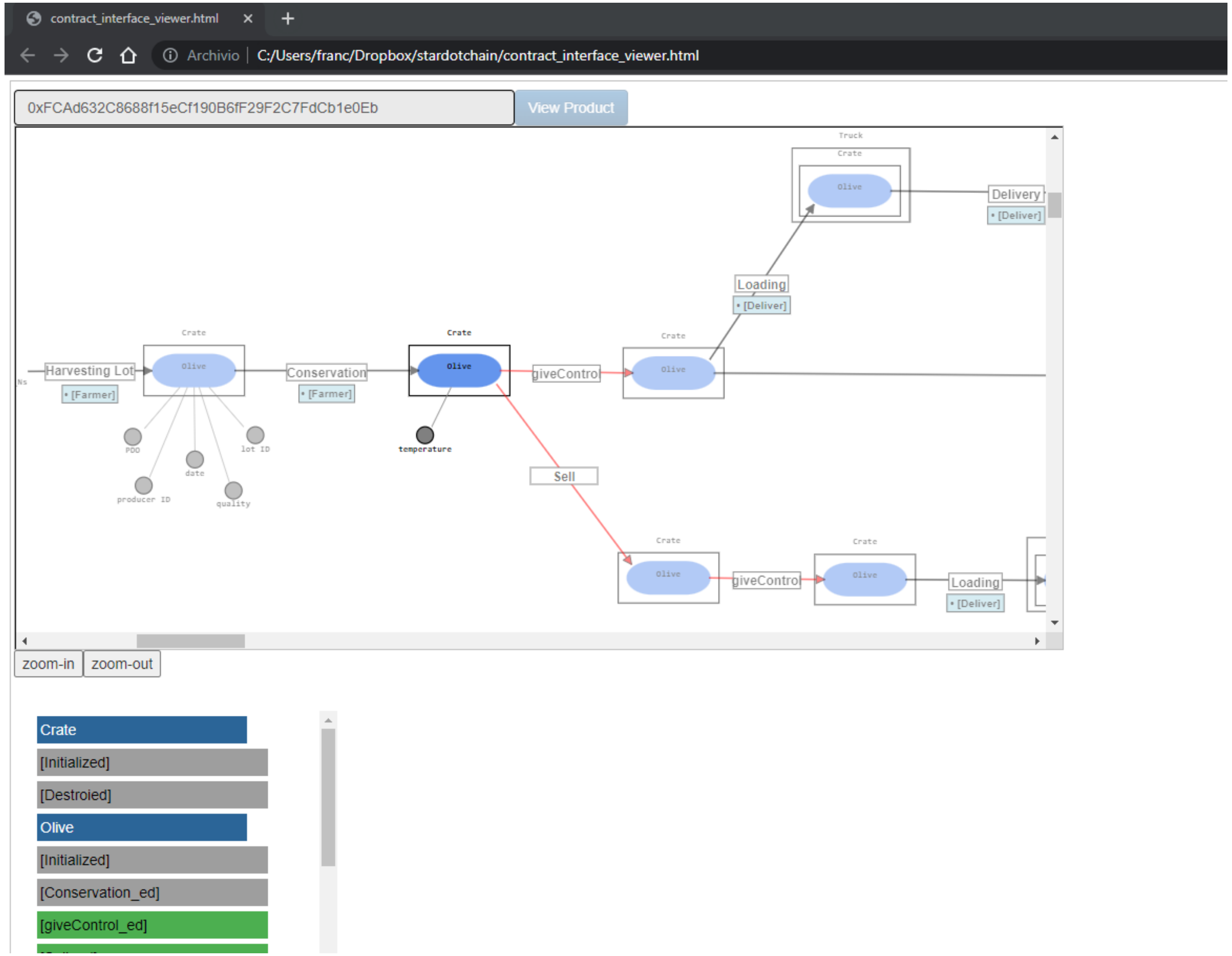
Function Conservation()

Function giveControl()

Function Sell()

Function Reuse()

Viewer Interface



0xFCAd632C8688f15eCf190B6fF29F2C7FdCb1e0Eb

- Crate
- [Initialized]
- [Destroied]
- Olive
- [Initialized]
- [Conservation_ed]
- [giveControl_ed]

THANKS FOR THE ATTENTION

/end