



THE FABLAB & THECRYPTO.FARM

PIRL SHARKS - PROJECTS INCUBATOR

PROGRAM PROPOSAL

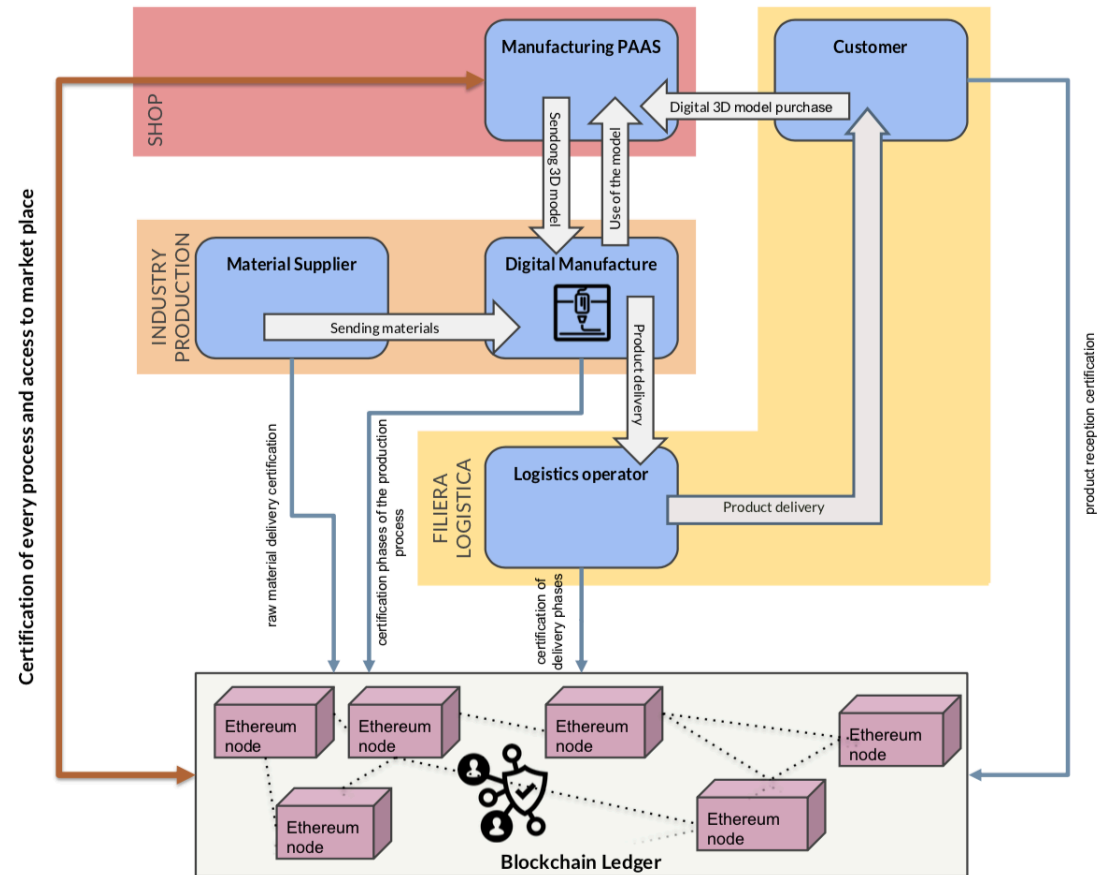
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INTRODUCTION

- In the upcoming years we will see a global widespread of technologies like 3D printing and blockchain
- 3D Printers will be used by individuals and companies to create and print items used in everyday life.
- Blockchain will be globally adopted to send and receive payments, create and share digital assets, certify business processes and so on.
- Our idea is to create a 3D File Printing platform, powered by a decentralised payment and file hosting system. Everyone earn renting its 3D printer and who need to print a GCODE file can use the platform to safely pay and print it at the nearest 3D printear.
- To accomplish that, we will use Pirl, one of the most innovative blockchain available. Pirl allows to develop a custom token (TFL Token), a smart contract to buy tokens and print 3D files stored in the storage Masternode

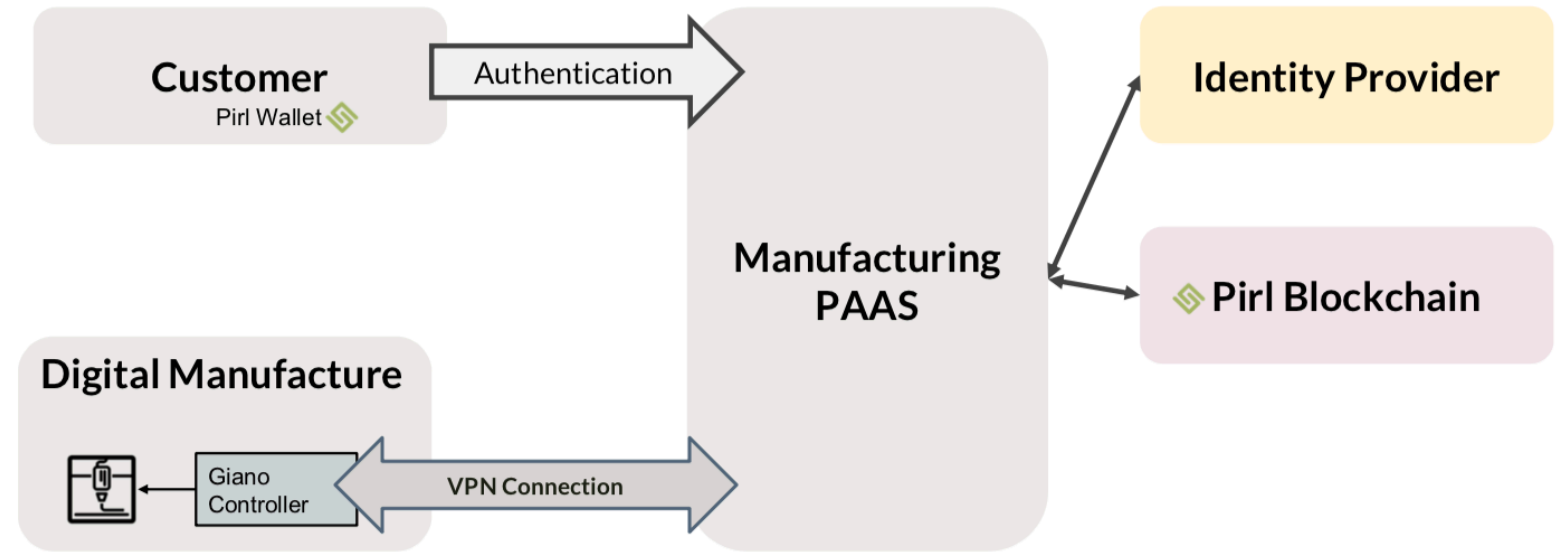
THE BIG PICTURE



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Authentication

All the actors of the PAAS Manufacturing system authenticate themselves through an identity provider systems or the blockchain itself. The operation is registered on the Blockchain



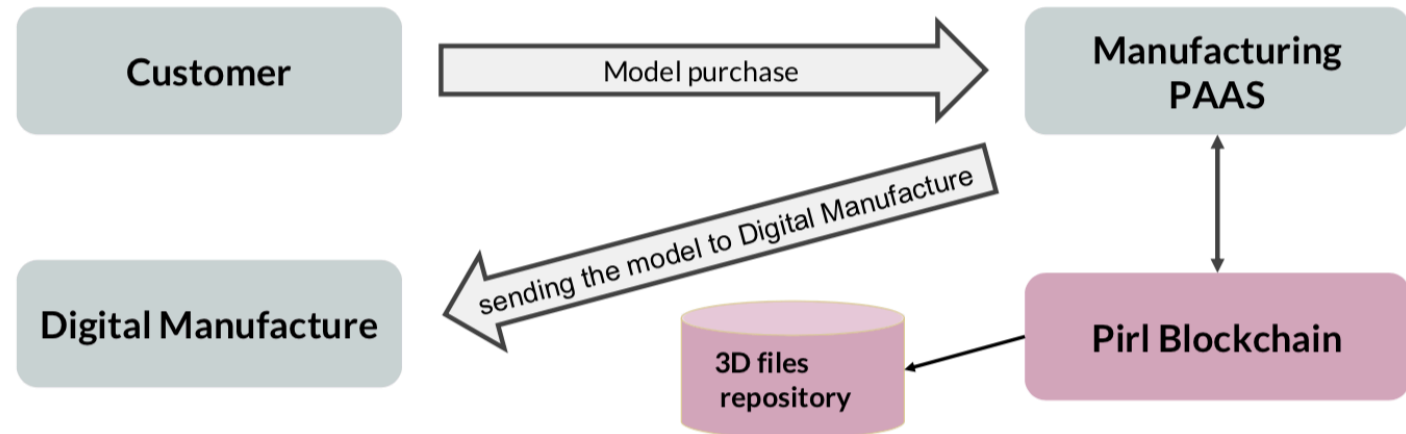
VPN Connection

All 3D printers will be connected to a hardware controller, Giano, that will be connected to the PAAS Manufacturing through a Virtual Private Network

THE BIG PICTURE

Use and purchase

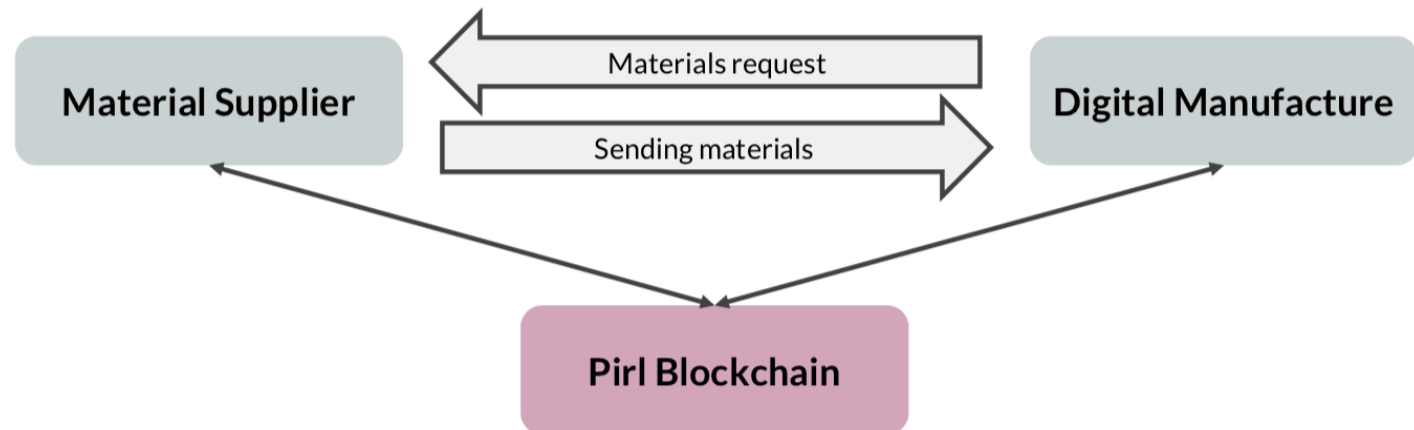
Once authenticated, the Customer acquires the 3D model on market place. The model is sent to the Digital Manufacture. The DM is selected according to some parameters (distance, supplies, work queue...) This operation is recorded on the blockchain, associating the identity of the customer, together with other information such as geographical location and time of use / purchase. The sending of the model to the Digital Manufacture is also certified.



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Request and send raw materials

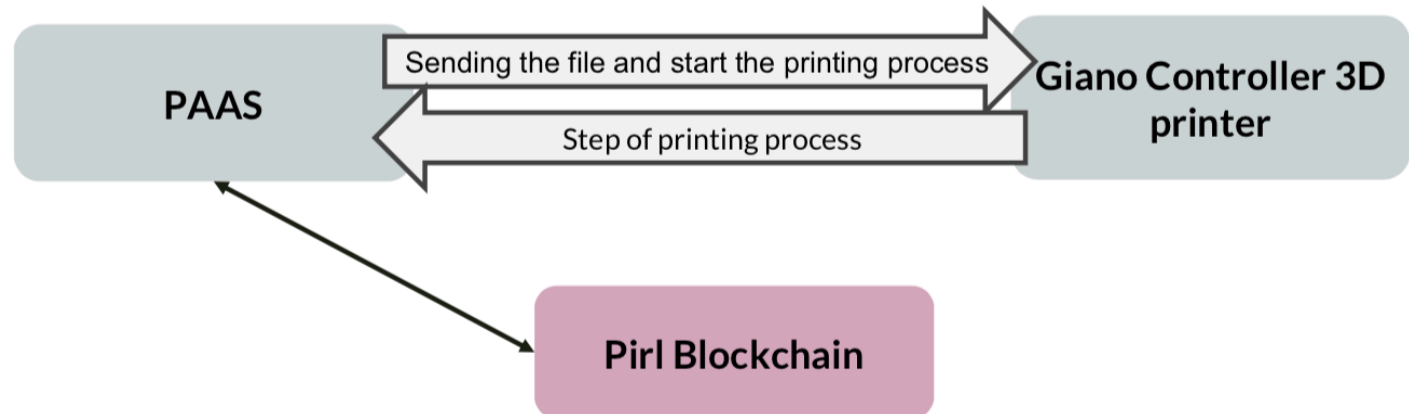
The use of raw materials is tracked by recording them on the blockchain, which the supplier will also use to certify the sending of materials, together with specific information such as quantities used and relevant characteristics.



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Certification of the production process

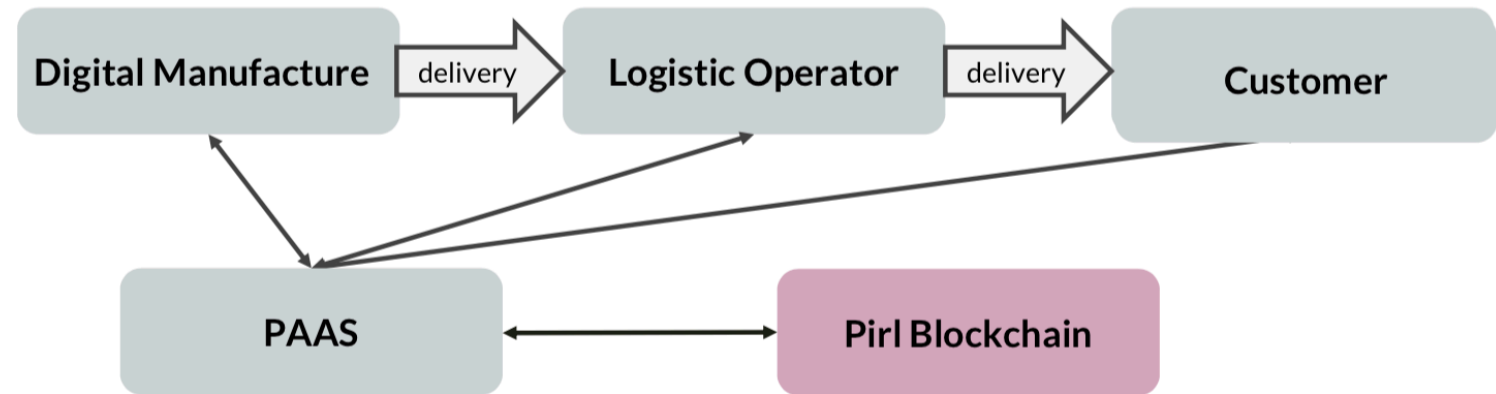
PAAS Manufacturing will certify every step of the production process, registering the product identifier and the start of the process on the blockchain. The Giano controller communicates to PAAS each processing step that will be recorded on the blockchain, associating this information with the product and manufacturer id and context information.



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Logistics

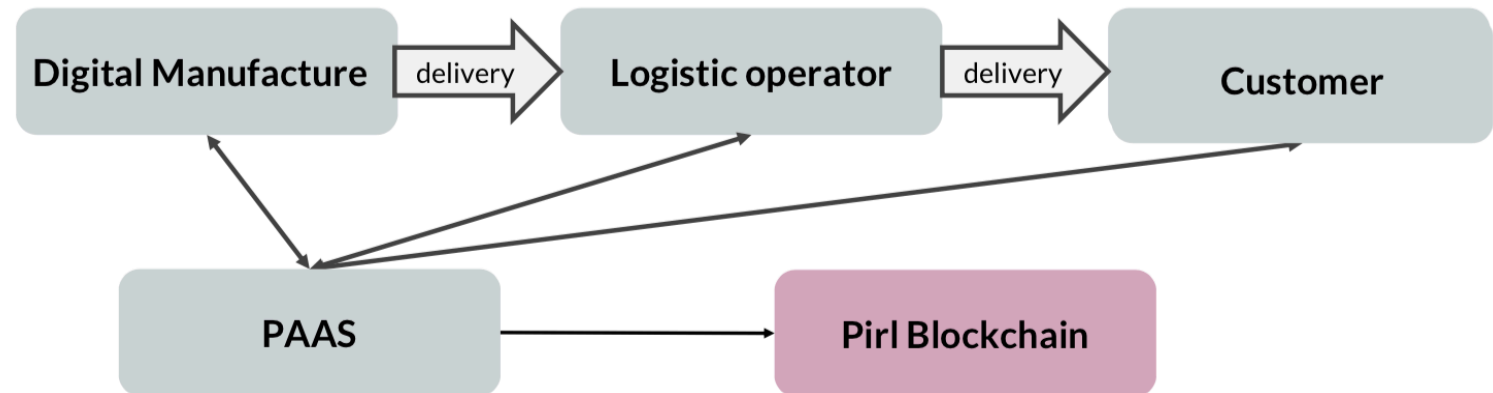
After processing, the Digital Manufacture sends the product to the Logistic Operator. This action is certified on the blockchain, associating it with the product ID and therefore with all its previous history already registered. Each stage of transport is certified by writing "where and when" on the blockchain until delivery.



THE BIG PICTURE

Verify of process

At any time, each of the actors involved, according to their security and profiling policies, can access the Blockchain via PAAS to check the information registered on the product. In this way, the players of the circuit including the customers can follow the whole life cycle of the product, being always informed on where it is, on the status and on when and where the work has taken place.



STATE OF THE ART

- We built the back-end (where the admin can manage/add/remove printers and files) of the platform and a Proof-Of-Concept of the front-end (where an user can register and request the print of a file)
- We developed a smart contract in order to:
 - **manage the TFL tokens.** Buy, sell, transfer and burn tokens.
 - **manage printers,** the smart contract owner can add or remove a printer. In the smart contract vision, a printer is represented by its owner address and it's used to send the TFL tokens when the printer is rented
 - **manage files,** the smart contract owner can add or remove a GCODE file. A file contains information about its price, its owner (saved as address where send TFL token each time a copy is printed) and the file URI. The file will be hosted on the IPFS provided by the storage Masternodes of the Pirl Network and the related functions currently available in the attached smart contract will be improved as soon as a beta version of the storage Masternode will be released.

SMART CONTRACT POC - addPrinter

- `addPrinter(address printer)`

- **Example:** `addPrinter(0x4b0897b0513fdc7c541b6d9d7e929c4e5364d2db)`

status	0x1 Transaction mined and execution succeed
from	0xca35b7d915458ef540ade6068dfe2f44e8fa733c
to	TFLToken.addPrinter(address) 0x0971b5d216af52c411c9016bbc63665b4e6f2542
gas	3000000 gas
transaction cost	49701 gas
execution cost	27021 gas
hash	0xa68ec93020cdd87cf6cfbd90aafbb0c3711b16a1ef9d3fdc0a13963c8ca54636
input	0xbdab05180000000000000000000000004b0897b0513fdc7c541b6d9d7e929c4e5364d2db
decoded input	<pre>{ "address printer": "0x4b0897b0513fdc7c541b6d9d7e929c4e5364d2db" }</pre>
decoded output	<pre>{ "0": "bool: success true" }</pre>
logs	[]
value	0 wei

SMART CONTRACT POC - balanceOf

- **balanceOf(address addr)**

- **Example:** balanceOf(0x14723a09acff6d2a60dcd77aa4aff308fddc160c)

from	0xca35b7d915458ef540ade6068dfe2f44e8fa733c
to	TFLToken.balanceOf(address) 0x0971b5d216af52c411c9016bbc63665b4e6f2542
transaction cost	23446 gas (Cost only applies when called by a contract)
execution cost	766 gas (Cost only applies when called by a contract)
input	70a0823100000000000000000000000014723a09acff6d2a60dcd77aa4aff308fddc160c
decoded input	{ "address ": "0x14723a09acff6d2a60dcd77aa4aff308fddc160c" }
decoded output	{ "0": "uint256: 7" }
logs	[]