
BC24

NOTE DE CADRAGE

Version **1.2**
23/06/2024



VERSION HISTORY

Version #	Implemented By	Revision Date	Approved By	Reason
1.0	Hugo Marques	12/06/24	Smart Traceability - Quentin T	Review with the project manager
1.1	Hugo Marques	22/06/24	Smart Traceability - Quentin T	Review with the full team
1.2	Hugo Marques	23/06/24	Smart Traceability - Quentin T	Last review - BC24 NFC Trace - Python module

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Introduction

Purpose of project charter

The BC24 project charter documents and tracks the necessary information required by decision maker(s) to approve the project for funding. The project charter should include the needs, scope, justification, and resource commitment as well as the project's sponsor(s) decision to proceed or not to proceed with the project. It is created during the Initiating Phase of the project. The intended audience of the BC24 project charter is the project sponsor and senior leadership.

Project and product overview

This project will be carried out by teams from the MIAGE of Paris 1 Panthéon Sorbonne. Teams will be composed of students from L3, M1 and M2.

The project runs from December 2023 to June 2024. At the end of the project, the student team will present the results to a jury composed of professors.

The ultimate goal of this project is to create a Proof of Concept for a traceability system in the meat industry.

Justification

Business need

Faced with the growing consumer demand for more transparency and traceability in the food supply chain, it is imperative for us to innovate and ensure rigorous tracking from production to distribution. We aim to implement a Proof of Concept (POC) for a meat supply chain tracking solution, from the farmer to the distributor, using blockchain technology, IoT sensors, and an intuitive web interface.

Objectifs

1. **Transparency and Traceability:** Provide full visibility into every step of the meat supply chain. Every participant, from breeder to distributor, must be able to track the progress of their products in real-time.
2. **Data Security and Reliability:** Ensure the integrity of information through blockchain technology, guaranteeing immutable data that is verifiable by all stakeholders.
3. **Process Improvement:** Optimize logistical processes and reduce losses through precise tracking and proactive resource management.
4. **Customer Satisfaction:** Meet consumer expectations regarding transparency about product origins and production conditions.

Scope

Objectives

BC24 aims to bring a renewal to the meat industry's supply chain by making it more secure thanks to blockchain technology while ensuring the transparency of the stored data. By adopting our solution, brands will see consumer trust grow.

The project is divided into the following key components:

NFC-Trace

- **NFC Tags:** NFC tags facilitate physical tracking of meat products from origin to consumer.
- **GPS Sensor:** Scanners are equipped with GPS sensors to provide geospatial traceability.
- **Temperature Sensor :**Scanners are equipped with temperature sensor to ensure quality and safety of meat products throughout the supply chain.

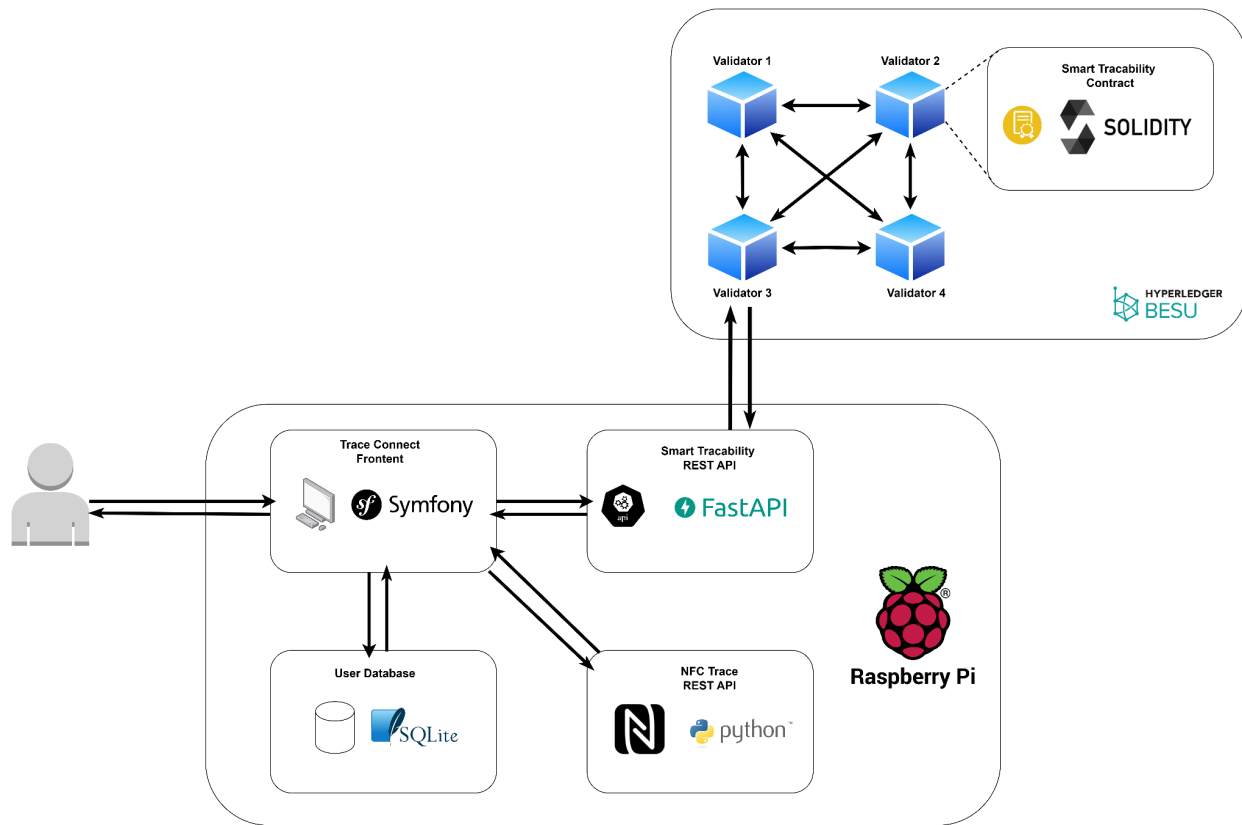
Trace Connect

- **Web Application:** A User-friendly web application designed for both consumers and stakeholders. This application will enable users to access detailed traceability information and product information.

Smart Traceability

- **Smart Contract / Traceable Tokens:** Development of a smart contracts to hold generated information and control the relevant information.
- **Blockchain Integration:** Integration on a private, gas-free blockchain, ensuring efficient and cost-effective infrastructure to ensure underlying traceability.

Architecture



Component	Description	Technologies	Environnement
NFC Trace	Describes a module and a REST API that will let the caller write to or read from a NFC tag. Additional functionality includes two modules to capture the temperature as well as getting the current GPS location directly from the Raspberry Pi.	Python REST API NFC Reader Sensor GPIO	Raspberry Pi (local)
TRACE CONNECT	Describes the graphical interface for the defined use cases. Interacts with all the different microservices.	Symfony PHP MySQL	Raspberry Pi (local)
SMART TRACEABILITY	Describes the smart contract and the REST API between the Blockchain and Trace Connect	Solidity Hardhat Python REST API Web3	Raspberry Pi (local) Hyperledger Besu (Cloud)

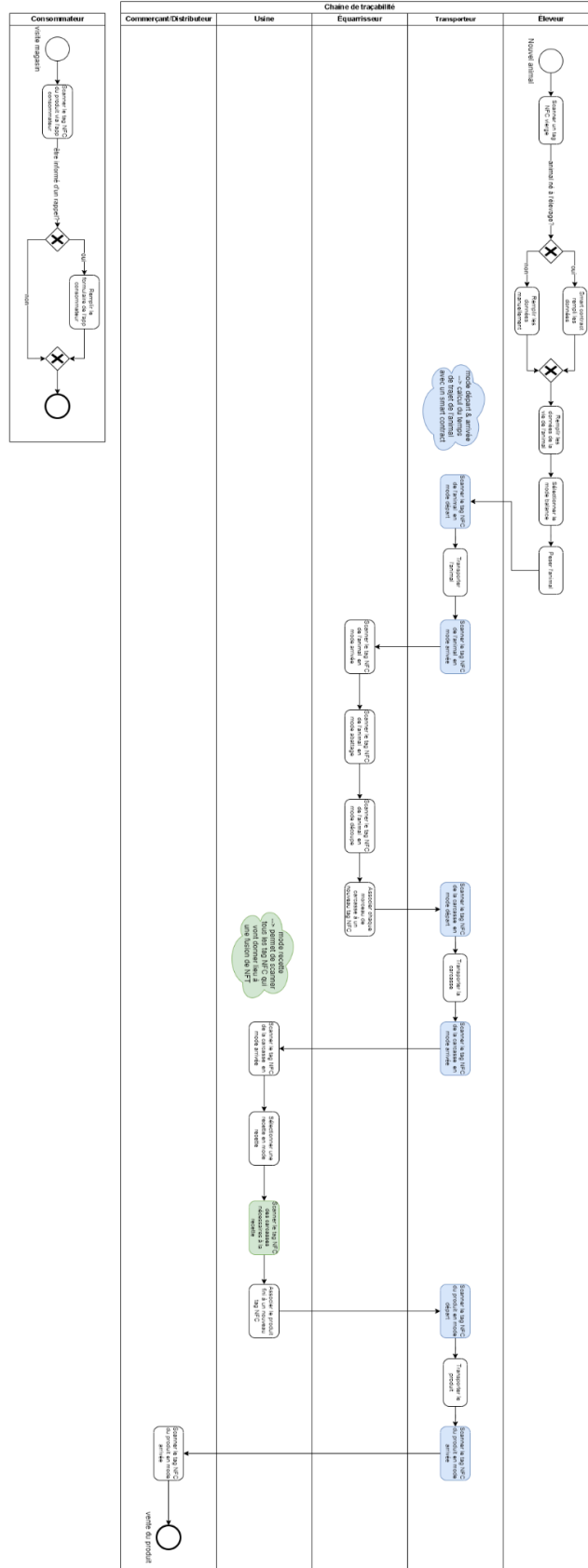
High level requirements

Use cases and personas

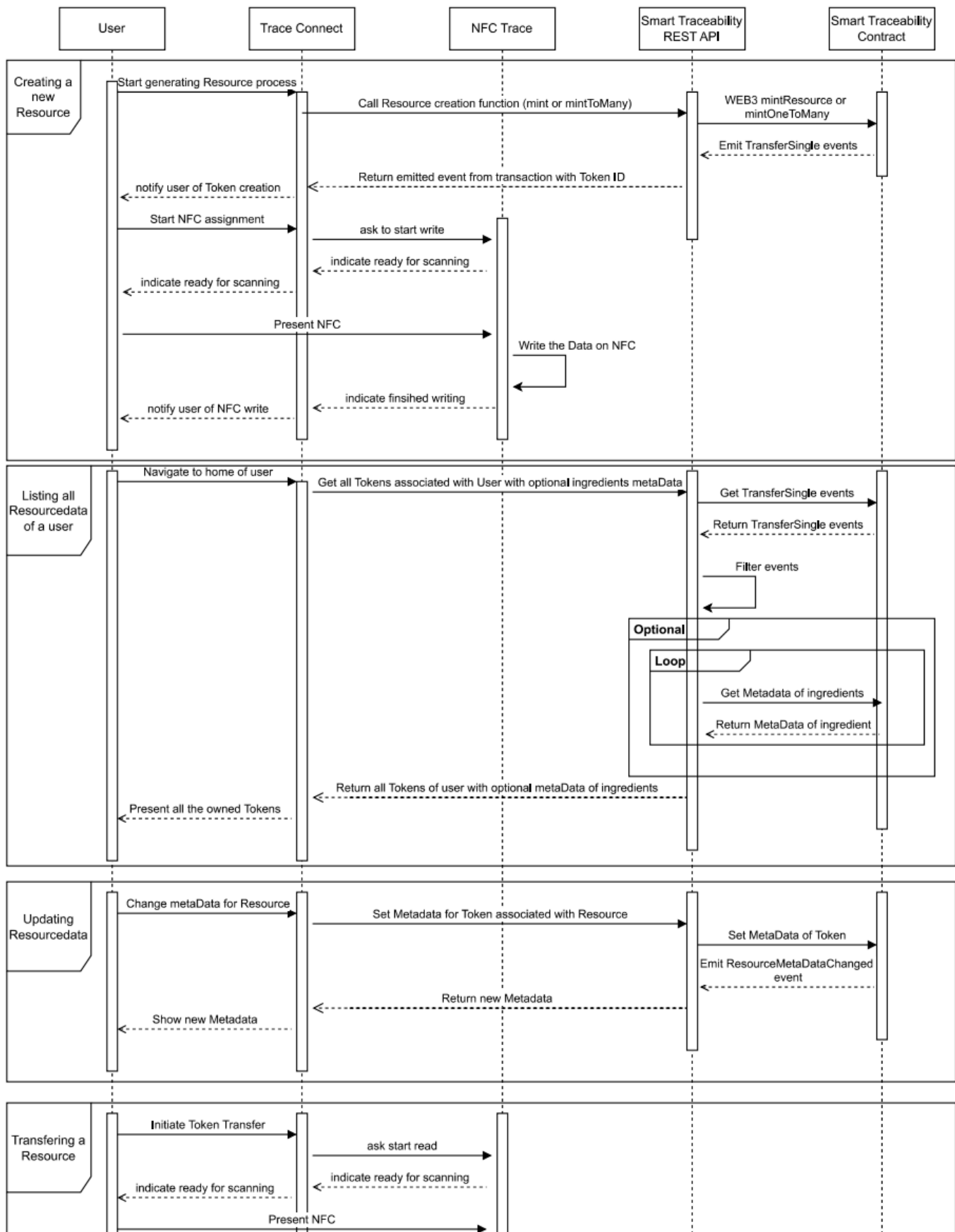
Actor	Activities	Subactivities	Functionalities
Breeder	Birth		Automatically fill in animal information (date of birth, breeding conditions, place of origin)
			Manually fill in the following information: gender of the animal
			Automatic attribution of NFT ownership to the breeder
	Arrival		Manually fill in animal information (all information mentioned above)
			Automatic attribution of NFT ownership to the breeder
	Health	Vaccine	Select a vaccine from a list, automatic filling of the vaccination date
		Diseases	Select a disease from a list, automatic filling of the vaccination date
		Weighing	Automatically fill in the animal's weight using an IoT scale
		Feeding	Manually fill in feeding information
Transporter	Arrival		Automatic attribution of NFT ownership to the transporter
	Departure		Automatically fill in the transport duration
Equarisseur	Arrival		Automatically fill in the following information: slaughterhouse approval number, country of slaughterhouse
			Automatic attribution of NFT ownership to the knacker
	Slaughter		Automatically fill in the following information: slaughter date
			Select the carcass species from a list
	Cutting		Automatically fill in the following information: cutting date
			Select the cut carcass part from a list
Factory	Arrival		Automatically fill in the following information: name of the factory, country of the factory
			Automatic attribution of NFT ownership to the factory
	Recipe		Select a recipe from a list
Distributor	Arrival		Automatic attribution of NFT ownership to the distributor

Digital version: [Requirements_actors](#)

General business process

Digital version: [Business Process](#)

High level sequence diagram





Deliverables

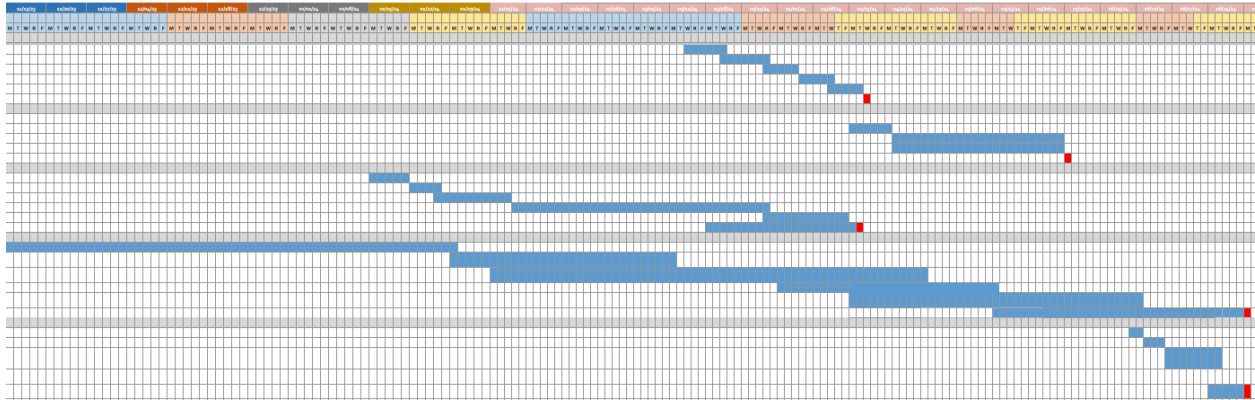
The following table describes the tasks each of the participating project teams had to work on. All communication and produced documentation is either in the corresponding Notion or in the Readme of the Github repository.

Major Deliverable	Deliverable Description	Responsible
M2 - Enterprise Creation		
Requirements	List of clear functional requirements to describe business needs <ul style="list-style-type: none"> • Notion 	Alix
BPMN of the solution	Description of the business process as well as the different stakeholders in the process <ul style="list-style-type: none"> • Notion 	Katia
M1 - Smart Traceability		
Blockchain	Deployment of a blockchain (local and cloud) which meets the business requirements set out by the M2 and which ensures security and traceability <ul style="list-style-type: none"> • github • Notion 	Etienne Paul-César
Blockchain REST API	Python API that enhances the communication with the smart contract and events from the blockchain <ul style="list-style-type: none"> • github 	Etienne
Database	Setting up a cloud instance to store the data we need to be accessible from any local web application.	Chadi
Projects Management	Ensure the coordination and progress of the projects of the different teams <ul style="list-style-type: none"> • Notion 	Quentin
Hardware	PCB design for garden friendly breakout integration Study of the material Connection Testing <ul style="list-style-type: none"> • Notion 	Hugo

Major Deliverable	Deliverable Description	Responsible
L3 - Trace connect		
Wireframes	Create Mockups prototype adapted to the needs expressed by M2, validated by M1. <ul style="list-style-type: none"> Figma Design 	Dan
Web application	The WebApp consists of two parts: <ol style="list-style-type: none"> 1. A user section, for consulting the information and traceability of any recourse and product in the production chain. 2. A business section, enabling the information required for traceability to be entered throughout the production chain, while facilitating management of resources for the various actors (breeder, transporter, slaughterer, manufacturer, distributor, admin) in the chain <p>These actors and their properties were defined by the M2 requirements.</p> <ul style="list-style-type: none"> github Notion 	Dan Quentin
L3 NFC-Trace		
Sensors - Team A	(IoT) Implementation of a Python component that communicates with several hardware modules and sensor connected to a Raspberry Pi. Sensors: NFC reader/writer, GPS sensor and a temperature sensor. <ul style="list-style-type: none"> Notion 	Nino Hugo
API - Team B	(IoT) Implementation the Python API that facilitates the interaction between the several modules / sensors and the web application. Additionally, ensure the security of the data stored in the NFC tags. <ul style="list-style-type: none"> Notion 	Alex Quentin
Integration Internship		
Raymond Internship	Integration of all aforementioned components <ul style="list-style-type: none"> Notion 	Raymond Quentin Etienne Hugo

Duration

Timeline



Digital version: [Timesheet](#)

Executive milestones

The table below lists the high-level executive milestones of the project and their estimated completion timeframe.

Executive Milestones	Estimated Completion Timeframe
requirements / specifications	26/01/2024
Prototype	05/02/2024
Hardware Familiarization / Raspberry Pi	03/04/2024
WebApp	17/04/2024
Hardware Interactions (Python)	17/04/2024
Blockchain & Smart Contracts	16/05/2024
Hardware Design	24/05/2024
APIs	27/05/2024
L3 APP Submission	27/05/2024
WebApp Integration	1/07/2024
Testing	01/07/2024

High-level alternatives analysis

Market Study

[Notion](#)

Meat Traceability:

1. <https://www.economie.gouv.fr/dgccrf/tracabilite-de-la-viande-bovine>
2. <https://www.la-viande.fr/securite-sanitaire/tracabilite-viandes>
3. <https://bovillage.eu/fr/tracabilite-des-viandes/>

Research papers:

1. https://www.viandesetproduitscarnes.fr/phocadownload/vpc_vol_37/Vol_3724_Blockchain.pdf
2. <https://www.reseaux-telecoms.net/actualites/lire-australie-la-blockchain-d-ibm-utilise-pour-la-tracabilite-de-la-filiere-viande-27717.html>

Deloitte's article tackling Blockchain impact on the Irish market:

- <https://www2.deloitte.com/content/dam/Deloitte/de/Documents/Innovation/Beefing-up-Blockchain-Meat-Supply-Chain-Transformation-Deloitte-2018.pdf>

Introduction

- The global demand for beef is increasing, with production set to reach 63 million tonnes and exports forecasted to grow by 5% to 10.5 million tonnes in 2018.
- Traditional supply chains need transformation to ensure end-to-end traceability, quality, and safety assurance.
- Technologies like Blockchain, Internet of Things (IoT), Augmented Reality, and Data Analytics can play a crucial role in achieving these goals.

Blockchain benefits for the beef industry

- Blockchain can provide transparency and assurance in food quality and safety.
- Six use cases identified for Blockchain in the beef industry:
 - **Grass Fed Assurance:** Ensuring cattle are raised on grass.
 - **End-to-End Traceability:** Tracking beef from farm to fork.
 - **Trade Finance:** Facilitating financial transactions.
 - **Consumer Engagement:** Enhancing consumer trust.
 - **Consumer Feedback Loop:** Gathering feedback.
 - **Certification:** Verifying quality and safety.

Assumptions, Constraints and Risks

Assumptions

This section identifies the statements believed to be true and from which a conclusion was drawn to define this project charter.

1. This project ensures the traceability of a piece of meat from the breeder to the distributor.
2. This project ensures the security of the supply/production chain.
3. This project allows different stakeholders to manage their goods.
4. The project is developed by all the project teams and the POC solution is functional

Constraints

This section identifies any limitation that must be taken into consideration prior to the initiation of the project.

1. Time: We are 5 teams with 5 different delivery dates.
2. Budget: see the cost table below

Item	Qantitty	Prix .u euro	livraison	facture	total
Raspberry 4+	5	70			350
micro HDMI	5	15			75
Breakout Garden	1	16,71			16,71
FreeNov	1	49,95			49,95
BE680	1	22,4			22,4
PA1010	1	35,1			35,1
PN532	3	12,99			38,97
HAT PN532	1	28,95			28,95
DB	1				0
PCB	1	2,89	12,82		15,71
TOTAL					632,79

3. Size of a smart contract: state machine solution.
4. Blockchain : gasfree
5. The L3 WebApp must be developed in Symfony PHP.
6. Solution must be dockerized in order to run on Raspberry Pi's side
7. Hardware: Communication protocols are standardized and may present conflicts.
8. Everything is local except the Blockchain and the database
9. Chip not breakoutgarden friendly : PCB prototype

Risks

Risk	Mitigation
ensure the Delivery Deadline / Quality of Deliverables	Project management and follow up and testing to be performed
Project Management: Changes in requirements	Teams must be flexible and capable of adapting to changing decisions
Communication and information issues	Teams must schedule frequent meetings with teams and sponsor to align
Team members may require significant time to learn and adapt to new technologies, which could delay project progress.	Schedule training sessions and workshops at the beginning of the project to familiarize the team with new technologies Encourage team members to share their learning and insights through regular knowledge-sharing sessions or documentation.
Delivery and quality of hardware components	Breakoutgarden extension or additionally cost
A team member may fall ill during the period they are supposed to complete their tasks	Have a second person planned who can take over the tasks and replace the ill person
Leak of knowledge management	Shared and centralized workspaces (Notion as a workspace and knowledges base) and reports meetings

Project organization

Roles and responsibilities

This section describes the key roles supporting the project.

Name & Organization	Project Role	Project Responsibilities
Nicolas Herbaut P1 Panthéon Sorbonne	Project Sponsor	Sponsor and technical guarantor of the proposed solution
Quentin Tambone M1 Smart Traceability	Projects manager	Project Manager ensuring teams progress: <ul style="list-style-type: none"> Framing : Implementation of rules, roadmaps, tasks, communication and follow-ups Delivery : Testing, reporting and validating
Florent Zheng M2 Création d'entreprise	Project manager	Project Manager ensuring progress of M2 Entrepreneurship Creation team: <ul style="list-style-type: none"> Ensuring satisfaction of business needs
Dan Kleczewski L3 Trace connect	Project manager	Project Manager ensuring progress of L3 Trace Connect team: <ul style="list-style-type: none"> Implementation of weekly L3 Trace Connect meetings Ensuring communication with Quentin T.
Nino Fazer L3 NFC Trace	Project manager	Project Manager ensuring progress: <ul style="list-style-type: none"> Implementation of weekly L3 NFC Trace meetings Ensuring communication with Quentin T
Alex SAM-YIN-YANG L3 APP NFC Trace	Project manager	Project Manager ensuring progress: <ul style="list-style-type: none"> Implementation of weekly L3 NFC Trace meetings Ensuring communication with Quentin T.
M2 Création d'entreprise <ul style="list-style-type: none"> Florent Alix Katia 	Members	<ul style="list-style-type: none"> Business requirement framing Market study

Name & Organization	Project Role	Project Responsibilities
M1 Smart Tracability <ul style="list-style-type: none"> • Paul-Cesar • Chadi • Etienne • Quentin • Hugo 	Members	<ul style="list-style-type: none"> • Monitoring team progress • Blockchain development • Testing • Integration • Hardware design
L3 Trace connect <ul style="list-style-type: none"> • Dan • Raymond • Seonho • Maké 	Members	Development of a the webapp with authentication and resource management
L3 NFC trace <ul style="list-style-type: none"> • Adrian • Aymeric • Angel • Khera 	Members	Reading and writing on NFC tag and using GPS and temperature sensor
L3 APP NFC trace <ul style="list-style-type: none"> • Elyahou • Alex • Omar • Katia 	Members	Implementation of an API ensuring the reachability of the hardware components
Raymong Zheng	Intern	Integrate the blockchain and the hardware to the webapp <ul style="list-style-type: none"> • Internship requirements

Stakeholders (internal and external)

Externe :

M2, the meat supply chain industry

Interne :

Dr. Nicolas Herbaut is the sponsor and ensures the technical coherence of the project.

Project charter approval

The undersigned acknowledge they have reviewed the project charter and authorize and fund the **BC24** project. Changes to this project charter will be coordinated with and approved by the undersigned or their designated representatives.

Signature:	TAMBONE	Date:	23/06/2024
Print Name:	TAMBONE		
Title:	Quentin TAMBONE		
Role:	Projects Manager		
Signature:		Date:	
Print Name:			
Title:			
Role:			
Signature:		Date:	
Print Name:			
Title:			
Role:			

Appendix: References

The following table summarizes the documents referenced in this document.

Document Name and Version	Description	Location
M2 Creation d'entreprise	<ul style="list-style-type: none">• compte rendu réunions• kanban / tasks	Creation Enterprise Notion
M1 : Smart Tracability	<ul style="list-style-type: none">• compte rendu réunions• kanban / tasks	Smart Traceability Notion
L3 : Trace connect	<ul style="list-style-type: none">• compte rendu réunions• kanban / tasks	Trace Connect Notion
L3 : NFC Trace	<ul style="list-style-type: none">• compte rendu réunions• kanban / tasks	NFC Trace Notion
Nicolas Herbaut	State Machine proposal	Blockchain Prototyping Notion
Github	WebApp APIs Blockchain Python modules	Organization Github