

Présentation basée sur le travail de G. Petit

Caractérisation et gestion de la valeur durable dans les chaînes de valeur agroalimentaires.

Application au cas d'une chaîne de valeur française de production et distribution de viande de porc.

Thèse soutenue le 11.12.2017

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<http://www.agroparistech.fr/podcast/Caracterisation-et-gestion-de-la-valeur-durable-dans-les-chaines-de-valeur.html>

Contexte de la recherche

- **Chaire SDSC**



- **Contractualisation SU–Terrena, filière porc Nouvelle Agriculture**

Un questionnement initial de ces organisations :

Au-delà de ces labels et actions entreprises, quelles informations mettre à disposition des consommateurs et par quels moyens?



Etape 1 : Analyse du contexte

- **1 : Traçabilité** : natures et formes des données transmises
 - Deux travaux d'analyse de la traçabilité, un audit traça de GS1 et une étude conduite sur bases d'interviews des acteurs

Information type -->	Functions		Nature of info	Data	Data today	
	Action	Object			# holds Today available info	# share with # Today shared info
#1 Animal feed supplier	Provide Formulate	Cereal Protein Mineral supplement	Water consumption Energy consumption Losses Productivity Nutritional quality Geographical origin	Quantities & origin of water Quantities & origin of Energy Quantities & nature of losses Quantity of raw material Quantity of product Analysis results Geographical information Varieties %OGM	Quantités et refs de produits vendus Provenance géographique des cultures OGM : oui/non	Quantités vendues --> #4 Provenance géographique des cultures --> (#4) Numéro de lot --> #4 Facture --> #4
#2 Genetic breeder	Select	Sow breed	Water consumption Energy consumption Losses Pork breed	Quantities & origin of water Quantities & origin of Energy Quantities & nature of losses Genetic information	Cartes d'identité des animaux sélectionnés = caractéristiques (rendement engrais,...)	Quantités vendues --> #4 Numéro de lot --> #4 Facture --> #4
#3 Vet/health material supplier	Provide	Vaccination Antibiotics Insemination material	Water consumption Energy consumption Losses Productivity	Quantities & origin of water Quantities & origin of Energy Quantities & nature of losses Quantity of raw material Quantity of product	Quantités et refs de produits vendus	Quantités vendues --> #4 Numéro de lot --> #4 Facture --> #4
#4 Weaner - Fattener	Bring Take care of effluents Need or buy Pilot and make decisions	Animal feed Animal water Animal healthcare Manure spread Mathanation Energy /electricity Water In his/her exploitation	Water consumption Energy consumption Losses Productivity Traceability information Pollutions (Margin?)	Quantities & origin of water Quantities & origin of Energy Quantities & nature of losses Quantity of raw material Quantity of product Lot number Quantities & nature og rejects	Courbe d'engraissement Numéro d'élevage Consommations d'eau partielles (facture) Consommations d'énergie partielles (factures) Conformité qualité de l'eau (analyses mairies)	Numéro d'élevage --> #5
#5 Slaughterhouse	Slaughter Handle meat maturation Handle first cutting	Porks Carcasses Meat	Water consumption Energy consumption Losses Productivity Traceability information Sanitary quality information Technological information Nutritional information Employees arduousness	Quantities & origin of water Quantities & origin of Energy Quantities & nature of losses Quantity of raw material Quantity of product Lot number Analysis results Absenteeism & work accidents	Numéro de lot Quantités abattues Temps de maturation Résultats analyse sanitaires Résultats observations vétérinaires Caractéristiques de la viande (TMP, gras,...) Consommations d'eau partielles Consommations d'énergie partielles	Numéro de lot --> #6 Caractéristiques de la viande (TMP, gras,...) --> #4
#6 Transformer	Handle final cutting Run transformation Run packing	Pieces of meat	Water consumption Energy consumption Losses Productivity Traceability information Sanitary quality information Technological information Nutritional information Employees arduousness	Quantities & origin of water Quantities & origin of Energy Quantities & nature of losses Quantity of raw material Quantity of product Lot number Analysis results Absenteeism & work accidents	Numéro de lot Quantités transformées Consommations d'eau partielles Consommations d'énergie partielles	Numéro de lot --> #7
#7 Carrier	Transport	Meat products From point A to point B	Water consumption Energy consumption Losses Traceability information	Quantities & origin of water Quantities & origin of Energy Quantities & nature of losses Lot number	Volume transporté Quantité d'énergie dépensée en transport Quantité de CO2 correspondant au transport	Numéro de lot --> #8
#8 Storer	Keep	Meat products During day 1 to day n	Water consumption Energy consumption Losses Traceability information	Quantities & origin of water Quantities & origin of Energy Quantities & nature of losses Lot number	Temps de conservation Température de conservation Volumes conservés	Numéro de lot --> #9
#9 Seller	Market	Product to consumer	Water consumption Energy consumption Losses Traceability information	Quantities & origin of water Quantities & origin of Energy Quantities & nature of losses Lot number	Pertes en linéaire Prix de vente Quantités vendues	Numéro de lot --> #10
#10 Consumer	Store Process Consume	Product	Water consumption Energy consumption Losses Utilisation process Appreciation	Quantities & origin of water Quantities & origin of Energy Quantities & nature of losses Qualitatives comments	Appréciation du produit Mode d'utilisation / préparation du produit "Histories" de consommations du produit Confiance dans la marque / le produit	Forums ? Réclamations client?

Etape 1 : Analyse du contexte

- **2 : Evolution des capacités des systèmes d'information liés aux transactions entre acteurs**

Standards de marquage utilisés pour identification automatique et la capture de données complémentaires (n° de lot, date expiration etc.), au format code-barres ou RFID

GS1 BARCODES

EAN/UPC



GS1-128



ITF-14



GS1 DataBar



GS1 DataMatrix



GS1 QR Code



GS1 Composite Barcode



GS1 EPC/RFID

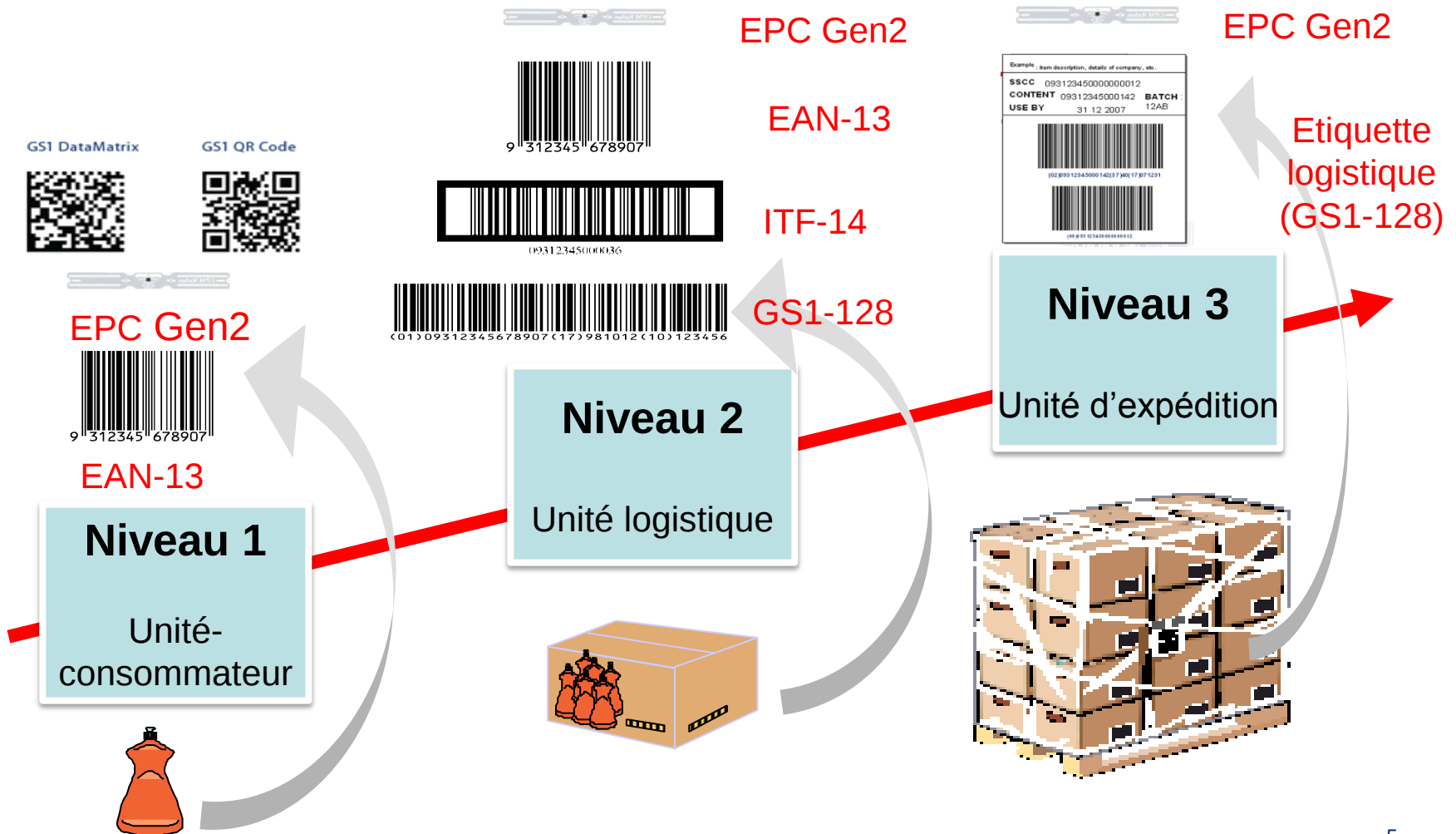
EPC HF Gen 2



EPC UHF Gen 2



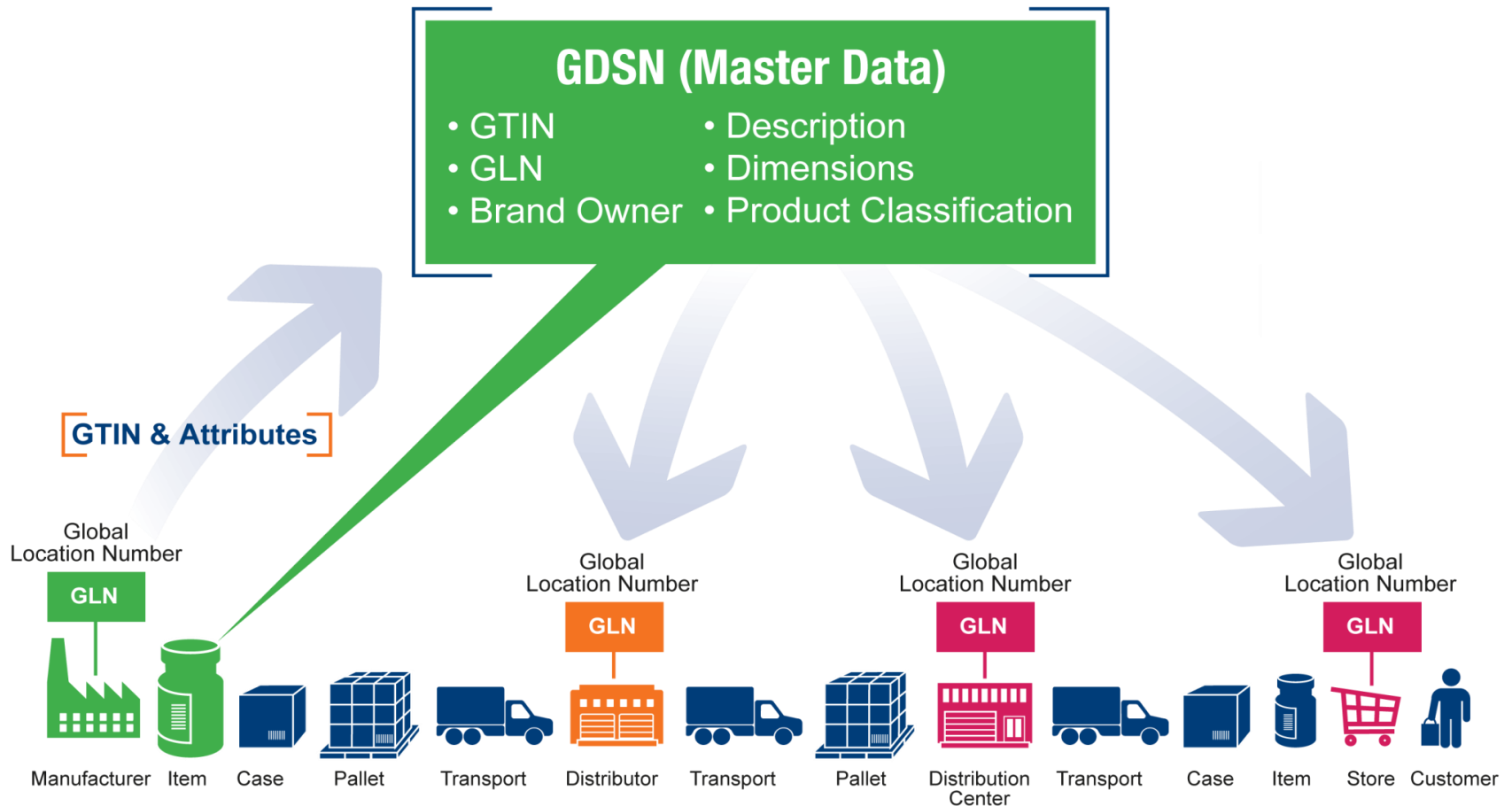
Etape 1 : Analyse du contexte



Etape 1 : Analyse du contexte

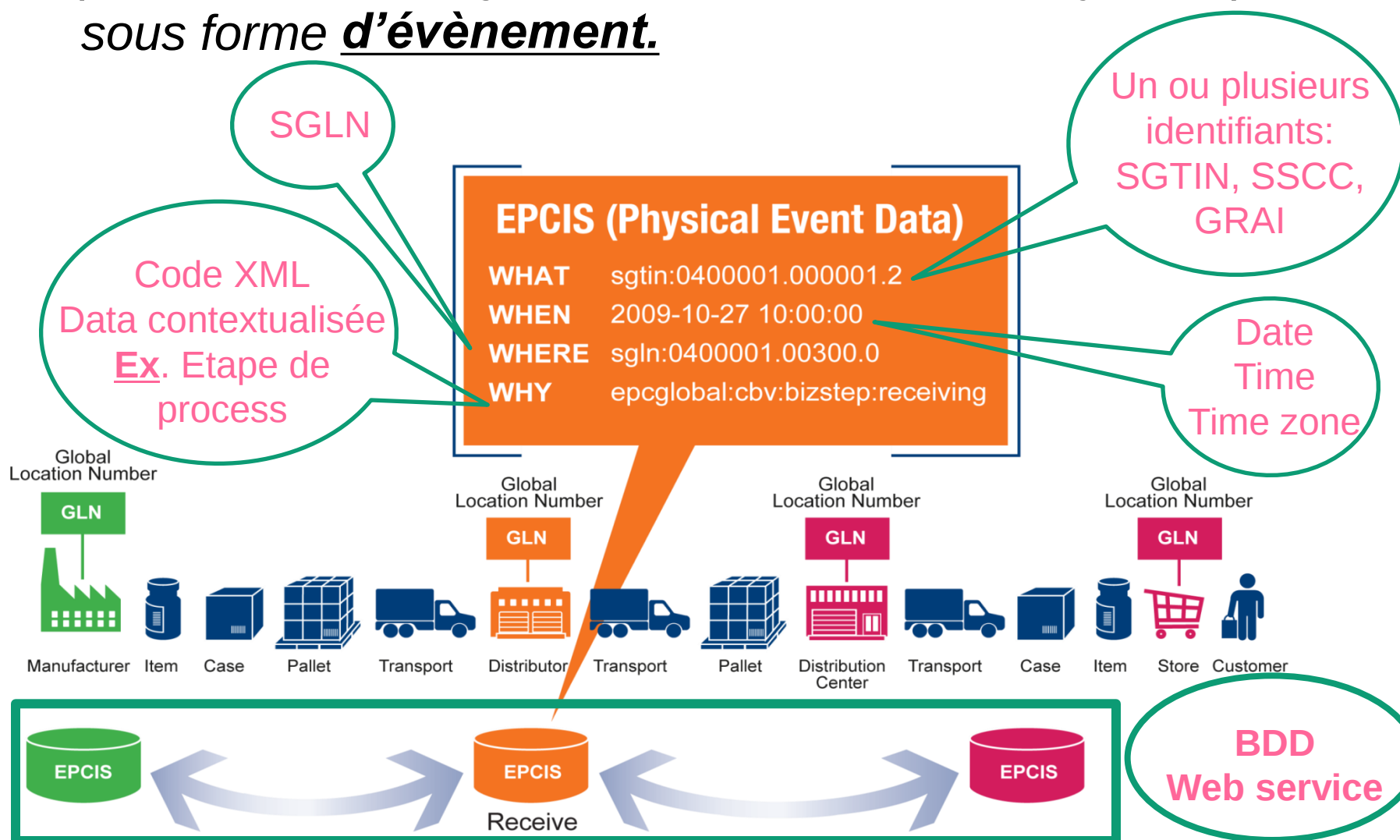
Industriel : « Publier une fois, diffuser à tous »

Distributeur : « Souscrire une fois, recevoir de tous »



Etape 1 : Analyse du contexte

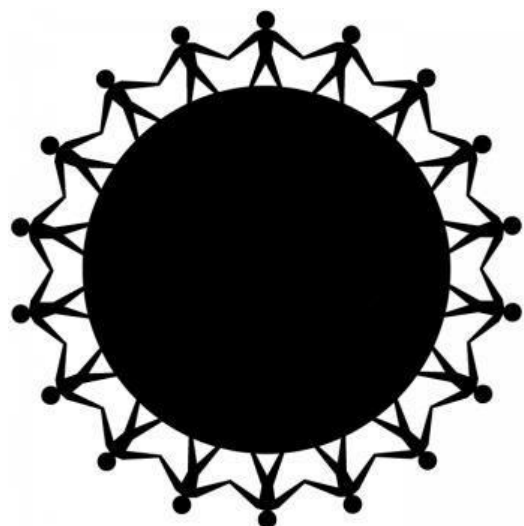
EPC : un ensemble de nouveaux standards qui permettent l'enregistrement de données dynamiques sous forme d'évènement.



Etape 2 : Analyse de la littérature

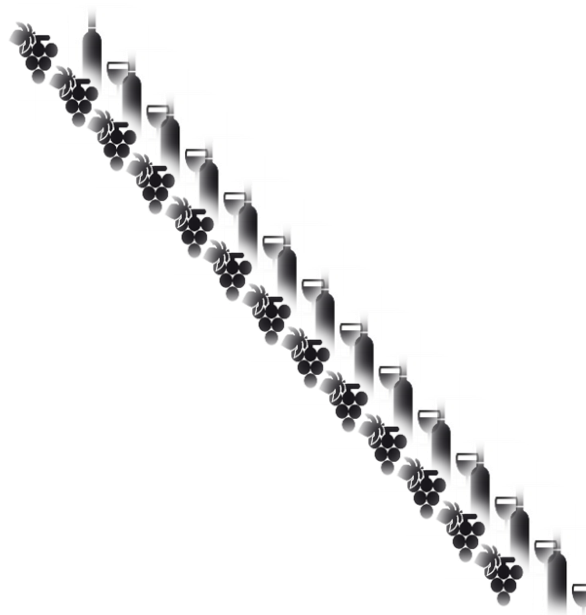
Innovation informationnelle et changements organisationnels : l'exemple de la traçabilité agroalimentaire informatisée.
Salançon, A. (2009).

6 études de cas analysées selon la théorie de l'acteur réseau.



Coopérative viti-
vinicole

Producteurs



Controverse

*Centralisation de l'information entre les mains de la cave =
asymétrie de l'information, déséquilibre du pouvoir*

Etape 2 : Analyse de la littérature

- **La gouvernance des relations entre acteurs des chaines de valeur :**

Dans le secteur alimentaire, la coordination verticale est généralement définie par un acteur dominant qui établit et contrôle les caractéristiques des produits et leur conformité aux normes. (Humphrey et al. (2006))

Deux « formes » d'acteurs dominants « **buyers driven** » et « **producer driven** » (cas des firmes de transformation à échelle internationale) ([Gereffi. Humphrey et al. 2005](#))

Trois situations qui modifient les coûts de transaction et donc l'intensité de la dominance :

- A. La complexité des informations et des connaissances à partager pour accomplir une transaction entre deux acteurs.
- B. Le volume d'information et de connaissances qui doivent être codifiées et échangées efficacement entre les deux parties sans surcoût de transaction.
- C. La capacité du marché des sous traitants à accomplir ces actions.

Etape 2 : Analyse de la littérature

- **Concept de durabilité dans les chaînes de valeurs alimentaires**

Travaux de Porter et al ([Porter and Kramer 2011](#))

« *The **concept of shared value** –which focuses on the **connection between societal and economic progress**- has the power to unleash the next wave of global growth* ». (p5)

« *There are three key ways that companies can create shared value opportunities :*

- *by **reconceiving products and markets**,*
- *by **redefining productivity** in the value chain,*
- *by enabling **local cluster development***». (p5)

Différentes publications illustrent la distance entre ces propositions et la réalité.
([Seuring 2013](#), [Seuring and Gold 2013](#))

Problématique

Création de valeur partagée	Porter	Valeur + avantage compétitif	2008
Chaîne de valeur	Goldberg, Porter, Haggblade, Gereffi; Raikes; Wallerstein	Commodity chain, filières globales, chaînes globales de valeur, réseau-filière	1968 ; 1885 ; 1991 ; 1994 ; 2000 ; 2011
Démarche individuelle > collective	Seuring	Sustainable supply chain management	2008, 2013
Démarches à dimensions + périmètre limités	Roy	ACV produits alimentaires	2009
Démarches à périmètre limité (site/produit)	Fortun-Lamothe	Evaluation DD exploitation cuni/avicoles	2008, 2010, 2014
	Ryschawy	Evaluation DD exploitation porcines	2009
	Craheix	Evaluation DD exploitations cultures	2012
	Busset	ACV filière olive	2012
Démarches à dimensions limitées (piliers)	Basset-Mens	ACV filière porc	2005
	Feschet	ACV sociale	2014
	Maloni	RSE	2006

- ❖ **Pas de modèle de gouvernance DD partagée vs CDV**
- ❖ **Pas a minima de modèle de mesure échelle CDV/trois piliers du DD (1^{ère} étape)**

Questions de recherche



- *Q1 Comment mesurer, évaluer et améliorer la valeur durable collective ?*
- *Q2 Comment permettre un pilotage collectif de la valeur durable en identifiant les données et les flux d'information à partager entre acteurs ?*
- *Q3 Comment faire adhérer tous les acteurs autour de l'harmonisation de leurs objectifs DD ?*

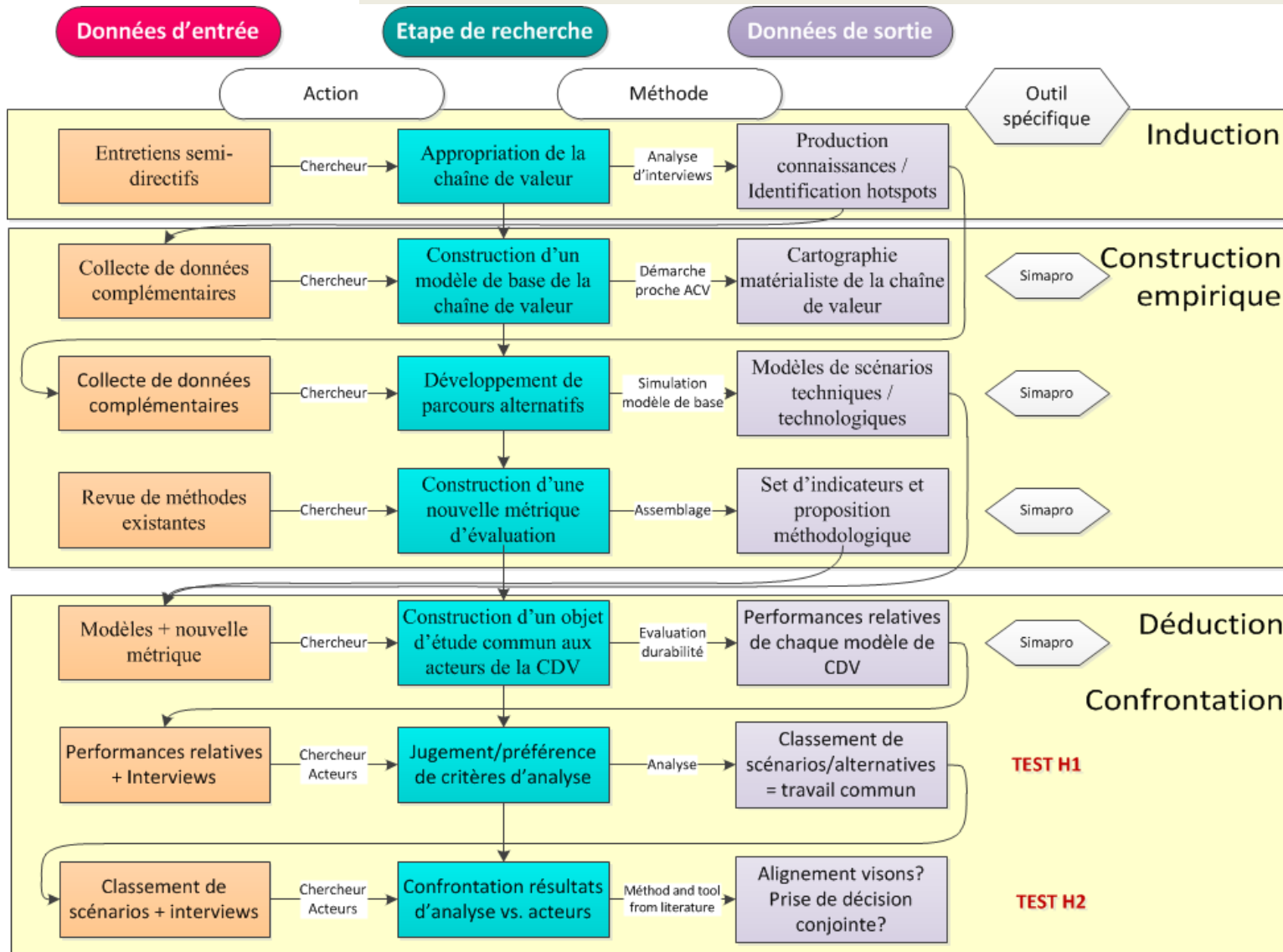
Hypothèses

H1. Disposer d'un outil de gestion commun facilite le travail conjoint sur la valeur partagée (vision commune).

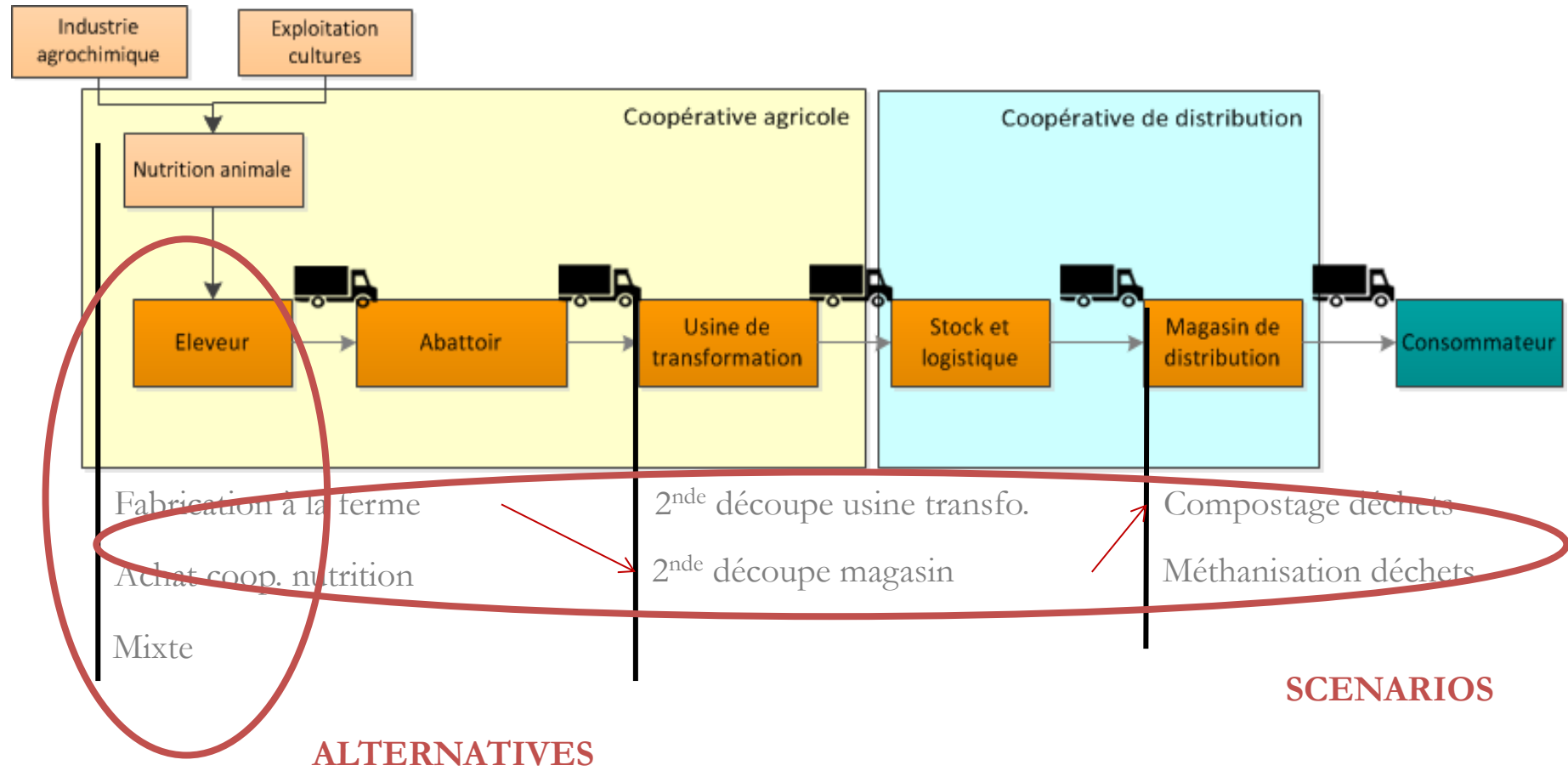
H2. Construire des scénarios alternatifs et les évaluer conjointement favorise une prise de décision collective (inclus cadre de mesure commun)

Outil de gestion « un conglomerat singulier, constitué par spécification de trois éléments de natures différentes mais en interaction: un substrat technique, une philosophie gestionnaire et une vision simplifiée de l'organisation » (Hatchuel et Weill, 1992)

Démarche de recherche



Une chaîne de valeur régionale



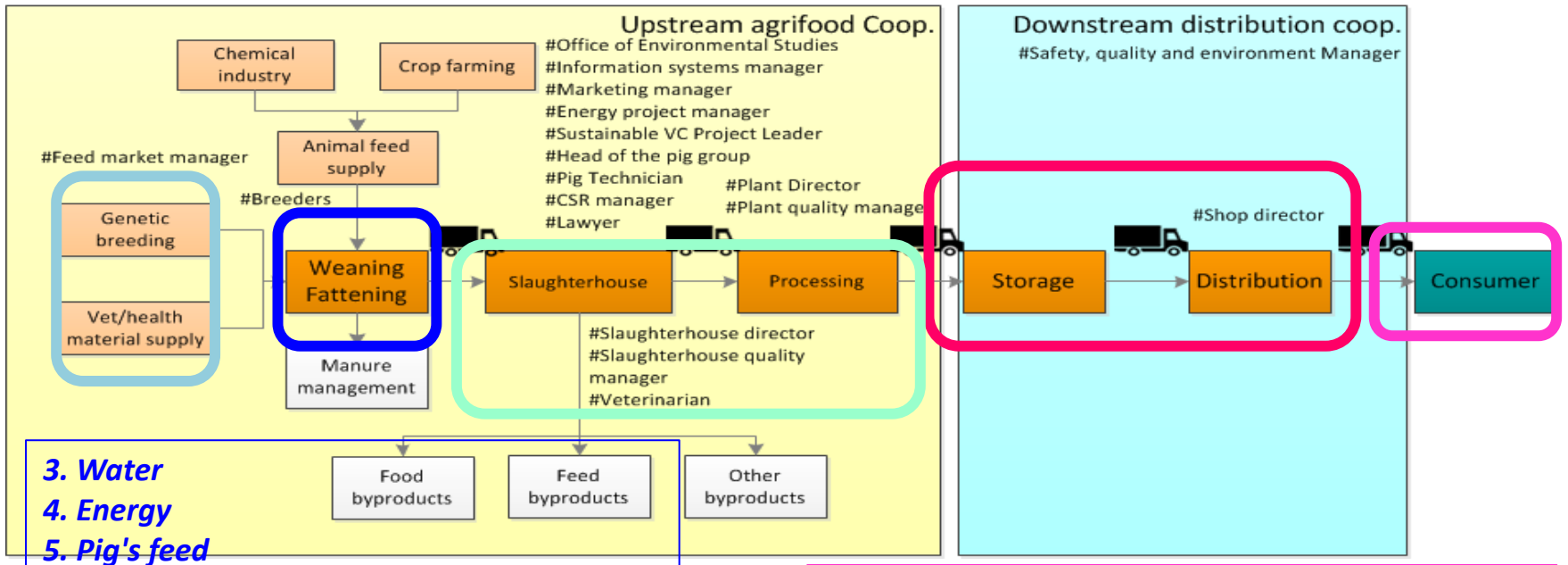
Résultats : Cartographie des hotspots

1. Biodiversity
2. Pig's performance

- 10. *Water*
- 11. *Byproducts Valorization*
- 12. *Consumer information*
- 13. *Workers welfare*

#Head of French Pig Agency

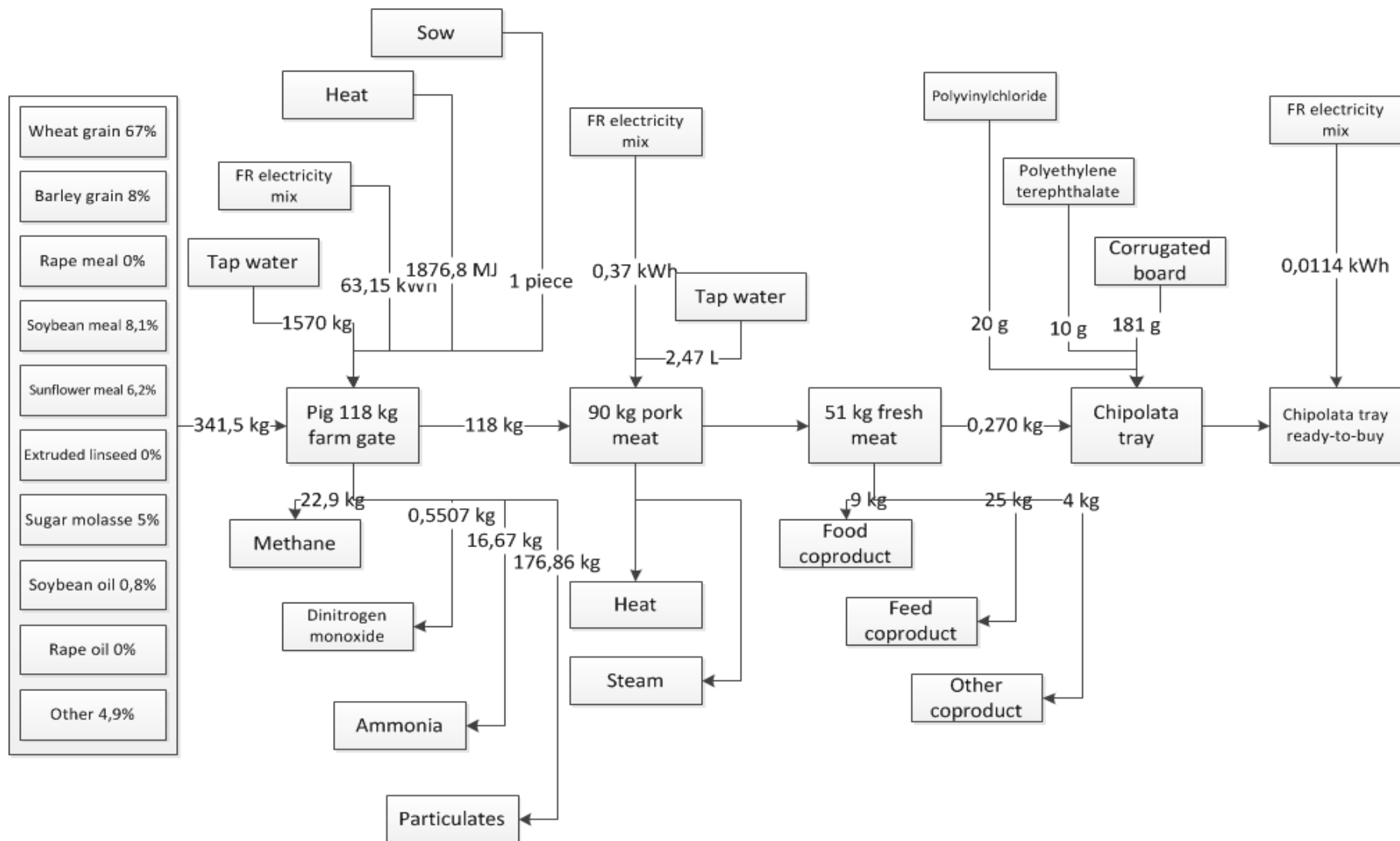
- 14. Water & energy**
- 15. Relationship with stakeholders**
- 16. Healthy and affordable food**
- 17. Equal opportunities**
- 18. Consumer information**



-
- ```
graph TD; A[] --> B[Food byproducts]; A --> C[Feed byproducts];
```
3. Water
4. Energy
5. Pig's feed
6. Pig's excretions
7. Animal welfare
8. Antimicrobial resistance
9. Economic health of the VC

19. Water and energy product implementation  
20. Healthy and affordable food  
21. Animal welfare

# Modèle de référence sur Simapro



# Nouvelle métrique : social

| Indicator                   | Hotspot | From | Expert opinions from interviews                                                                                                                                                                                                                              | Comment / further explanation                                                                                                                                                                                   | DPSIR |
|-----------------------------|---------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Carcass pH                  | 7       | GRI  | #Slaughterhouse director<br>"There is an interest [for actors] to know that pH24 is representative of a certain level of quality"<br>"We didn't wait for them to look after animal welfare"                                                                  | The more the animal is stressed, the higher the acid pH value of the meat due to the production of lactic acid.                                                                                                 | S     |
| Max transport without pause | 7       | GRI  | #Sustainable value chain Project Leader "<br>[Transport between farm and slaughterhouse] Should we not shorten certain cycles, play on the positioning of certain slaughterhouses, or on our supply, on how to organize collection rounds, things like that" | The animal is stressed during transport                                                                                                                                                                         | S     |
| Localness                   | -       | GRI  | #Slaughterhouse director<br>"On the social front, there is the will on the site to work on aspects tied to job pain points"                                                                                                                                  | Value related to the local features of the value chain and products. Indicator expressed in terms of percentage of local cereals (region) in the pig diet                                                       | S     |
| Farmer welfare              | 13      | GRI  | #Head of the French Pig Farming Agency<br>"You can't kill the farmer"                                                                                                                                                                                        | In the absence of a quality indicator to describe the "wellness" hotspot, a qualitative global rating is applied on the basis of a survey                                                                       | P     |
| Employee welfare            | 13      | GRI  | #Plant Director<br>"Employees think that their work is better valorized"                                                                                                                                                                                     |                                                                                                                                                                                                                 | P     |
| Biodiversity                | 1       | GRI  | -                                                                                                                                                                                                                                                            | Number of species included in the feeding recipe for pigs. In the absence of a good indicator, this one at least has the merit of addressing the issue and showing the value of describing this issue in future | S     |
| Sensory evaluation score    | 20      | GRI  | #Marketing manager<br>To come back, the consumer has to find another service with added value"                                                                                                                                                               | Study of a panel of consumers to assess perceived taste quality                                                                                                                                                 | S     |
| Omega 6 / Omega 3           | 20      | GRI  |                                                                                                                                                                                                                                                              | Refers to the health benefits of a better omega 6/omega 3 ratio in our diet                                                                                                                                     | S     |
| GMO feed ratio / formula    | 20      | GRI  |                                                                                                                                                                                                                                                              | Refers to the French rejection of GMOs, desire not to consume them, and therefore the perceived value of a food that does not contain them                                                                      | S     |
| Water losses after cooking  | 20      | Masc |                                                                                                                                                                                                                                                              | Study on finished product to describe the technological quality of the product and the related potential value                                                                                                  | S     |

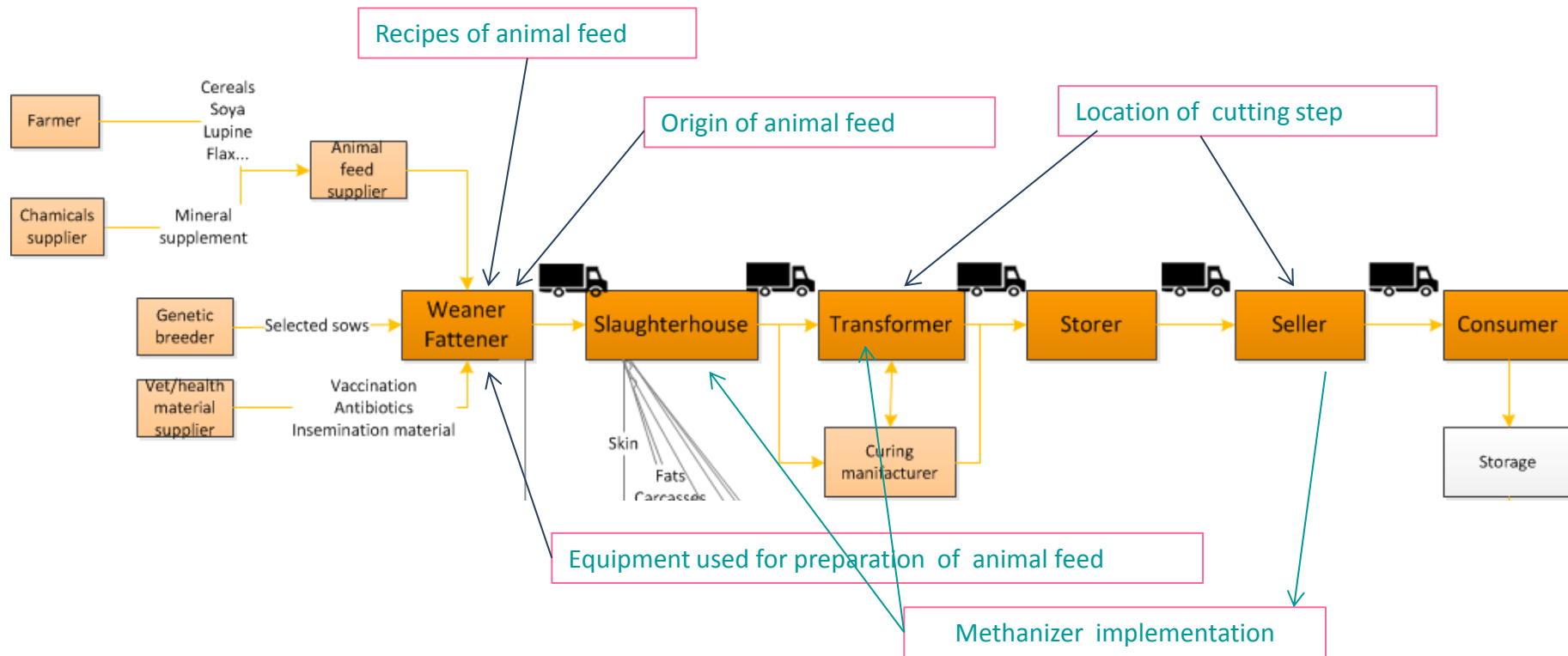
# Nouvelle métrique : économique

| Indicator                           | Hotspot | From | Expert opinions from interviews                                                                                                                                                                                                                                                 | Comment / further explanation                                                                                                                                                     | DPSIR |
|-------------------------------------|---------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Additional cost paid to the farmer  | 9       | Masc | <u>#Slaughterhouse director</u><br>"At one point, there is an added value generated for breeders to compensate for part of the incremental costs and part of the contribution to this sector. These extra costs, in discussion with [the other partners], can be redistributed" | An additional reward for the breeder in difficulty following the introduction of a new business model                                                                             | S     |
| Production valorization (loss rate) | 11      | GRI  | <u>#Head of the pig group</u><br>"Concretely, it is making process changes, raising people awareness, achieving recovery, consuming less"                                                                                                                                       | Direct financial loss related to the non-marketing of the product equivalent                                                                                                      | S     |
| Lean muscle percentage              | 2       | Masc | Informal discussions                                                                                                                                                                                                                                                            | Lean muscle percentage is directly used to calculate the compensation paid to the farmer. It is therefore a marker of the economic health of at least one link in the value chain | S     |
| Waste and losses rate               | 9       | GRI  | Informal discussions                                                                                                                                                                                                                                                            | Indirect financial loss related to the implementation of a fictitious product (unnecessary operating cost)                                                                        | S     |
| Number of hires                     | 9       | Masc | <u>#Head of the pig group</u><br>"That day, he hired someone to be able to come with us"                                                                                                                                                                                        | Number of hires throughout the value chain, linked to introduction of a new scenario or business model                                                                            | S     |
| Added work                          | 9       | Masc | Informal discussions                                                                                                                                                                                                                                                            | Extra workhours for at least one value chain actor                                                                                                                                | S     |
| Variation in labor cost             | 9       | Masc | Informal discussions                                                                                                                                                                                                                                                            | Variation (positive or negative) of the overall cost of labor related to the introduction of a new scenario or business model                                                     | S     |
| Short-term investment (€/t)         | 9       | GRI  | <u>#Slaughterhouse director</u><br>"It is necessary to implement ecological, social, societal aspects and not only to compensate in terms of investment (economic)"                                                                                                             | Short-term investments for the introduction of a new scenario or business model                                                                                                   | I     |
| Long-term investment (€/t)          | 9       | GRI  |                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                   | I     |
| Variation of cost-to-make           | 9       | Masc | <u>#Energy project manager</u><br>"One considers the economic motivation, to boost the industrial framework. The challenge is to control the costs"                                                                                                                             | Change in manufacturing cost offset to tray                                                                                                                                       | S     |

# Nouvelle métrique : environnemental

| Indicator              | Hotspot | From | Expert opinions from interviews                                                                                                                                                    | Comment / further explanation                                                                                                                                                                                                            | DPSIR |
|------------------------|---------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Climate change         | 3, 4, 6 | LCA  | <p>#<u>Energy project manager</u></p> <p>"Finally, we have a real coherence with the soul of the company, it is the impact of our activity on the local or global environment"</p> | <p>Mid-point indicator used to describe hotspots (water, energy, pig waste). The terminology of the hotspots and that used by the interviewee rely more on pressure indicators but are actually impact indicators (Recipe framework)</p> | I     |
| Terrestrial acidif.    | 3, 4, 6 | LCA  |                                                                                                                                                                                    |                                                                                                                                                                                                                                          | I     |
| Water eutroph.         | 3, 4, 6 | LCA  |                                                                                                                                                                                    |                                                                                                                                                                                                                                          | I     |
| Human toxicity         | 3, 4, 6 | LCA  |                                                                                                                                                                                    |                                                                                                                                                                                                                                          | I     |
| Freshwater ecotox.     | 3, 4, 6 | LCA  |                                                                                                                                                                                    |                                                                                                                                                                                                                                          | I     |
| Marine ecotox.         | 3, 4, 6 | LCA  |                                                                                                                                                                                    |                                                                                                                                                                                                                                          | I     |
| Land uptake—<br>agric. | 3, 4, 6 | LCA  |                                                                                                                                                                                    |                                                                                                                                                                                                                                          | I     |
| Land uptake—<br>urban. | 3, 4, 6 | LCA  |                                                                                                                                                                                    |                                                                                                                                                                                                                                          | I     |
| Water depletion        | 3, 4, 6 | LCA  |                                                                                                                                                                                    |                                                                                                                                                                                                                                          | I     |
| Fossil-fuel depletion  | 3, 4, 6 | LCA  |                                                                                                                                                                                    |                                                                                                                                                                                                                                          | I     |

# Illustrations de l'utilisation du modèle



- A. Full on-farm processed feed, rapeseed dominant
- B. Full on-farm processed fee , maize dominant
- C. Full purchased feed, rapeseed dominant
- D. Full purchased feed, soy dominant
- E. Mixed (part on-farm processed and part purchased), soy dominant
- F. Mixed, maize dominant
- G. Addition of linseed to the animal feed
- H. Methanizer shared between actors of the value chain
- I. Second meat cutting directly at the distribution shop
- J. Mixed feed, linseed addition, methanizer shared
- K. Mixed feed, linseed addition, methanizer shared, cutting at the distribution shop

# Respondents weighting

|       | Actor 1 |   | Actor 2 |   | Actor 3a |   | Actor 3b |   |
|-------|---------|---|---------|---|----------|---|----------|---|
| Soc1  | 4       | 2 | 3       | 5 | 3        | 2 | 2        | 2 |
| Soc2  |         | 2 |         | 5 |          | 2 |          | 2 |
| Soc3  |         | 5 |         | 2 |          | 3 |          | 3 |
| Soc4  |         | 2 |         | 3 |          | 3 |          | 3 |
| Soc5  |         | 2 |         | 3 |          | 3 |          | 3 |
| Soc5  |         | 5 |         | 3 |          | 3 |          | 3 |
| Soc6  |         | 4 |         | 5 |          | 2 |          | 2 |
| Soc6  |         | 4 |         | 5 |          | 2 |          | 2 |
| Soc7  |         | 4 |         | 5 |          | 2 |          | 2 |
| Soc8  |         | 4 |         | 5 |          | 2 |          | 2 |
| Soc9  | 1       | 1 | 2       | 5 | 2        | 2 | 2        | 2 |
| Soc10 |         | 3 |         | 3 |          | 5 |          | 5 |
| Eco1  |         | 1 |         | 5 |          | 2 |          | 2 |
| Eco2  |         | 3 |         | 3 |          | 5 |          | 5 |
| Eco3  |         | 4 |         | 2 |          | 2 |          | 2 |
| Eco4  |         | 3 |         | 2 |          | 2 |          | 2 |
| Eco5  |         | 3 |         | 2 |          | 2 |          | 2 |
| Eco6  |         | 4 |         | 3 |          | 2 |          | 2 |
| Eco7  |         | 4 |         | 3 |          | 5 |          | 5 |
| Eco8  |         | 2 |         | 5 |          | 2 |          | 2 |
| Eco9  | 5       | 2 | 4       | 2 | 4        | 4 | 4        | 4 |
| Eco10 |         | 5 |         | 4 |          | 4 |          | 4 |
| Env1  |         | 5 |         | 4 |          | 2 |          | 2 |
| Env2  |         | 2 |         | 4 |          | 4 |          | 4 |
| Env3  |         | 5 |         | 2 |          | 2 |          | 2 |
| Env4  |         | 5 |         | 2 |          | 2 |          | 2 |
| Env5  |         | 4 |         | 4 |          | 2 |          | 2 |
| Env6  |         | 4 |         | 4 |          | 2 |          | 2 |
| Env7  |         | 4 |         | 4 |          | 4 |          | 4 |
| Env8  |         | 4 |         | 4 |          | 4 |          | 4 |
| Env9  | 2       | 2 | 5       | 5 | 2        | 2 | 2        | 2 |
| Env10 |         | 2 |         | 5 |          | 2 |          | 2 |

A1: agricultural cooperative,  
A2: logistician,  
A3: store 1  
A4: store 2.

 Very important

 No important

# Results without weighting

|       | A         | B         | C         | D         | E         | F         | G         | H       | I         | J       | K       |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|---------|-----------|---------|---------|
| Soc1  | -5,4      | -5,4      | -5,4      | -5,4      | -5,4      | -5,4      | -5,6      | -5,4    | -5,4      | -5,6    | -5,6    |
| Soc2  | 8         | 8         | 8         | 8         | 8         | 8         | 2,8       | 8       | 8         | 2,8     | 2,8     |
| Soc3  | 15,9      | 35,0      | 93,5      | 91,0      | 48,5      | 84,9      | 91,0      | 91,0    | 91,0      | 15,9    | 15,9    |
| Soc4  | -2        | -2        | -2        | -2        | -2        | -2        | -5        | -2      | -2        | -5      | -5      |
| Soc5  | -2        | -2        | -2        | -2        | -2        | -2        | -5        | -2      | -2        | -5      | -5      |
| Soc6  | -9,7      | -6,3      | -6,0      | -5,3      | -11,3     | -7,0      | -6,3      | -5,3    | -5,3      | -9,7    | -9,7    |
| Soc7  | -6,02     | -6,02     | -6,02     | -6,02     | -6,02     | -6,02     | -6,34     | -6,02   | -6,02     | -6,34   | -6,34   |
| Soc8  | 10,7      | 10,7      | 10,7      | 10,7      | 10,7      | 10,7      | 3,8       | 10,7    | 10,7      | 3,8     | 3,8     |
| Soc9  | 7,5       | 7,5       | 7,5       | 7,5       | 7,5       | 7,5       | 0,9       | 7,5     | 7,5       | 0,9     | 0,9     |
| Soc10 | 15,45     | 15,45     | 15,45     | 15,45     | 15,45     | 15,45     | 13,2      | 15,45   | 15,45     | 13,2    | 13,2    |
| Eco1  | 0         | 0         | 0         | 0         | 0         | 0         | -10       | 0       | 0         | -10     | -10     |
| Eco2  | 1         | 5         | 5,9       | 5,9       | 1         | 5         | 4,55      | 5,9     | 5,9       | 1       | 1       |
| Eco3  | -60,9     | -60,9     | -60,9     | -60,9     | -60,9     | -60,9     | -61,9     | -60,9   | -60,9     | -61,9   | -61,9   |
| Eco4  | 1         | 5         | 5,9       | 5,9       | 1         | 5         | 4,55      | 5,9     | 5,9       | 1       | 1       |
| Eco5  | 0         | 0         | 0         | 0         | 0         | 0         | -13       | 0       | 0         | -13     | -13     |
| Eco6  | 0,17      | 0,25      | 0         | 0         | 0,335     | 0,335     | 0         | 0,5     | 0         | 0,5     | 0,5     |
| Eco7  | 3         | 4,5       | 0         | 0         | 6,25      | 6,25      | 0         | 0       | 0         | 3       | 3       |
| Eco8  | 24        | 24        | 0         | 0         | 18        | 18        | 100       | 20      | 0         | 144     | 144     |
| Eco9  | 8         | 8         | 0         | 0         | 6         | 6         | 0         | 0       | 0         | 14      | 14      |
| Eco10 | 30        | 39        | 0         | 0         | 31,3      | 38,5      | 0         | 43,5    | 0         | 73,5    | 73,5    |
| Env1  | 1 815 474 | 1 802 227 | 1 803 321 | 1 819 355 | 1 809 714 | 1 812 392 | 1 868 506 | 128 418 | 1 856 315 | 128 763 | 125 533 |
| Env2  | 8 882     | 8 727     | 9 047     | 9 114     | 9 204     | 9 432     | 10 551    | 5 023   | 9 626     | 6 045   | 6 031   |
| Env3  | 81        | 79        | 50        | 59        | 62        | 93        | 118       | 53      | 59        | 114     | 114     |
| Env4  | 2 433 286 | 2 421 922 | 2 240 300 | 2 270 810 | 2 157 413 | 2 199 149 | 2 288 051 | 220 041 | 2 267 413 | 104 266 | 83 417  |
| Env5  | 3 021     | 3 106     | 2 592     | 2 462     | 2 707     | 3 157     | 2 571     | 762     | 2 499     | 1 066   | 1 044   |
| Env6  | 916 151   | 904 334   | 776 651   | 734 365   | 707 373   | 712 825   | 760 476   | 101 246 | 744 318   | 72 952  | 55 471  |
| Env7  | 501 602   | 415 184   | 236 829   | 325 076   | 318 773   | 274 965   | 427 068   | 325 076 | 314 857   | 422 840 | 422 692 |
| Env8  | 614       | 660       | 368       | 192       | 210       | 210       | 216       | 192     | 139       | 203     | 118     |
| Env9  | 29 715    | 29 002    | 12 639    | 9 973     | 14 345    | 26 875    | 9 843     | 3 170   | 9 560     | 7 449   | 7 432   |
| Env10 | 549 687   | 549 122   | 550 504   | 552 019   | 547 919   | 552 210   | 567 459   | 18 905  | 565 505   | 16 379  | 15 292  |

# Results

|            | A     | B     | C     | D     | E     | F     | G     | H     | I     | J     | K     |
|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Actor 1    | 35,01 | 34,87 | 31,68 | 31,76 | 28,60 | 34,47 | 32,88 | 23,99 | 31,76 | 20,12 | 16,85 |
| Actor 2    | 40,32 | 39,64 | 33,08 | 34,66 | 32,54 | 38,07 | 34,68 | 27,13 | 33,90 | 24,31 | 20,68 |
| Actor 3a   | 30,64 | 30,26 | 26,78 | 28,43 | 24,45 | 30,31 | 29,15 | 19,63 | 28,73 | 17,32 | 14,29 |
| Actor 3b   | 16,16 | 16,80 | 14,73 | 15,38 | 13,88 | 16,76 | 14,41 | 12,58 | 15,50 | 10,51 | 9,30  |
| Unweighted | 3,11  | 3,28  | 2,78  | 2,84  | 2,74  | 3,21  | 2,61  | 2,56  | 2,82  | 2,13  | 1,92  |

*Aggregated indicators value considering all different data acquisition and processing stages*

# Traitement des hypothèses

- **H1. Disposer d'un outil de gestion commun facilite le travail conjoint sur la valeur partagée** (*validée*)
  - Objet de travail commun
  - Set d'indicateurs compilés et non-contextualisés = aucun dialogue possible vs. référentiel commun
  - Rendre compte des impacts des innovations possibles sur la durabilité de chaque acteur et de façon globale
  - Notion de transmission de l'information à la bonne échelle (données pertinentes, agrégées)

# Traitement des hypothèses

- **H2. Construire des scénarios alternatifs et les évaluer conjointement permet la prise de décision collective**

*(partiellement validée)*

- Sensibilité des indicateurs vs. alternatives/scénarios
- Confrontation partielle avec les acteurs, objectif de prise de décision non atteint
- Outils de gestion conjointe proposé mais non implanté et/ou assimilé

Merci de votre attention

## The eco-design and eco-innovation concepts

- **Eco-design:** a well-established concept
  - *“Integration of environmental aspects into product design and development, with the aim of reducing adverse environmental impacts throughout a product's life cycle.”* [ISO 14006:2011]
- **Eco-innovation:** a polysemic term
  - *“a new product, process or service, development (NPD) process that provides significant environmental performances”* [Fussler & James 1996].
  - Ill-understood concept with many theoretical uncertainties [Andersen 2008]
  - Inventory of 16 definitions related to eco-innovation and sustainable innovation [Carrillo-Hermosilla et al. 2010]

# The eco-design and eco-innovation concepts

- Divergent viewpoints about eco-innovation:
  - **Intensity** of the eco-innovation
    - radical / incremental [Baroulaki, 2007]
  - Integration of the **social aspect** in the scope of the eco-innovation [Cucuzella,
    - Difficulty to clarify the similarities and differences between eco-design and eco-innovation.
    - Difficulty to draw a clear boundary between these two concepts.
- Surveys on industrial implementation of eco-innovation are scarce[Santolaria et al. 2011; Bocken et al. 2014]