Role play

Isocycling horticultural used plastic films

Session Schedule (Duration: 3h30)

9:00 – 10:00: Theoretical perspectives (circular economy and business models) (60 min.)

10:00 – 10:45: Developing sustainable business models (45 min.)

- N groups of 6 to 14 participants.
- Participants receive a card corresponding to one of the 5 roles.
- Their card specifies whether they will participate in the development of the business model of organization A (Agriplast) or B (horticultural farmers).
- An "Organization" sheet of the BM^3C^2 framework, in A2 format, is made available to each group.
- Their mission is to complete the sheet in order to develop, as a first step, a sustainable BM.
- Each participant's role card contains information to develop the business model.

10:45 – 11:00: break (15 min.)

11:00 – 12:15: Developing circular business models (75 min.)

- A "Connection" sheet of the BM^3C^2 framework, in A2 format, displaying the possible connections between business models, is communicated to all participants.
- The two previous "Organization" sheets are placed on either side of the "Connection" sheet.

> Brainstorming by role (30 min.)

- Everyone with the same role card comes together and reflects on the following elements: what are their needs, fears, interests and temptations for not playing within the rules of the game of the project?
- They develop proposals to connect the different business models which are to be presented in a plenary session.

> Debate (45 min.)

- Each group of actors presents its proposals with regard to its given "role". The other participants react according to their needs, fears, interests and temptations (as in the FAcT-Mirror© Method) and their emotional state (although not explicitly stated, each role card relates to one of Edward de Bono's six thinking hats).
- To avoid the debate taking too long, it is possible to ask the other roles to vote for the different proposals (tokens from 5 to -5) and to give an explanation of their votes.
- On the central "Connection" sheet, write the ideas agreed upon as they are validated.
- Also provide a "sticking points" form (and why not take the time to run a small session on "removing objections".

15:15 – 12h30: Results (15 min.)

Participant roles

Business model of organization A	Business model of organization B
Horticultural farmers → emotions (red)	A.D.I.VALOR → Neutrality (white)
The Cooperative → Organization (blue)	Agriplast → Creativity (green)
A.D.I.VALOR → Neutrality (white)	PlastiRecycl → Pessimism (black)

Roles of trainers-facilitators:

- represent the competitiveness cluster that supports the "isocycling" project for plastic films for horticultural farmers,

- oversee the debate.

Allocation of roles in a group of 14 participants:

Business model of organization A	Business model of organization B
Horticultural farmers (4)	Agriplast (4)
Cooperative (2)	PlastiRecycl (2)
A.D.I.VALOR (1)	A.D.I.VALOR (1)

Role card n° 1

Claude Lamâche, horticultural farmer in the Nantes region

You have taken over the family's horticultural business from your father and are proud to be the descendant of a long line of horticultural producers from Nantes. A specialization of their activity allowed the horticultural farmers from the Loire-Atlantique region to become national – even European – leaders in the production of lamb's lettuce, an early leek variety, radish, cucumber and the lily of the Valley, and that's a big deal!

It must be said that the geographical region around Nantes offers favorable conditions for horticultural farming: a mild climate, plenty of water with the nearby Loire river, and sandy soils conducive to the growing of vegetables. Naturally, horticultural farmers have succeeded in taking advantage of these natural resources to provide quality products. Their specialty is the production of a variety of early vegetables that can be sold at a good price because they are still scarce in early spring.

Two techniques enable the farmers to obtain early produce. First, cultivation is practiced on a sand bed in butted planks to avoid the stagnation of water, which is harmful to vegetables. The sand planks are then covered to protect the vegetables from the weather and diseases, and to hasten their growth. Today, the small semi-forcing tunnel known as the "Nantes tunnel" is the most commonly used coverage and it consists of a polyethylene film stretched over the tunnels' arches. This film must allow light to pass through to enable photosynthesis, indispensable to the growth of the vegetables. It must also be very resistant to avoid tearing during its mechanical installation and removal, or in the event of a storm. The perishability of vegetables has an impact on the stages of production. To ensure they remain fresh, there are constraints in terms of deadlines between the harvesting, washing and shipping dates.

Your business comprises eight main activities: 1) supply (seeds, sand, semi-forcing film), 2) sowing, 3) harvesting, 4) control, 5) sorting, 6) washing, 7) packing, and 8) shipping. The films you use for your tunnels are laid out in the "horticultural strips" (plots) and are used only once for three to ten weeks, from September to March. In the winter, two or three crop cycles can be grown on the same strip. The films are removed immediately before harvesting. They are covered in water (rain, dew, frost), sand and soil. In the past, films that were worthless after use were incinerated or buried. Since these practices were banned in the early 1990s, they are now recycled in a nearby factory. As a result, films are now bought new and then resold to be recycled after use. You occasionally joke about this with your buddies, saying you sell vegetables and plastic films! Jokes aside, although selling these films brings in only a little supplemental income, this income is much appreciated and helps you through. It is therefore important for you to exploit it in the best possible manner.

A few months ago, Mario from the agricultural cooperative asked you to take part in a project named SMART. The letters mean something, but it was something in English so it's impossible to say exactly what. However, you understood that the objective of the project is to develop, at your farm, a local and circular production chain of recycled horticultural plastic films that you can reuse in your plots. You laid down your conditions right from the first meetings: the films' resistance and transparency must be guaranteed and they must be cheaper than new films.

A few weeks ago, the first film samples were placed on your plot to allow you to observe them under real conditions. At the technical level, you found that the new plastic films performed exactly the same as the films you used before. However, you are very disappointed. You have just found out that the price of the spools will remain unchanged. The semi-forcing film spools actually represent your third most costly charge (several tens of thousands of euros!) after wages and sand, so you worry about their cost. Moreover, the eco-contribution used to finance their recycling is constantly on the rise. At this rate, you'll be forced to close shop!

As much as you understand the interest for Agriplast, the industrial partner, to use recycled plastics, you do not see what this will change for you. Yes, the change is mostly symbolic: unlike today, your used films will no longer end up as trash bags. But good feelings alone will not get you through the month!

So you tend to skip some of the project's meetings: you run a small business and your lamb's lettuce is waiting for you! Because of a lack of time, you have your feet firmly on the ground and you prefer concrete activities to discussions and endless debates in meeting rooms, especially when today's weather and market are not good for business.

Last night, you almost called Mario to tell him you were pulling out of the project. But then you felt a tinge of regret: it's true that your used plastic films could be put to better use...

But you don't have a good feeling about Agriplast. The company proposed a complicated system of renting films, adding a multi-year contract into the bargain. As a result, you can no longer pit plastic vendors against each other every year to buy the cheapest possible spools. You're not going to get stuck in a relationship with someone who sells recycled spools at the price of new ones, are you?

In 2015, you had already noticed a sharp rise in the price of the films, even as oil prices – from which they are made - were low. The price opacity does not inspire your confidence and encourages you to try and maintain control over your films in order to put them to better use.

Moreover, you consider that a semi-forcing film is a disposable single-use product. So you do not really understand the idea of "pay per use". Not only will it cost you more, you will no longer be able to sell your by-product.

In any case, you are reluctant to engage in a long-term contract with a single supplier while you yourself are unsure of your activity's future, even in the short term, given the weather and market risks.

The icing on the cake was when the girl from Agriplast said at the last meeting that your films were "very soiled". Your films are very clean! One only has to look at the state of the mulching films. The only reason you are here today is because the partners of the SMART project decided to organize a day to discuss and compare the different viewpoints between horticultural farmers and plastic vendors in order to envision solutions acceptable to each party.

Role card n° 2

Mario Mutualisi, President of the agricultural cooperative

For 2 years now, you have been the elected President of an agricultural cooperative of horticultural farmers from the Nantes region. A former farmer, you know everything about the job. If you were to assess your two-year Presidency, you would say that the experience has allowed you to look at the sector from a different perspective. You feel that you have a better understanding of the issues and global challenges to overcome.

210 horticultural farms cultivate approximately 30 plant species on an open field measuring 4 800 ha, as well as under 400 ha of large plastic houses and 125 ha of heated greenhouses. They employ 4,000 full-time employees and have a turnover of 300 million euros. They produce between 30,000 and 35,000 tonnes of lamb's lettuce annually, which represents 85% of the domestic production and 50% of the European production. Horticultural farmers have mastered cultivation on sand beds in butted planks and the skillful management of their coverage in order to obtain early vegetables. They also have the logistical skills necessary to deliver fresh vegetables all over Europe.

Horticultural farming is far from easy. In addition to working the land, there are also unfavorable weather conditions, market fluctuations, and the large retail food distribution chains with whom one must always haggle.

Given the competition with each other to market their vegetables, farmers have joined forces to make cheaper purchases, such as for semi-forcing films, distributing their produce or defending their interests. In this regard, their trade union, the FMN (Federation of the Horticultural Farmers of Nantes), perfectly fulfils its role.

In particular, farmers need to come together to protect their horticultural holdings, now coveted because of the expansion of the urban area of Nantes and because sand has also become highly sought after by the construction industry.

At the head of specialized firms firmly implanted within a specific region, horticultural farmers are sometimes too close to each other (same job, same working environment), and this may hinder certain innovations. You think it's a shame and you believe that it would do the farmers good to stop focusing on their core business and consider new ways of exploiting their resources and skills.

That is why you were excited when the structure managing the strategic issues of the sector, spoke to you about the SMART (Sustainability, Material, Agreement, Recycling, Together) project, an innovative project in the field of circular economy certified by a competitiveness cluster dedicated to vegetal) and financed by the Pays de la Loire Region. You immediately called Claude Lamâche, a dynamic young horticultural farmer, to ask him to participate in the experiment.

In your daily activity, you act as an intermediary between suppliers (plastic vendors, seed producers...) and horticultural farmers: each farmer buys a few hundred spools of semi-forcing films from you annually for no less than the tidy sum of several tens of thousands of euros!

In the SMART project, you have decided to use your role as an intermediary to try and implement tools to make the collaboration effective and operational. Given that your position puts you into contact with both horticultural farmers and plastic vendors, you are trying to organize everything to make progress.

You are familiar with the various stakeholders in the sector, unlike Agriplast, which is simply a member of the CPA (French National Committee for Plastics in Agriculture), and whose objective is to promote the use of plastics in agriculture.

You believe that the quality of the relationship and the trust between Agriplast and horticultural farmers should be facilitated by their geographical proximity (75 km, while Agriplast's main competitors are 700 km away).

You are very interested in the “recyclable by horticultural farmers” nature of the new films proposed by Agriplast. This is in line with the strategic guidelines adopted during the cooperative’s last General Assembly and is aimed at promoting sustainable development.

The CDDM (Horticultural Farmers’ Departmental Development Committee), a partner in the SMART project, provides technical support to vegetable producers and develops technical references after conducting experiments. After testing, it found that the agronomic performance of recycled films (productivity, transparency and ease of installation/dismantling) was equivalent to that of new films.

At each meeting, Claude digs his heels in. You are unable to convince him that a partnership with Agriplast would mean a win-win partnership for each party concerned.

The lower price largely expected by the horticultural farmers is not yet possible because of the cost of washing the dirty films, but this could change. After all, the SMART project is still simply an R&D project. By continuing to collaborate and by recycling larger volumes of used films, it may be possible to lower prices in the future.

The partners of the SMART project organized a meeting to discuss and compare the different viewpoints between horticultural farmers and plastic vendors in order to envision solutions acceptable to each party. This meeting has already been cancelled twice by the farmers, who stressed that their priority was their farms. But today, it will finally take place.

Role card n° 3

Albertine Ladonnée, A.D.I.Valor

You represent the Agriculture, Plastics and Environmental (APE) initiative, the national initiative charged with collecting and maximizing the value of agricultural films. The organization in which you work, A.D.I.VALOR (Farmers, Distributors, Manufacturers for the Valorisation of agricultural waste) is an eco-organization that was founded in 2001 to manage the collection and disposal of agricultural waste. Its activities have progressively expanded over the years (empty packaging, plant protection products, twines and nets, etc.). Since 2009, A.D.I.VALOR has been organizing and financing the collection and processing of used agricultural films (UAF) via the APE initiative.

These films and many other packaging materials are made from low-density polyethylene. From the 550,000 tonnes collected in France in 2012, 80,000 tonnes of recycled plastic were produced, representing a recycling rate of only 15%. This low rate is due to the difficulties encountered by plastic vendors and recyclers. The quality of inputs is extremely heterogeneous, raising the costs of recycling and making the process more complex. This also complexifies the provision of stable outputs.

The price of recycled pellets follows the fluctuations in the price of virgin pellets, and is generally at a discount. However, the price of virgin pellets is directly related to the speculative oil market. This can cause supply difficulties for companies specialized in plastic processing.

Moreover, the cost of pre-processing used plastics (collection, sorting, washing, etc.) may exceed the price at which recycled plastics are sold if oil prices are low. Until recently, solutions such as exporting to China were preferred to recycling because they were easier and cheaper. Often, only cost-compensating mechanisms, through contributions under the “Extended Producer Responsibility” principle, help restore the financial equilibrium of recycling chains. The eco-contribution mechanism is applied to the used agricultural films managed by the APE initiative.

The APE initiative was set up following the recommendations of the CPA (French National Committee for Plastics in Agriculture). Founded in 1958, the CPA is an association which seeks to promote the development of the use of plastics in agriculture. Government authorities adopted the principle in 2006 and professionals in the sector participated on a voluntary basis. The CPA entrusted A.D.I.VALOR with the management of the APE initiative.

Framework agreements signed with the State set the objectives to be achieved. The second agreement, signed in 2011 with the Ministry of Ecology, set out to collect 75% of used films and to recycle 99% of agricultural films by 2015. ADEME funded A.D.I.VALOR from 2009 to 2012 to support the start of the initiative. It was then expected to be funded by the collection of an eco-contribution which would be added to the price of each spool put on the market. Used films are bought from horticultural farmers at a price set by A.D.I.VALOR and referred to as “value addition support”. Although the amount of collected eco-contributions for semi-forcing films has steadily increased, rising from 25 euros/t in 2009 to 80 euros/t at the end of 2014, this amount is still insufficient to cover operating costs. Reducing the level of soiling of the films would enable the achievement of financial equilibrium by reducing the costs associated with their processing.

In the face of the steady increase in the eco-contribution collected since the launch of the APE initiative, the plastic vendor AgriPlast and the horticultural farmers from Nantes and their partners have recently launched the SMART project. This project seeks to create a local and circular production channel to produce plastic films by recycling used films. The SMART project and, in particular, its generalization across the sector should it be imitated, would lead to the review of the economic models currently implemented in the APE initiative and would even pose a threat to it. However, a reorganization of the scheme may be worth considering.

The actual environmental advantage of the SMART project is relative. Recycling prevents the harmful dispersal of waste and helps reduce the greenhouse effect and energy consumption, but its impact on the

preservation of natural resources is somewhat derisory. The 2,500 tonnes of virgin polyethylene film that can be saved each year through the recycling of used films in Nantes would remain negligible compared to the 74,000 tonnes of various used packaging and plastics collected by A.D.I.VALOR. If all plastics were to be recycled on a planetary scale, the overall oil consumption would drop by less than 10%. The current emphasis on recycling also overshadows other potentially more beneficial processing options (waste prevention, reuse, etc.).

The partners of the SMART project have decided to organize a meeting to discuss and compare the different viewpoints between horticultural farmers and plastic vendors in order to envision solutions acceptable to each party.

Role card n° 4

Véronique Duplast, technical/sales representative at Agriplast

Agriplast is a subsidiary of a Swedish plastics group. It has been operating in Maine and Loire since 1999. The company produces and markets various agricultural plastic films and recycles used films from industrial sources. Revenue is generated primarily from the sale of wrapping and silage films which find important outlets in agricultural activities (cultivation and animal husbandry) in Normandy, Brittany, Pays de la Loire and Poitou, i.e., regions close to the Maine and Loire. The company also sells semi-forcing films to the horticultural farmers of Nantes, but this represents only 10% of its turnover.

Petrochemical companies manufacture virgin polyethylene pellets, composed primarily of petroleum compounds. This is where AgriPlast buys the materials it uses to manufacture its films. The pellets are then extruded at your firm to form plastic films, and the films are then rolled into spools. Semi-forcing films consist of three layers. The central layer constitutes half the total thickness and is manufactured using a different polyethylene recipe from the one used for the two peripheral layers. The film spools are delivered to distributors on pallets.

Your activity is conditioned by your access, which is sometimes problematic, to virgin pellets and by their sharp price fluctuations. The price of virgin pellets is the single largest component of the cost of producing spools. This represents at least half of the total cost, and sometimes much more. Given that the films used by horticultural farmers require outstanding mechanical properties, one of your suppliers is crucial because of the absence of efficient alternatives. The other components of the cost of films originate from the functioning of the extrusion operation, the additives added to the pellets, and transport. It is not always possible to reflect the increase in the price of oil in your selling price and you must thus consistently adjust your margins, which translates into significant variations in your financial results from one year to another.

Until now, used films have been managed by the APE (Agriculture, Plastics and Environment) initiative, the national branch of the collection and valorization of used agricultural films. A.D.I.VALOR (Farmers, Distributors, Manufacturers for the Valorisation of agricultural waste) is the eco-organization that manages the APE initiative, delivers used films to PlastiRecycl which is based not far from the farmers. This company recycles them into garbage bags and tarpaulins. This end to the life of your products concerns you. First, they end up as garbage bags - a rather sad end for highly effective technical plastics. Then, they are recycled by another company. Last year, you went to Sweden, to the group's headquarters, and discovered other ways of doing things, notably, other ways that paid great attention to environmental protection. This inspired you to experiment with new ways of making plastic films.

Indeed, other than possessing industrial equipment to make new films, Agriplast also has used plastic recycling lines for plastics originating primarily from industrial sources. To avoid wasting resources and in an approach favoring a circular economy, you submitted the SMART (Sustainability, Material, Agreement, Recycling, Together) project to a competitiveness cluster. The project has been certified and has been receiving funding from the Pays-de-La-Loire region! The SMART project aims to "iso-cycle"[1] films so that they can be re-used by horticultural farmers. The SMART project paves the way for a circular economy and proposes new business models and new value propositions.

Prior to the SMART project, your business model was based on the volume of film spools you sold to cooperatives of horticultural farmers. They would buy your spools only after comparing your prices with other plastic vendors. The challenge of the SMART project, which is Agriplast's strategy, is to strengthen your proximity to the horticultural farmers of Nantes through this project that seeks the co-development of an innovative product and a new local and circular activity. By consolidating the company's position on the territory, you ensure its sustainability and the creation of jobs and also protect it from the possible decision by the Swedish group to shift the location of the activity to another European site.

[1] "isocycle": neologism meaning same function, same as value or same quality after second use or recycling by opposition to "downcycling" (lower function/value/quality) and "upcycling" (improved function/value/quality).

The SMART project will first have to undertake a feasibility study to assess the possibility of producing recycled films from used and soiled films used in horticultural farming. From the first meeting, the farmers laid down their conditions: the resistance and transparency of recycled films must be guaranteed and they must be cheaper than new ones because they are made from used materials. You have therefore begun to collect used films from Claude Lamâche, the horticultural farmer participating in the project, to recycle them. The pellets you have obtained are of good quality but the operation is difficult and costly. Indeed, your washing lines are designed for used films originating from industrial sources, which are much less soiled than horticultural farming films. Recycled granules are then incorporated, with rates ranging from 10% to 100% in the central layer, in a series of test films, with peripheral layers remaining exclusively composed of virgin resins. This has allowed you to determine the maximum level of recycled granules incorporated into the central layer of the films and you have managed to reach 100%! Qualification tests show that the mechanical properties of these recycled films are equivalent to those of new films. Given that the central layer of recycled films is comprised exclusively of recycled granules, the consumption of virgin polyethylene is halved, reducing your dependence on the access to this resin.

Before making recycled films, several pre-processing phases are necessary: sorting used films, shredding them into flakes, washing them, wringing them, then drying the flakes. The regenerated polyethylene can then be extruded, pelletized and finally cooled and wrung. During the tests, you had a hard time with the washing, given that your lines were designed and dimensioned to wash barely soiled plastics. However, as noted, the films used by horticultural farmers are very dirty compared to the used films from industrial sources. The stains still cover two thirds of the entire surface of used films! So you have quickly been made aware of the limitations of your equipment.

At the last meeting, you almost got into a heated discussion with Claude Lamâche about the cleanliness of the used films when you explained that the large amount of dirt on his films had significant cost implications. But it takes more to stop Véronique Duplast! You are confident: it’s a mere misunderstanding and tensions will ease once you get to know each other's activities better.

To prevent the price of recycled spools from exceeding that of new spools – given the expensive investment in a new washing line - you have decided to outsource the washing of used films and their regranulation to a service provider who is experienced in processing dirty films. To further reduce costs, there is a need for a closer relationship between AgriPlast and the horticultural farmers. While they are close from a geographical perspective, you have felt, as the meetings have progressed, that the farmers are reluctant to enter into a partnership with you. Yet, if you were guaranteed a steady flow of plastic to recycle, with regard to both quality and quantity, and if you were sure that a new, more efficient washing line would be cost-effective, you could eventually reduce the price of the spools. But to achieve this, you need to conclude a medium-term agreement with the horticultural farmers or their cooperatives. Otherwise a two-million Euro investment is too risky!

Overall, you are quite pleased with the project’s progress. You have deepened your understanding of user expectations and the positioning of the product on the Nantes market. The difficulties encountered have been revealing and have helped you become aware of your key skills. You have thus consolidated your expertise in adding value to used films from industrial sources, allowing you to produce “high performance recycled plastic”. This emerging skill is intended to generate a competitive advantage or even create a new activity for AgriPlast.

Despite the horticultural farmers’ reluctance, you hope to become one of their major suppliers because of the quality of your products and the services you will provide to them: attentiveness to their needs thanks to your regular presence on the ground, rapid delivery, and speedy reactivity in responding to their difficulties.

You have thus initiated a meeting to discuss and compare the different viewpoints with the horticultural farmers in order to envision solutions acceptable to each party.

This meeting has already been cancelled twice by the farmers, who stressed that their priority was their farms. But today, the meeting is finally going to take place!

Role card n° 5

Jean Doubt, PlastiRecycl

Since the ban on the incineration or burying of the used plastic films used by horticultural farmers in the early 1990s, these films must now be recycled. Your factory, established in 1995 in the Maine and Loire region, was the first designed for this purpose. Since 2009, recycling has been managed by the APE initiative, headed by A.D.I.VALOR (Farmers, Distributors, Manufacturers for the Valorisation of agricultural waste).

Your company is now called PlastiRecycl and belongs to a large industrial group. The used films delivered are weighed, ground, washed and dried before being recycled. The resulting second-generation pellets are used to make garbage bags and tarpaulins.

A “value-addition support” allows horticultural farmers to buy back their used films, which will be recycled in the APE initiative.

A.D.I.VALOR is attempting to recycle used horticultural farming films in your firm because you are the closest recycler geographically. That said, recyclers specialized in the recycling of agricultural films in polyethylene are rare because of the significant investments required and the know-how to master.

In 2016, there were three main players in France, two of whom belong to your group, and fewer than ten in total in Europe. Your firm, and another site of your group, process 75% of the used agricultural films collected by A.D.I.VALOR. To avoid situations of near-monopoly and excessive mutual dependence, A.D.I.VALOR sends some of the collected films to recyclers located further away, including to transnational recyclers. For instance, used films collected from farmers in the Vendée travel hundreds of kilometres despite the fact that your site is only a few dozen kilometres away from their farms. You have heard about the SMART project and you are skeptical. Horticultural farmers would never want to be tied to a plastic vendor. You are even a little annoyed because this project is likely to change the equilibrium of the APE initiative, if only because AgriPlast and horticultural farmers could withdraw themselves and start dealing with each other directly. Indeed, AgriPlast could supply new films to the farmers and then collect their used films directly, without going through the APE scheme. Once recycled, these would then be directly returned to the farmers.

Confined to the horticultural farmers of Nantes, the changes would be marginal. The 5,000 to 6,000 tonnes collected annually are low compared to the 50,000 tonnes of used films collected by the APE initiative or the 550,000 tonnes of the French low-density polyethylene waste deposit. However, the already fragile initiative would be destabilized if all recyclers bypassed it.

The principle of proximity adopted by AgriPlast with regard to the SMART project is opposed to the strategy adopted by your own firm. For your part, you claim before eco-organizations that your industrial group has a strong investment capacity and can achieve economies of scale because it is highly concentrated. It is also free from spatial and social issues and privileges industrial and economic strategies.

The partners of the SMART project have decided to organize a meeting to which you have been invited by A.D.I.VALOR to highlight your views on the opportunities and risks of such a project for the plastic film recycling sector.