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## **PACMAN - Pathosystem Coordination, Management of Animal and Human Networks**

François Charrier, François Casabianca, Oscar Maestrini

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# PACMAN

## Metaprogram GISA

Final report: results from 2015 to 2017  
*English version*



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Month / Year

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## Guidelines for the report

This report (a maximum of 10 pages excluding annexes) aims at allowing the steering committee and the scientific advisory board of the metaprogram GISA to follow the results, outputs and outcomes of the funded projects. In this respect, the report will be made available to the members of these committees.

This final report will be prepared in two steps. A first version of the report will be requested about 3 or 4 months after the end of the project. Two years later, the steering committee will ask you to review the first version and complete the highlights and results, as several outcomes could emerge at a fair distance from the completion of the initial project. Published articles and others outputs of the project will be updated at this moment.

The steering committee reserves the right to use the highlights given in this report to promote the activities of the metaprogram GISA. In case of confidential results or under intellectual property rules, please tick the relevant box on the corresponding page.

For communication purposes, please summarize the main results, outputs and outcomes on a four or five slides show.

The report is divided in 4 parts:

- 1/ General description of the project
- 2/ Overview of the consortium
- 3/ Ex-post positioning of the project in the six finalities and three ambitions of GISA
- 4/ Highlights

Please, during the redaction of the report be aware that non-specialist of the involved disciplines will consult the report. Consequently, try to prepare this report to make it understandable by non-specialists. Illustrations (picture, graph...) are welcome.

## General description of the project

(5 pages maximum including graphs)

Acronym: PACMAN

Title: Pathosystem Coordination, Management of animal and human networks

Envergure

Exploratoire

Réseau

Dates and duration:

GISA budget: 60k€

### Leader(s) of the project

Name: Charrier François

Unit and Division: UR LRDE, Département SAD

Contacts: francois.charrier@inra.fr

Name:

Unit and Division:

Contacts:

### Objectives

#### *Main objectives*

*Remember the main objectives of the project*

The project dealt with the issue of how to build animal disease collective management strategies, by taking into account the complexity of the “human-animal-ecosystem” interface (the pathosystem : a pathogen shared by several biological compartments, under certain conditions, considering that compartments are managed by human organizations that are more or less coordinated), and the growing involvement of stakeholders on sanitary issues (or the growing consideration of the necessity to involve stakeholders). The project was based on the idea that pathogen cycle realisation occurs differently from a territory to another according to environmental conditions (e.g. there is no badger in Corsica, so the bovine tuberculosis epidemiological cycle is not the same that in another territory in Continental France), and stakeholders’ practices (e.g. free ranging farming systems are based on practices that can play a role in pathogen transmission). Consequently, collective instruments to manage pathogen must fit with local situation.

The project was structured around three complementary objectives:

- Obj 1. Understanding how biological compartments are connected, under stakeholders’ practices
- Obj 2. Understanding how existing collective strategies are implemented in a territory, and how their implementation reveals mismatch (or gaps) between strategy designers and stakeholders (receivers).
- Obj 3. Testing a participatory approach to build a new collective strategy, by involving stakeholders in the design process.

These three objectives are complementary as understanding stakeholders’ practices is a key issue to design and implement management strategies. Revealing stakeholders’ practices (Obj 1.) and the mechanisms of mismatch construction (Obj 2.) produced results to be integrated in our participative approach (Obj 3.).

#### *Achievement of planned objectives*

*Describe the activities that have been performed to meet the objectives set in the proposal*

To reach these three objectives, three corresponding work packages were designed, in which several tasks were carried out.

- **WP1: understanding the infectious interaction between compartments**
  - o T1.1. Stakeholders’ practices and representations of interaction between domestic pigs and wild boars: using a semi-structured interviews approach (targeting hunters and farmers).
  - o T1.2. Specific approach on Hepatitis E virus (HEV): using molecular epidemiology to identify shared genome strains between compartments (pigs, wild boars, consumption products, humans).

- T1.3. Pathogen dynamics regarding farming practices: a double scale approach (Corsica area and micro-regional area), we compared the dynamic of two different pathogens (HEV and Aujeszky virus) in wild boars and domestic pigs.

These tasks were conducted with PACMAN partners: Cirad (coordination with ASForce project), Anses (Several units: Ploufragan for Aujeszky virus, Maison-Alfort for HEV, Nancy for wild fauna) and ONCFS.

#### - **WP2: Analysing existing strategies**

This WP encompassed 4 case studies plus another one being implemented in partnership with Risksur project (FP7 program). The 4 case studies are based on a genealogical analysis of each strategy (synchronic and diachronic analysis of management events) and analysis of the instrumentation process (how instruments are designed and implemented, which effect they trigger, how they are adapted,...).

- T2.1. Trichinosis control instruments: investigating why a part of corsican breeders do not slaughter their pigs (for meat production) in slaughterhouses, where sanitary controls take place,
- T2.2. Blue tongue (BTV) crisis management strategy (2013-2015): through observatory participation and semi-structured interviews, we show how the strategy to eradicate BTV face difficulties in its implementation, and how it is progressively partially adapted to fit producers' conditions.
- T2.3. Bovine tuberculosis (BTB) management strategy (2014-2015): through observatory participation and stakeholders interviews, we studied how the detection procedures have been associated with other instruments in a "local" strategy
- T2.4. Aujeszky experimental plan (2011-2013): we conducted an ex-post analysis of an experimental strategy supported by state authorities, to explain reasons of failure of Aujeszky management strategies in Corsica.
- T2.5. African Swine Fever (ASF) surveillance system (in association with Risksur project): we conducted workshops with various stakeholders in order to test participative tools to assess ASF surveillance system.

Results from the 4 case studies are to be integrated in a comparatist approach to extract generic principles on disease management strategy designing and implementation.

These tasks were mainly conducted by INRA LRDE, in association with INRA EpiA and Cirad on T2.5.

#### - **WP3: testing a participatory approach to design a new collective management strategy**

A participative approach was carried out to design a new collective strategy to manage Aujeszky disease situation in Corsica. It was structured in 3 steps: ex-post analysis of the situation (stakeholders interviews, aiming at indentifying themes to be discussed in workshops); deconstruction workshops (aiming at deconstructing the Aujeszky problem and at formulating solutions); co-construction workshops (aiming at producing a strategy).

In this task, mainly driven by INRA LRDE, we integrated results from WP1 (T1.3.) and WP2 (T2.4.).

#### *Problems and changes in objectives*

*Describe any difficulties and problems that have hindered the achievement of the planned objectives and any alternative plans or changes with respect to the original proposal.*

- WP1: we experienced strong human management difficulties with a non-permanent staff recruited in 2013. He was supposed to work on Pacman WP1, but we had to redirect his work on other project. This had a consequence on work distribution within LRDE, conducting to a strong involvement of F. Charrier (WP2 & 3) on WP1, and thus, to stagger (to delay?) the implementation of different tasks of the project.
- WP1: GPS protocol implemented in ASForce project could not be carried out as first results were disappointing regarding to efforts made (implementing this type of protocol in Corsican mountains was difficult). We thus relocate activities on understanding pathogens dynamics regarding farmers' practices (Hepatitis E virus & Aujeszky virus).
- WP2: OASIS approach to be interrogated: partner involved in this task disengaged. We replace this part by our participation to a phd work, held in the RISKSUR project (EU FP7 program) aiming at testing participatory tools

to assess animal disease surveillance systems (C. Calba, CIRAD). We conducted participative workshops with the phd student on the African Swine Fever surveillance system in Corsica.

- WP3: the choice of the disease was not decided at the time we write Pacman proposal. We did not mention Aujeszky disease in the proposal. Given the evolution of local situation, this disease appeared to be the most relevant (end of the experimental plan that failed, absence of solution after this failure...), in comparison with the ones we mentioned in the proposal (BTV situation too “explosive”, hydatidosis not considered as a problem...).

### **Strength and weakness of a research project in the framework of a multidisciplinary GISA project**

*Please give your opinion and illustrate with concrete situations.*

#### *Difficulties or problems encountered*

We faced few difficulties regarding to the terminology in each scientific discipline. Some discussion during the project were about clarifying the terms used by some of us.

A concrete example is about the terms “Risk factors”, mainly used by epidemiologists, and the use of the term “risk”: whereas it represents a probability for a danger to occur (quantified data), it can be used to “name” many phenomena, not necessarily quantified. As a result, in comparison with the overall description of Pacman project, where the term of risk is heavily used, we progressively shifted towards a terminology that is more used in social sciences, through the notion of “mode of existence” (of the pathogen, of the instruments,...), as it allowed us to be more holistic in our approach (taking into account stakeholders’ practices, knowledge, instrumentation,...).

#### *Values added allowed*

Just a quote can be meaningful: “through PACMAN, you succeeded in making epidemiologists and social scientists to speak together” (S. Rossi, ONCFS).

#### *Solutions*

### **Strength and weakness of the research project within the partnership**

*Please give your opinion and illustrate with concrete situations.*

#### *Difficulties or problems encountered*

PACMAN suffered from an unbalanced partnership between social sciences and eco-epidemiology/virology. Few forces were available on WP2 & 3. This had for consequence a delay to implement tasks on different case studies.

PACMAN also had quite a large number of scientific partners, who are not based in Corsica. This resulted in difficulties in coordination.

#### *Values added allowed*

PACMAN partnership is characterized by a large number of discipline & competencies: specialists of diseases at Anses (Ploufragan for Aujeszky disease, Maisson-Alfort for HEV for instance), specialists on wild fauna at Anses (Nancy), ONCFS and Cirad, specialist in epidemiology at INRA and Cirad, in animal sciences at INRA and social sciences at INRA and Cirad. The configuration of this consortium was a strength to conduct the type of research we wanted to perform (case studies).

#### *Solutions*

To gather such a heterogeneity of disciplines, we drove our project on a type of research: the “problem oriented researches” (in opposition to “theory-oriented research”). Such a scientific posture, based on problems formulated from “the field”, brings researchers “watch over” the boundaries of their disciplines.

### **Strength and weakness of the research project with stakeholders**

*Please give your opinion and illustrate with concrete situations.*

#### *Difficulties or problems encountered*

The main difficulty was to get stakeholders interested by the project. As it is a research problem, the necessity of an output for stakeholders appears to be essential.

Another difficulty was the stakeholders' limited availability to participate to our workshops, especially pig farmers and veterinarians. It resulted in an extension in time of the operations (3 workshops in 2015 and 3 in 2016).

At last, we mainly addressed, in Pacman, diseases that are regulated (Aujeszky disease, BTV, BTB,...) : This lead to negotiations with State authorities to get an “authorization” to work on these diseases, especially for Aujeszky disease (WP3).

### *Values added allowed*

The Pacman posture, which is “problem oriented”, allowed to have a particular attention from stakeholders, as they are the first to formulate problems. The implementation of Pacman allows us to highlight:

- The fact that state authorities acknowledge that “classical” disease management strategies are limited (failure situation)
- The fact that research has a role to play in this transition process, characterized by the need to create territorial tools to manage animal health.

Stakeholders' participation brought many results:

- Stakeholders' knowledge:
- Stakeholders' legitimation in designing process:
- Stakeholders' concerning and empowerment:

### *Solutions*

**What did facilitate conducting interdisciplinary research (give 2 examples maximum) and, on the contrary, can you give 2 examples of barriers that could not be broken through or were particularly difficult to overcome in order to achieve interdisciplinarity?**

Problem oriented research (problem coming from situations)

Difficulty to make scientific partners involved on tasks where there scientific discipline is non dominant?

**Have you come up with solutions for an integrated management of animal health with your research project? (in 10 to 12 lines maximum)**

Main scientific outputs are the formulation of 4 principles in designing & implementing disease management strategies: i) micro-regional approach (local coordination of the strategy); ii) simultaneity & step by step process (the need to solve a group of problem before addressing others); iii) conditionality (objectives to be reached before triggering following stages of the strategy); iv) stakeholders empowerment (local organisation to be created, involving leading stakeholders such as farmers...). An important stage in designing disease management strategies is the deconstruction of the situation, aiming at bringing stakeholders to formulate problems and solutions. It allows to “shorten” the distance between sanitary instruments (to be designed and implemented) and local farming systems (which exist in a complex environment).

At last, Pacman project brings elements of methodology to achieve different stages of a design process involving stakeholders.

**If so, which practical solutions can you propose?**

Cf supra

**If not, what prevented you from achieving the required level of integrated management of animal health?**



## Overview of the consortium

### INRA consortium

#### INRA research units involved

Unit (Acronym)	Division (Acronym)	Disciplines involved				
		Choose the disciplines in the list, if you need more than 4 pre-selected disciplines, please use the appropriate number of lines for the unit concerned.				Others, precise
LRDE	SAD	livestock systems	Choisissez un élément.	Choisissez un élément.	Choisissez un élément.	Management sciences
Lisis	SAD	sociology	Choisissez un élément.	Choisissez un élément.	Choisissez un élément.	
EpiA	SA	epidemiology	Choisissez un élément.	Choisissez un élément.	Choisissez un élément.	
Moisa	Cirad-SAE2	sociology	Choisissez un élément.	Choisissez un élément.	Choisissez un élément.	
		Choisissez un élément.	Choisissez un élément.	Choisissez un élément.	Choisissez un élément.	
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		Choisissez un élément.	Choisissez un élément.	Choisissez un élément.	Choisissez un élément.	

#### Details of INRA staff involved

Permanent Staff	
<i>Precise number of agents, independently of working time</i>	
Senior researchers	3
Junior researchers	1
Technicians	1

Non-permanent Staff	
<i>Precise number of agents, independently of working time</i>	
Fixed-term contracts	
PhD	
Postdoctoral fellows	
Master students	2

### Partners/stakeholders consortium involved in the project

Please for each partner/stakeholder, mention the person(s) involved, their involvement in the research process, **skills and resources (human or financial)** provided and include logo.

These information will help us to estimate the financial leverage effect of GISA. In this objective, do not hesitate to estimate financial support from non-INRA participants and salary costs of non-INRA person-months involved in the project.

#### Academic partners

Research Institution	Unit	Division	Location	Names	Discipline	Role in Pacman
ANSES	Unité pathologie des animaux sauvages	Laboratoire de la rage et de la faune sauvage	Nancy	Richomme Céline	Epidemiologist; specialist on wild fauna	WP1: expertise on wild boars WP2: expertise on BTB in wild fauna

	UMR 1161 Anses-INRA-ENVA Virologie	Laboratoire de santé animale de Maisons-Alfort	Maison-Alfort	Pavio Nicole	Virologist	WP1: analysis of pig and wild boars samples (HEV) + research work
	Unité virologie immunologie porcines	Laboratoire de Ploufragan / Plouzané	Ploufragan / Plouzané	Lepotier Marie-Frédérique	Virologist	WP1: analysis of pig and wild boars samples (Aujeszky virus) + research work
<b>CIRAD</b>	UR Animal et Gestion Intégrée des Risques (AGIRs)	Environnement et Sociétés (ES)	Montpellier	Jori Ferran	Epidemiologist	WP1: infectious interaction between wild boars & domestic pigs
				Calba Clémentine	Epidemiologist (phd student)	WP2: test of participatory tools to assess ASF surveillance system
	UMR Marchés, Organisations, Institutions et Stratégies d'Acteurs	Environnement et Sociétés (ES)	Montpellier	Figuié Muriel	Sociologist	WP2: BTB case study
<b>ONCFS</b>	Unité Sanitaire de la Faune		GAP	Rossi Sophie	Epidemiologist	WP1: infectious interaction between wild boars & domestic pigs

### *Private partners*

Fédération Régionale des Groupements de Défense Sanitaire du Bétail de Corse (FRGDS, Regional association for livestock sanitary defense) : Mélanie Gallois (FRGDS coordinator) was involved in WP3. She participated to the final interpretation of collective workshops.

### *International partners*

## Ex-post positioning of the project in the six finalities and three ambitions of GISA

### Ambitions addressed by the project

Now the project is ended, objectively and on the base of the work achieved please tick ex-post the relevant boxes in comparison to the initial ambitions; it can be within a unique ambition or at the interface between two ambitions.

	Understanding the animal and his pathogens	Shaping health in the farms and in the supply chains	Preserving man and his territory
Understanding the animal and his pathogens	<input type="checkbox"/> Not achieved <input type="checkbox"/> Partially achieved <input type="checkbox"/> Totally achieved	<input type="checkbox"/> Not achieved <input type="checkbox"/> Partially achieved <input type="checkbox"/> Totally achieved	<input type="checkbox"/> Not achieved <input type="checkbox"/> Partially achieved <input type="checkbox"/> Totally achieved
Shaping health in the farms and in the supply chains		<input type="checkbox"/> Not achieved <input type="checkbox"/> Partially achieved <input checked="" type="checkbox"/> Totally achieved	<input type="checkbox"/> Not achieved <input checked="" type="checkbox"/> Partially achieved <input type="checkbox"/> Totally achieved
Preserving man and his territory			<input type="checkbox"/> Not achieved <input type="checkbox"/> Partially achieved <input type="checkbox"/> Totally achieved

Please comment any ambition which has been achieved and was not foreseen at the beginning:

### Aims addressed by the proposal

Now the project is ended, objectively and on the base of the work achieved please tick the relevant boxes and precise what can be considered as a contribution to the aim.

- Controlling livestock diseases
- Foreseeing and analysing emerging diseases
- Producing respecting public health and environment
- Producing respecting the animal
- Adapting to global change the management of livestock health and welfare
- Understanding the decisions and aims of the stakeholders for health management, predict the social and economic consequences

Please comment any aim significantly achieved:

On the objective “Understanding the decisions and aims of the stakeholders for health management, predict the social and economic consequences” and ‘Controlling livestock diseases”, we specifically highlighted trade off & lock-in effects between the implementation of collective disease management strategy (designed by State authorities) and stakeholders socio-technical systems. And while WP2 brought knowledge on this mechanisms, WP3 brought collective solutions.

## Highlights

*In few words and with bullet points give the main highlights obtained during the project or allowed by the project. For more detailed highlights, please use the appendix part*

- WP1 :
  - Stakeholders knowledge about infectious interaction pattern (domestic pigs & wild boars) to be used in strategy designing process
  - Stakeholders practices that shape infectious interaction pattern (domestic pigs & wild boars):
  - Same practice, different effects on different pathogen dynamics
- WP2:
  - Why we fail in controlling animal disease in a territory: gaps between strategy designers & stakeholders
  - Instruments adaptation: stakeholders experiencing new forms of actions (micro-regional approach on bovine tuberculosis, steering committee during BTV crisis, experimental strategy for managing Aujeszky disease,...)
  - Instrument arrangements to manage sanitary situations: the construction of the management situation (to manage a disease, need to manage animals, need to manage humans...)
  - Demonstration of the relevancy of using participatory tools to assess disease surveillance systems
- WP3:
  - Participatory method to design a livestock disease management strategy (3 steps approach)
  - The deconstruction of a sanitary situation (arrangements of problems, arrangements of instruments)
  - A new and original collective strategy, based on 4 principles:
    - Micro-regional organization
    - Simultaneity and prioritization
    - Conditionality
    - Stakeholders empowerment & recruitment

Confidential information?       Yes       No

*If yes, please detail what is confidential:*

### Main activities and achievements of the consortium

*Give the main scientific results of the project (15 lines + 1 or 2 illustration(s))*

WP1 produced results on how animal compartments are connected (e.g. HEV strains shared between domestic pigs, wild boars, products and humans), under the conditions of stakeholders' practices: management of reproduction (reproductive sows are separated from the herd), number of visits (farmer visiting his herds in the mountains), female castration,... It also showed that same practices do not have the same effect from a pathogen to another (Aujeszky virus and Hepatitis E virus).

WP2 produced knowledge on strategic framing to manage animal diseases in territories: the non-neutrality of instruments and the mechanisms of stakeholders' coordination are pointed out: lack of collective moments in the case of Aujeszky disease management strategies; the BTV steering committee as a collective arena where instruments and stakeholders are tested; the BTB strategy relying on new instruments adapted to territory

characteristics (micro-regional experimentation); trichinosis control through slaughterhouse, showing tensions between sanitary instruments and socio-technical systems.

Using results from WP1 & 2, WP3 allowed us to highlight framing principle to design and implement disease management strategies: micro-regional approach; step by step process; conditionality principle; stakeholders' empowerment. It also brought methodological results to design collective strategies (3 steps method: ex-post analysis; deconstruction workshops; co-construction workshops).

Finally, PACMAN project produced knowledge in eco-epidemiology (infectious interaction between domestic and wild fauna), participative epidemiology (stakeholders' knowledge to produce epidemiological data), and organizational studies (the role of instruments in designing process, unexpected effects of instruments, strategy framing as a set of coordinated instrumentation, role of territory characteristics and socio-technical systems in strategy design and implementation process).

### Outputs and outcomes of the project

	number	List and details ( <i>join pdf when relevant</i> )
<i>Publications</i>		
France – peer-reviewed journal	1	- Charrier F., Ducrot C. 2017. Vie et mort d'un instrument de gestion d'une crise sanitaire en élevage : le cas du comité de pilotage régional de la crise de la fièvre catarrhale ovine survenue en Corse en 2013. <i>Annales Méditerranéennes d'Economie (sous presse)</i>
France – book or chapter		
France - conference	4	- Charrier, F., Casabianca, F. (2015). La mise en dispositif de la lutte contre la maladie d'Aujeszky en Corse : le poids des instruments. Presented at 9. <i>Journées de Recherches en Sciences Sociales (JRSS), Nancy, FRA (2015-12-10 - 2015-12-11)</i> . - Charrier F., Laval M., Maestrini O., Jori F., Pavio N., Casabianca F. (2016). Virus de l'hépatite E en Corse : une maladie émergente interrogeant les approches à l'interface « homme-animal-écosystème ». Summer School of infectious diseases, Cargèse 14-16 novembre 2016. - Charrier F., Casabianca F., Hannachi M., Babier M. (2017). Rendre possible l'impossible: décider ensemble dans une démarche de co-construction d'un dispositif de gestion de la maladie d'Aujeszky en Corse. Submitted to OPDE Symposium, oct 2017. - Charrier F. (2017). Towards new forms of organizations to manage animal diseases. Local Seminar, Corte, april 2017.
International – peer-reviewed journal	5	- Charrier F., Casabianca F., Pailhes N., Maestrini O. (2017). First steps to build an animal disease management strategy: collective approach to deconstruct problem. <i>Archivos de zootecnia</i> .

		<ul style="list-style-type: none"> <li>- Pavio, N., Laval, M., Maestrini, O., Casabianca, F., Charrier, F., Jori, F. (2016). Possible Foodborne Transmission of Hepatitis E Virus from Domestic Pigs and Wild Boars from Corsica. <i>Emerging Infectious Diseases</i>, 22 (12).</li> <li>- Jori, F., Laval, M., Maestrini, O., Casabianca, F., Charrier, F., Pavio, N. (2016) Assessment of Domestic Pigs, Wild Boars and Feral Hybrid Pigs as Reservoirs of Hepatitis E Virus in Corsica, France. <i>Viruses</i> 2016, 8, 236</li> <li>- Calba, C., Charrier, F., Antoine-Moussiaux, N., Hendrikx, P., Saegerman, C., Peyre, M., Goutard, F. (2015). . Applying participatory approaches in the evaluation of surveillance systems: A pilot study on African swine fever surveillance in Corsica. <i>Preventive Veterinary Medicine</i>, 122 (4), 389-398</li> <li>- Relun, A., Charrier, F., Trabucco, B., Maestrini, O., Molia, S., Chavernac, D., Grosbois, V., Casabianca, F., Etter, E., Jori, F. (2015). . Multivariate analysis of traditional pig management practices and their potential impact on the spread of infectious diseases in Corsica. <i>Preventive Veterinary Medicine</i>, 121 (3-4), 246-256</li> </ul>
International – book or chapter		
International - conference	2	<ul style="list-style-type: none"> <li>- Charrier, F., Casabianca, F., Maestrini, O. (2016). Designing problems and solutions to build disease management strategies: experiencing participative approach against Aujeszky disease in Corsica. 9th Symposium on Mediterranean pig, Portalegre, oct 2016.</li> <li>- Trabucco, B., Charrier, F., Jori, F., Maestrini, O., Cornélis, D., Etter, E., Molia, S., Relun, A., Casabianca, F. (2013). Stakeholder’s practices and representations of contacts between domestic and wild pigs: a new approach for diseases risk assessment?. Presented at 8th International symposium on the Mediterranean pig, Ljubljana, SVN (2013-10-10 - 2013-10-12).</li> </ul>
Other, precise below		
<i>Dissemination actions</i>		
Articles of popularization		
Conferences of dissemination		
Training in the upper and technical education	3	<ul style="list-style-type: none"> <li>- Casabianca F., Figuié M. (2015). Présentation du projet Pacman à l’Ecole-Chercheur : Mobiliser les approches par les transitions dans la recherche sur les changements agricoles et alimentaires : pourquoi et comment ? &gt;&gt; 10-12 mars 2015, Sète</li> </ul>

		<ul style="list-style-type: none"> <li>- Charrier F. (2017). Projet Pacman – Sciences Participatives (table ronde). Ecole Internationale de Recherche d’Agreenium, 21-22 mars 2017.</li> <li>- Charrier F., Maestrini O., Vincensini P. (2016). Approche participative pour la conception de dispositifs de gestions des maladies. Intervention dans le Master « Agrosociétés, Environnement, Territoires, Paysage, Forêt » (AgroParisTech), le 13/12/2017</li> </ul>
Training in continuing education		
Other, precise below		
Presentation to local authorities & stakeholders	2	<ul style="list-style-type: none"> <li>- Charrier, F., Maestrini, O., Casabianca, F., Trabucco, B., Relun, A., Laval, M., Jori, F., Cornélis, D., Etter, E., Molia, S., Calba, C., Goutard, F., Grech-Angelini, S. (2015). Travaux de recherche sur les risques liés à la PPA en Corse. Document de synthèse des résultats et des débats lors de la journée de restitution des projets ASForce et RiskSur aux acteurs à Corte, le 22 mai 2015;</li> <li>- Charrier F. (2017). Présentation de la démarche participative pour la conception d’un dispositif de lutte contre la maladie d’Aujeszky aux autorités sanitaires (réfèrent National tuberculose bovine et SRAL Corse), mars 2017.</li> </ul>
<i>Other scientific valuations</i>		
International patent obtained		
Submitted international patent		
National patent obtained		
National patent in course of obtaining		
International scientific symposia organization		
National scientific symposia organization		
New business start-up or swarming		
New collaborative project	2	<ul style="list-style-type: none"> <li>- Project NOVPATH : « Nouvelles approches pour la gestion des pathosystèmes », (on-going instruction for CTC funding). Partnership with Anses, Cirad, Oncofs, FRGDS.</li> <li>- Collaboration in Project HVE : « Diminuer la propagation du virus de l’Hépatite E (VHE) en Corse: Développement d’un candidat-vaccin vivant atténué contre le VHE porcine ». Collaboration with INSERM and University of Corsica.</li> </ul>
Other, precise below		

*Please don’t forget to summarize the main results, outputs and outcomes on a two slide show. (1 slide of presentation, 2-3 slides of results and 1 slide of conclusion)*

## Appendix

In the Appendix, we wish to detail some results for each WP (part 1) and additional impact of the projects that we judge important to highlight (part 2)

### Part 1: Detailed results in each WP

#### - WP1: understanding the infectious interaction between compartments

- T1.1. Stakeholders' practices and representations of interaction between domestic pigs and wild boars: using a semi-structured interviews approach (targeting hunters and farmers), we produced knowledge on how infectious interaction occurs (direct contact like sexual interaction at a specific time of the year or indirect contact like consumption of sides-off) and which farming practices play a role in enhancing or controlling these different type of interaction (herd surveillance, female castration, reproduction management practices,...). We highlighted the fact that some farming systems are more at risk than other, especially according to targeted markets, production logics, etc. We established a typology of these systems and practices (Relun et al, 2015; Jori et al, 2014). Also, this work demonstrated the relevancy of using data collecting methods inspired from social sciences methods (semi-structured interviews and inductive posture) on eco-epidemiological issues, in comparison with other methods such as GPS to monitor animal movements (expansive and difficult to implement).
- T1.2. Specific approach on Hepatitis E virus (HEV): we demonstrated, through molecular epidemiological approaches (analyse of RNA sequences) that the virus is shared between several compartments: human, wild boars & pigs (Pavio et al, 2016). But we also highlight the role of breeding practices, especially through the role of cross-bred wild boars (Jori et al, 2016).
- T1.3. Pathogen dynamics regarding farming practices: a double scale approach (Corsica area and micro-regional area), we compared the dynamic of two different pathogens (HEV and Aujeszky virus) in wild boars and domestic pigs. We show that dynamics are different, especially according to the breeding practices and the proximity between hunting areas and pasture lands (Charrier et al, paper being written).

#### - WP2: Analysing existing strategies

- Trichinosis control instruments: by investigating why a part of corsican breeders do not slaughter their pigs (for meat production) in slaughterhouses, where sanitary controls take place, we highlight the tensions between instruments of the slaughterhouse (negative effects of the slaughtering procedure on sanitary procedure).
- Blue tongue crisis management strategy (2013-2014): through observatory participation and semi-structured interviews, we show how the strategy to eradicate BTV face difficulties in its implementation, and how it is progressively partially adapted to fit producers' conditions. We particularly show that the steering crisis committee is a key instrument, that might inspiring for designing long-term territorial instruments to manage animal health (Charrier et Ducrot, 2017)
- Bovine tuberculosis management strategy (2014-2015): The analysis of the strategy implemented in Corsica reveals that stakeholders are resourceful to adapt existing instruments to territory conditions. And whereas BTB regulations are strict, State authorities manage to adopt original strategies, such as experimenting a set of instrument in a particular micro-region, involving local stakeholders.
- Aujeszky experimental plan (2011-2013): our work shows that regulation instruments play a role in designing the disease management strategy. By seeking to reach complementary objectives, designers implement additional measures, which penalized the whole strategy, resulting in a partial failure of the strategy (Charrier et Casabianca, 2015).
- African Swine Fever surveillance system (Risksur project): through participative workshops, we demonstrate that participative tools are relevant to assess surveillance systems, especially by highlighting

other types of criteria that classical methodologies, such OASIS (criteria on acceptability, on trust,...). Calba et al, 2015).

- **WP3: designing a new disease management strategy, by involving stakeholders**

- A 3-steps participatory method (ex-post analysis of the situation, deconstruction stage, co-construction stage): WP3 methodology gives some highlight of what is important to consider in such process: for example, the deconstruction of the situation, in an arena where discussions are opened, is an important issue as it is the moment when stakeholders collectively formulate problems and solutions.
- Deconstruction of a complex situation: this work allowed us to produce knowledge on how to build the situation to be managed: it revealed to complexity of a sanitary situation and the multiple problems, at different levels, to be dealt with: financial, organizational, technical, regulatory problems, are to be dealt in a certain order (systemic approach), and concerns all stakeholders (necessity of a step by step strategy and coordination between stakeholders).
- A new strategy to be implemented: WP3 main output is a new strategy involving every type of stakeholders, based on innovative organizations (local steering committees in micro-regions) and instruments (local database, formations,...). This new strategy is to be presented to State authorities and farmers' associations in order to be implemented.
- Framing strategy designing and implementing processes: main scientific outputs are the formulation of 4 principle in designing & implementing disease management strategies: i) micro-regional approach (local coordination of the strategy); ii) simultaneity & step by step process (the need to solve a group of problem before addressing others); iii) conditionality (objectives to be reached before triggering following stages of the strategy); iv) stakeholders empowerment (local organisation to be created, involving leading stakeholders such as farmers...).
- Stakeholders' participation & legitimation into new form of designing process: our process showed that stakeholders have knowledge to share (and sometimes more that sanitary authorities), knowledge that is relevant to design an operation or to formulate a problem. Hence, our approach allowed us to bring legitimacy to stakeholders, especially farmers, to have a role in strategy designing process.

**Part 2: additional impacts of the project**

- The Regional Association of the local pig breed (ARGPRC), who participated to our collective workshops, initiated the conception of a disease control strategy, involving breeders (to avoid the spread of diseases by animal movements). It is considered as an indirect impact of our work.
- SRAL considered to use key elements of our methodology (collective workshops) to address the problem of BTB in Corsica.