Labellisation de thèses

Appel à propositions

DATE LIMITE : lundi 9 mars 2020

#DigitAg, l'Institut Convergences en Agriculture Numérique, a démarré au 1er Janvier 2017, avec la vocation de mener des actions de recherche, principalement autour de thèses et de masters, et de fédérer une communauté sur l'agriculture numérique (Voir en Annexe 1, le résumé). Dans ce cadre, #DigitAg lance une nouvelle campagne de labellisation et de co-financement de thèses (vous pouvez consulter les sujets déjà retenus en Annexe 6).

Sont éligibles à cet AAP labellisation #DigitAg (Comité de sélection Annexe 2), les thèses qui :

- **Contribuent à l'agriculture digitale**
- **Sont portées par l'un (au moins) des laboratoires de #DigitAg**
- **Correspondent à une inscription de doctorants en ED à partir de la rentrée scolaire 2018, et suivantes**

La labellisation ouvre des avantages. Comme les doctorants cofinancés par #DigitAg, le doctorant labellisé #DigitAg bénéficiera de :

- Visibilité : affichage du sujet/candidat de thèse sur le site #DigitAg
- Communauté : intégration de l'étudiant dans la communauté scientifique #DigitAg, en particulier, participation aux séminaires et journées des doctorants #DigitAg
- Accessibilité : tarifs préférentiels aux écoles chercheurs organisées par #DigitAg
- Transfert : le candidat pourra candidater au processus de maturation auprès de la SATT AxLR.
- Diffusion : #DigitAg met en place un service de développement informatique de démonstrateurs / services web à partir des résultats des thèses ; ce service sera ouvert à toutes les thèses labellisées sur sélection.

Les thèses labellisées reçoivent une aide financière pour la participation de l'étudiant à une conférence internationale (sous réserve d'un papier accepté et avec une limitation financière à 1000 euros).

Les thèses labellisées par #DigitAg sont affichées avec le label : **#DigitAg. Le laboratoire s'engage à ce que le doctorant #DigitAg participe aux activités #DigitAg** (en particulier aux journées des doctorants, 1 fois / an à partir de 2018) et contribue aux échanges d'informations entre son laboratoire d'accueil et la communauté #DigitAg.

Labellisation des thèses

Retour en remplissant le formulaire en ligne ci-dessous :
https://framaforms.org/aap-labellisation-these-2020-1502978550

Ensuite, votre directeur d'unité recevra directement un email pour donner son avis en remplissant un formulaire.

Votre demande sera prise en compte uniquement si les deux formulaires sont remplis

Date limite : lundi 9 mars 2020

Annexe 1 – Résumé du projet #DigitAg

L'agriculture fait face à un triple défi: être compétitive, préserver l'environnement et offrir des conditions de vie correctes aux agriculteurs. Pour y répondre, la mission Agriculture-Innovation2025 (2015) a recommandé aux ministres de l'Agriculture et de la Recherche de développer les outils numériques: capteurs, objects connectés, internet des objets, smartphones, images satellites, big data, simulation, HPC … Mais innover en agriculture numérique présente des verrous particuliers, liés à l'adaptation des technologies, à l'adoption par les usagers et à la manière dont toute la chaîne de valeur peut être transformée. L'ambition de #DigitAg, l'Institut de Convergence en Agriculture Numérique, est d'aborder ces verrous scientifiques et techniques en rassemblant une masse critique de chercheurs et enseignants-chercheurs de plusieurs communautés scientifiques (agronomie, sciences pour l'ingénieur, numérique, économie, sociologie, sciences du management…). L'objectif est de booster le développement de l'agriculture numérique et des entreprises des TIC (technologies de l'information et de la communication) qui fourniront les produits et les services numériques, en France et dans les pays du Sud –stratégiques pour l'économie numérique. Les 6 axes de recherche identifiés (TIC et sociétés rurales, TIC et innovation, acquisition de données, systèmes d'information, big data agricole, simulation) seront abordés en répondant à 8 challenges opérationnels, sur des problématiques allant de la ferme à la chaine de la valeur et aux territoires. Localisé à Montpeller où il bénéficiera de l'apport de 7 projets PIA et du projet l'Isite Université de Montpellier), #DigitAg est porté par 4 organismes de recherche leaders (INRA, INRIA, IRSTEA, CIRAD), 3 acteurs locaux de l'enseignement supérieur (Université de Montpellier, Montpellier Supagro, AgroParisTech Montpellier), l'ACTA, la SATT AxLR et 8 entreprises (IDATE, Smag, Vivelys, Pera-Pellenc, Agriscope, Fruition Science, ITK, Terranis). Abritant une "graduate school" dédiée à l'agriculture digitale, il offrira plus de 150 bourses de masters, 56 bourses de thèses, 17 à 19 ans de post-doc et 72 mois de salaire pour l'accueil de scientifiques haut-niveau. Trois nouveaux parcours de master seront créés, ainsi que des dispositifs innovants d'enseignement: le "mas numérique" (viticulture de précision), une chaire d'entreprises et un observatoire de l'agriculture numérique.

Contact: veronique.bellon@inrae.fr, Coordinatrice & marjorie.domergue@inrae.fr, Chef de Projet

Coordination: INRAE

Partenaires: INRAE, INRIA, CIRAD, Université de Montpellier, Montpellier Supagro, AgroParisTech, ACTA, SATT AxLR, IDATE Digiworld Institute, SMAG, Pera-Pellenc, ITK, Fruition Sciences, Terranis, Vivelys, Agriscope

Annexe 2 – Comité de sélection

V Bellon-Maurel (INRAE) I Piot-Lepetit (INRAE) T Sari (INRAE)	Coordination
L Temri (MSA) P Labarthe (INRAE)	Scientific axis 1- ICT and rural society
S Mignon (UM) D.Galliano (INRAE)	Scientific axis 2- Innovation in digital agriculture
R Bendoula (INRAE), P Combette (UM),	Scientific axis 3- Sensors and data acquisition
M Teisseire (INRAE), P Neveu (INRAE)	Scientific axis 4 : Information systems, data storage, transfers and sharing
A. Termier (INRIA), P Poncelet (UM)	Scientific axis 5 : Data Mining, Data Analysis and Knowledge Discovery
F Garcia (INRAE), P Martre (INRAE)	Scientific axis 6 : Modelling and simulation
C Gary (INRAE)	Challenge 1: ICT and the agroecology challenge
P Martre (INRAE)	Challenge 2: Digital solutions to optimize the genotype in changing production systems and markets
O Naud (INRAE)	Challenge 3: ICT and crop protection
J van Milgen (INRAE)	Challenge 4: ICT and sustainable animal production
P Labarthe (INRAE)	Challenge 5: ICT and new farm advisory services
D Ienco (INRAE)	Challenge 6: ICT and agricultural territory management
I Piot-Lepetit (INRAE)	Challenge 7: ICT for a better acknowledgement of agriculture in the global value chain
M.Roche (CIRAD)	Challenge 8: ICT and agricultural development in Southern countries (Africa)
V Ranwez (MSA)	Education
F Brun (ACTA)	Transfert – Valorisation

Annexe 3: AXES SCIENTIFIQUES de #DigitAg

Les questions scientifiques de l'IC sont organisées en 6 axes ayant les objectifs scientifiques suivant:

Axis 1: ICT and rural societies. Objective is to **understand ICT influence on rural societies,** ie

Obj 1.1 To understand how ICT technologies contribute to improving management at farm level and territory governance.

Obj 1.2 To understand how ICT-enabled new services change the role of actors of the agriculture, incl. advisory services.

Axis 2: Innovation in digital agriculture. Objective is to **understand construction and legal issues of ICT-based innovation** :

Obj 2.1To understand how to successfully build - technological and organisational - innovation in "digital agriculture"

Obj 2.2To address the legal and ethical issues of intellectual property of data and knowledge, and consequences on value share

Axis 3: Sensors and data acquisition. Objective is to **foster the development of suitable sensors and data acquisition systems,**

Obj 3.1 To study and design sensors to address sensing bottlenecks eg field phenotyping, disease, plant & animal status.

Obj 3.2 To develop "frugal" data acquisition technologies based on use of smartphone devices and satellite images.

Axis 4: Information systems, data storage, transfer. Objective is**:**

Obj 4.1 : To make progress in agricultural information system design, with the constraints of Big Data and interoperability

Axis 5 – Data Mining, Data Analysis and Knowledge Discovery. Objective is **to design new data mining and visualisation methods, appropriate to agricultural data characteristics and users:**

Obj 5.1 To design new data mining methods, appropriate to agricultural big data characteristics and preserving privacy;

Obj 5.2 To develop visual and interactive methods for data analysis, tailored for non-specialists.

Axis 6: Modelling production systems in smart agriculture. Objective is **to explore new ways of model integration/qualification**

Obj 6.1 To make progress in genotype-to-phenotype modelling, by new data integration methods and knowledge injection;

Obj 6.2 Developing methods for integrating different types of information & knowledge (generated from data, experts, models);

Obj 6.3 To make advances in quantification of uncertainty in agricultural models **.**

Les grands enjeux scientifiques de chacun des axse sont décrits ci-dessous.

Axis 1: ICT and rural society change. Digital agriculture may open new avenues for improving management of farms, territories and food supply chains. The way ICT contribute to these dynamics is still to be investigated: farms targetting productivity gains may adopt precision agriculture technologies (eg sensors, automatic data processing, decision aid systems, etc) whereas non-conventionnal farming may use other digital collaborative tools to communicate, access information or trade. Litterature is abundant about "ICT and development" but much lesser regarding "ICT and agriculture" or "ICT adoption in northern countries" (see 1.2.1) and #DigitAg will concentrate on these issues. ICT tools make it possible build up more horizontal collaborations and new networks. New services are created and delivered by organisations of various natures and sizes even with newcomers extraneous to agriculture. It is therefore essential to analyse to which extents these innovations participate to organisational, economic and institutional changes. What are the impacts of ICT-based innovation on the evolution of practices, of resource management processes, on farms (perfomance, sustainability, resilience, exclusion), on farm occupation? Do these new services induce new collaboration schemes? Are there differences in farmer - advisory service relationships, due to digital technologies? Is there a danger for farmer of loosing autonomy in decision-making? Do ICT make private-public relationships evolve? ICT may also induce new relationships between farmers and cooperatives, as well as new organisations and regulatory processes in territory or in agricultural supply chains. Lastly, the impact of such new tools must be assessed regarding productivity, competitiveness and sustainability criteria, as well as changes of governance processes at the rural territory level, and efficiency of public policies related to accompaniment, transparency, control and actor mobilisation.

Axis 2: Innovation in digital agriculture. Digital agriculture relies on the development of innovations that could be described as managerial, and of which construction, diffusion and uses should be studied. First, the issue of innovation construction arises regarding design processes and the integration of users in the early stages of design. Co-design of decision support tools with farmers and regional actors, collective exploration activities, are important factors in product and service adaptation to actual needs and in their broader diffusion. Supporting different modes of design and enhancing participatory design implies to study the variety of uses and applications of such tools. In a context where innovation is increasingly open, new forms of organizations supporting innovation have to be explored (innovation ecosystems, living labs…). The elaboration of this variety of new services questions the development of operating procedures, governance, and funding (business models). It comes then to analyze the diffusion of these innovations, including forms and determinants of this dissemination to farmers, companies, cooperatives and actors of territories. Extraction, analysis and dissemination of the data finally poses ethical issues and legal problems of intellectual property. Who has access to the data? Who control and own the data (private, public?) and to which ends? If intellectual property Law does apply to the data bases, the question will be then: will the data bases be open and free for exploitation and will the data be considered as well liable to a large dissemination?

Axis 3: Sensors and data acquisition/processing. Agriculture is charaterized by several harsh constraints with regard to data acquisition and sensor development: small markets, low margins, large and variable areas to cover, a high variability of objects of interest, rough conditions of use, and a low-to-medium level of ICT understanding from users. In accordance, sensors/ data acquisition systems must be robust, with little maintenance, easy-to-use and with the expected metrological properties. Sensors can have different configurations: portable, in contact (with the animal, the plant, the soil, etc), embedded in tractors and other agricultural tools or in aerial drivers (UAV, planes), or in satellites (earth observation). In addition to these classical measurement devices, data acquisition is to be carried out by farmers, though devices such as smartphones and tablet computers. Today, sensor/ data acquisition/processing techniques complying with agricultural needs are still lacking. #DigitAg aims at addressing this gap, especially regarding: (i) assessment of plant, animal and soil state (physiology, composition, health…), (ii) Sensor networks (eg weather sensors such as Temperature, Hygrometry, rain, hail…), (iii) Embedded sensors in tractors, UAV, (v) Smartphone-based and (vi) multi-resolution satellite image processing. The scientific questions linked to these issues are: a) a better understanding of light/matter interaction of optical and radar sensors, b) the application of IoT concepts to agriculture in context-aware approaches, c) the design of microsystems for measuring/transferring data on physical parameters (temperature, hygrometry, droplets…) at low cost, low energy (incl. energy harvesting and for sustainable agriculture, d) the ergonomy of smartphone based data-acquisition, to ensure a good adoption by farmers.

Axis 4: Information systems, data storage, transfers and sharing. The above-mentioned embedded sensors, Internet of Things, experiments, crowd sourcing, etc, produce many data potentially available for new services in agriculture. Up to recently, the use of information system in agriculture has been relatively behind the ones in the industrial sector. Information systems in the area of agriculture have some particularities that are not seen in information systems designed for business, as they have to take into consideration additional elements such as space and time. The current advanced agricultural data management processes, which enables us to share data and knowledge across disciplines, sectors and countries, falls within several scientific topics in Computer Science. Data must be retrievable, accessible, interoperable, and re-usable in order to produce datasets that will support interdisciplinary cutting-edge research aiming at meeting the present and future challenges of agriculture, food security and market needs. The main challenges of data management are i) Scalability (Big data, big applications), ii) Complexity (relevance, uncertainly, confidence, multi-scale, etc), iii) Heterogeneity of data sources and semantics, iv) Privacy and Ethic (sensitive farm data, fundings, surveys, etc), v) Data flows and reproducibility (scientific workflows, provenance). Moreover, due to interdisciplinary requirements and context-aware approaches, data management in the agriculture domain requires adding intelligence to data (common vocabulary, ontologies, rules).

Axis 5 – Data Mining, Data Analysis and Knowledge Discovery. Agricultural data are at the same time continuously growing in volume, multi-scale (time, space), uncertain, dynamic, and heterogenous. They can also be sensitive and may require solutions that preserve privacy. Unfortunately, there are no data mining approaches capable to deal, simultaneously, with all the features characterizing agricultural data. The work hypothesis is to build up a methodology based on the broad spectrum of expertise and skills in statistical data analysis, data mining and integration of imperfect knowledge that the #DigitAg teams have developed for other sectors (eg medical sector). The proposed methods will be co-designed with domain actors (data scientists, advisor experts, farmers) and they will interact with these actors at different levels, either to receive domain knowledge, to help specify the problem at hand or to present results. An important challenge will be the definition of interactive methods especially tailored for non-specialists (ex: visual analytics, justification and explanation). These methods will lead to a major breakthrough in the practical exploitation of agricultural Big Data. A precise framework for the evaluation of results will be set up along the project duration, based on statistical model validation, the agronomist expertise (INRA, ACTA) and collaboration with other domain actors. Such framework represents a resolutely innovative aspect in the data-mining and statistical analysis domain. Assessing current results on agricultural time scales (seasons, years) will allow us to continuously improve the proposed methods.

Axis 6: Multiscale modelling and simulation. Models are an essential component of digital agriculture, as they enable one to turn “data” into “information”, “diagnosis” and “agricultural advices”. They are the basis for precision agriculture/ livestock farming and Decision Support Systems (DSS). An overhaul of our current production and impact models is urgently demanded: models need to better represent and take into account the plant interaction with its environment, the effects of multi stresses and extreme climatic events, the impact of alternative field and farm management strategies... Today’s bottelnecks to modelling/ simulation is the lack of applicability of dynamic models. Our objective is to improve it by coupling different types of models, and by using real time data assimilation, at various spatial (from farm plot to regions) and time scales. First, the genetic asset has to be considered: genotype-to-phenotype models (*ie models who link the genes with plant behaviour in real environment*) will be informed by the outputs of high-throughput phenotyping methods. To this end, modular modelling solutions are preferred to easily add and share new models with explicit genetic information. Second, the operational use of next generation sensors in agriculture (IoT, drones…) creates the need for new methodologies (e.g. spatio-temporal data analysis, including advanced statistical inference) for data integration in models (including seasonal weather projections) to produce more accurate and predictive information in real time. There is also a need to enhance the development of management/decision models based on such data. Third, for production system assessment, models should predict a larger array of responses (services) and trade-offs than they currently do. Production models should be coupled with economic models for strategic decision-making, and methods (fuzzy logic, multi-objective optimization, argumentation…) for multi-criteria evaluation are needed. Last, modelling research should also address more transversal issues, e.g. quantification of model uncertainty and model integration. Uncertainty quantification is demanded by tactical decision-makers and by policymakers. Finally, models that integrate different sources of information (both qualitative and quantitative) and of knowledge (expert-based knowledge, data-driven knowledge…) are expected for both tactical and operational decision-making.

Annexe 4: Les enjeux et défis sociétaux

#DigitAg a identifié 8 challenges répondant aux 2 défis (stakes) sociétaux en lien avec l'agriculture :

STAKE I: Agricultural production improvement by ICT-enabled agriculture
Challenge 1: ICT and the agroecology challenge.
Challenge 2: Digital solutions to optimize the genotype in changing production systems and markets.
Challenge 3: ICT and crop protection.
Challenge 4: ICT and sustainable animal production.

STAKE II : A better society inclusiveness for ICT-enabled agriculture
Challenge 5: ICT and new farm advisory services.
Challenge 6: ICT and agricultural territory management.
Challenge 7: ICT for a better acknowledgement of agriculture in the global value chain.
Challenge 8: ICT and agricultural development in Africa.

Les objectifs sont décrits ci-dessous.

STAKE I: Agricultural production improvement by ICT-enabled agriculture

Challenge 1: ICT and the agroecology challenge (30-35%). Agroecology uses biodiversity and ecological processes to design efficient, sustainable and still productive agricultural systems. Managing more complex systems with solutions adapted to local conditions requires collecting and processing a lot of information about the state of the physical and biological components (plant, animals, soil, wheather…). Then, digital technology is a powerful, still under-estimated, lever of the agroecological transition. Addressing this challenge requires the development of new sensors (A3), of information systems and data processing to connect local and global data (A4 & A5), of models to predict and support decision making (A5 & A6); it will rely on cooperation with social sciences (A1 & A2) to connect processes, techniques and people, for instance in the framework of a living lab project. *A first example of research would be to study, based on case studies, how ICT can be mobilized to continuously monitor and assess ecosystem services to help farmers to manage their transition to agroecology, while maintaining their farming system within the expected balance between provisioning and other ecosystem services.*

Challenge 2: Digital solutions to optimize the genotype in changing production systems and markets (10-15%). Fast developing high-throughput plant and animal phenotyping is a powerful lever to set up new production systems optimized to the local conditions. However, until now, sensors, data storage, data processing and modeling solutions for phenotyping have been designed rather independently making the whole phenotyping chain rather inefficient and limiting its use outside the research laboratories. Tools and methods should be standardized and improved: eg more physiological understanding must be input to develop new sensors (A3) and models (A6) in parallel. In addition, an integrative approach should be followed for data and knowledge mining and reuse (A2, A4 & A5). This ICT-based integration of phenotyping tools and methods, coupled with the understanding of farmers' and markets' needs (A1), will streamline operational research to tailor ideotypes, in silico, to new production systems and markets. *Subjects to study would be (1) how genotype-to-phenotype models calibrated using information from high-throughput phenotyping could be used to inform varietal choices or to develop varieties better adapted to future cropping systems; (2) how ICT could help linking data collected in farmer networks with genotypic information to optimize varietal choice and crop management.*

Challenge 3: ICT and crop protection (10-15%). Reducing pesticide usage is a major issue, with simultaneous requirements of transparency, safety, environment preservation and farmer income. Technical, sociological, economical and organisational barriers hinder generalised change in crop protection practices and massive pesticide use reduction. New angles of views are required. We propose the following hypothesis for a scientific interdisciplinary co-construction: the basis is that "with crop protection, the farmer looks for a revenue and a market", and therefore "crop protection must be rethought through **tailored services supported by ICT that combine economical and technical insurances**". The design, organization and implementation of such services rely on understanding individual and collective risk aversion, tailoring adequate services (A2) and developing appropriate sensors (A3), traceability devices (A1 & A4), Information systems (A4) and data-driven and expert-based models (A5 & A6). *A first research subject would be to study, design and experiment new means of risk assessment based on the combination of human-based and new sensor-based information, both at field scale and bioclimatic region scale;*

Challenge 4: ICT and sustainable animal production (10-15%). Animal production is one of the agricultural sectors most advanced with ICT, with new livestock technologies, eg RFID identification, sensors and robots (milking and feeding robots). Not only does this influx of technology improves the livestock productive efficiency but it also changes the farmer profession, creating a new relationship with the animal, and induces the need for a massive transition of the whole animal production sector to integrate these new approaches. Whereas farmers use these devices for monitoring, the different actors of advisory, selection, processing and health offices could benefit from this information for broader objectives. This raises the following generic questions: quality of data, interoperability (A4), evolution of current models to better integrate individual and longitudinal dimension of data in livestock management (A5 & A6), renewed multicriteria objectives of livestock performance (A1 & A2), and finally social and economic inquiries about farmer comfort, economic viability, attractiveness and acceptability of these tools regarding the model of livestock systems to be promoted (industrial vs agroecological) (A2).

STAKE II : A better society inclusiveness for ICT-enabled agriculture

Challenge 5: ICT and new farm advisory services (5-10%). The agricultural advisory sector will be deeply altered by the availability of ICT ressources. First, innovations are expected, with more individualized and targeted advices based on bigger data flows processed in real time. But ICT can generate discrepancies between farmers: some wil be empowered by embracing these new technologies whereas others will be made dependent of big companies to collect and process data. Second, ICT may have an impact on the organisation of advisory services, which may evolve either towards local networks of collaborating agents, with simple ICT devices, or towards big consulting firms managing significant investments to collect and process data. Finally, legal issues related to intellectual property and consequential value sharing. To understand and anticipate these issues, scientific communities as law, social and management sciences (A1 & 2), computer and information sciences (A4 & 5) and agronomists (A6) are to be called. *A first subject would be the analysis of new ICT tools providing advices at farm level and the change of decisions and practices depending of the farm characteristics.*

Challenge 6: ICT and agricultural territory management (5-10%). Data produced by farmers and by other actors operating on the same territory can help us to optimize the use of collective resources for agricultural purposes. For instance, information acquired by crowdsourcing campaign can be leveraged to support farming actions and/or define territorial monitoring systems. How to boost data collection (A2 and A3), how to organize, manage (A4), exploit and share (A5) the hidden knowledge behind this data constitutes major challenges to support the development of a territorial intelligence in which the farmer plays a central role and can benefit from. *A first subject would be to study how farmers could collect data about their land and practices (eg technical itinerary, presence of species of ecological interest…) to be used by land managers to assess the ecological services provided by agricultural spaces. Another example would be to study how ICT can help a better social integration of farmers in land governance structures.*

Challenge 7: ICT for a better acknowledgement of agriculture in the global value chain (3-5%). The stake is to reach a healthy and sustainable food production whereas strengthening farmer position in the global value chain. An enhanced traceability, including the product whole story, will have several benefits, either directly - eg more transparency on prices and on environmental footprints, a restored relation of trust with consumers - or indirectly through "big data" it generates. Knowledge extraction (A5) from traceability-based big data (requiring efforts on information systems, A4) will make it possible for agricultural products to better match stakeholders requirements (eg consumers, food industries, groceries). Questions are raised about the impacts of such technologies on actors, the data property and transparency for all the actors in the value chain. *A first subject would be to design models able to extract from data potentially in-conflict stakeholders' preferences and constraints, to build consensual alternatives and to justify choices, helped by social sciences.*

Challenge 8: ICT and agricultural development in Africa (10-15%). Southern countries are very concerned by digital agriculture, with constraints different from European ones. Many ongoing experiments focus on agricultural advisory, insurance, credit, education, but there is still much room for innovation, in particular through a more holistic approach to understand the factor of success of digital agriculture in Southern countries. This calls for research about how to design services based on "frugal" ICT-based technologies, eg mobile and smartphones, internet (with audio blogs) and low-cost satellite images. Specialists of innovation (A2), data acquisition technologies (A3), information system (A4), and modelling (A6) must work jointly for that purpose, in search of an ICT-enabled development model that both answers well to literate or illiterate farmers' needs. *A first research subject would be the analysis of new services for farmers provided by advisory organizations and the design of business model to support such services".*

ANNEXE 5: Liste des unités de #DigitAg

Unités de recherche / UMR	Irstea	INRA	INRIA	Cirad	Montpellier SupAgro	Université de Montellier	AgroParis Tech	Axes de recherche (cf annexe 3)
ITAP	x				x			3, 6
TETIS	x			x			X	3,4,5
AGIR (Toulouse)		x						1,6
IATE		x		x	x	X		5
MIAT (Toulouse)		x						6
PEGASE (Rennes)		x						3,5,6
System		x		x	x			6
GRAPHIK			x			X		4,5
LACODAM (Rennes)			x					5
ZENITH			x			X		5
AIDA				x				6
AMAP		x		x		x		6
GECO				x				6
Green				x				1, 2
Hortsys				x				6
Innovation		x		x	x			1, 2
LEPSE		x			x			3, 5 , 6
MISTEA		x			x			4, 6
MOISA		x		x	x			1, 2
SELMET		x		x	x			3,4,5,6
Dynamiques du Droit						X		2
IES						X		3
CEE-M		x			x	X		1
LIRMM						x		3, 4, 5
MRM						x		1, 2
GenPhySE								3,4,5,6
G-EAU	x			x	x		x	1,2,6
AGAP		x		x	x			3,4,5,6
Emmah		x						3,4,5,6

ANNEXE 6: Thèses en cours et sujets campagne 2019

Thèses en cours :

https://www.hdigitag.fr/fr/doctorants-theses-en-cours-et-soutenues-agriculture-numerique/

Thèses qui ont été sélectionnées en 2019:

https://www.hdigitag.fr/fr/offres-theses-campagne-2019/