www.ruc-aps.eu, #RUCAPS2020

MAKING AN IMPACT

Agri-Food Value Chain Decision-Making under high risk and uncertainties; an H2020 grant to support joint EU and South American Agriculture strategies

Dr. Jorge Hernandez

Director Proyecto H2020 RUC-APS

H2020 RUC-APS Project

- Funding body: EU H2020 Framework
- Call: H2020-MSCA-RISE-2015
- Topic area: "Marie Skłodowska-Curie Research and Innovation Staff Exchange (RISE)"
- Project duration: 48 months (started on 3/10/2016)
- Overall Budget: €1.3M
- Web-site: www.ruc-aps.eu

Horizon 2020
European Union funding
for Research & Innovation
MARIE CURIE ACTIONS

What is happening since….ALWAYS!!

Uncertainty and Risk conditions (Many variables and their interrelationships to consider)

Hail Storm

Wild Animals

Pesticide damage

Drought conditions

KEY DECISIONS

What, Where, when, how to produce? to deliver in the right quantity, time and quality to end customers?

Horizon 2020
European Union funding
for Research & Innovation
MARIE CURIE ACTIONS

Innovation in Agriculture Production Systems is a must

#RUCAPS, #RUCAPS2020

Horizon 2020
European Union funding
for Research & Innovation
MARIE CURIE ACTIONS

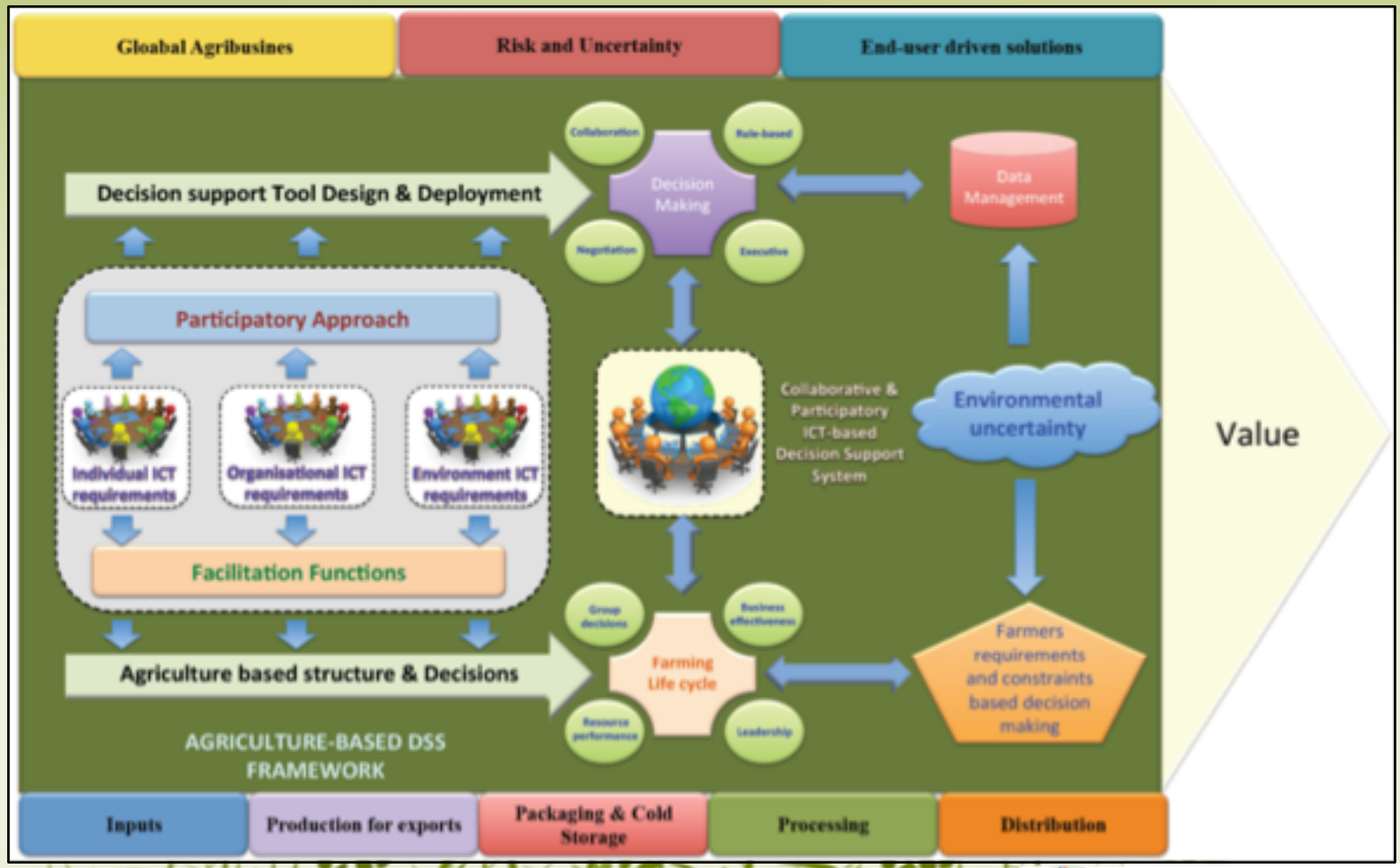
Identify the Challenges in Agri-Food Supply Chains

- **What is not new**
  - Farming and agronomic management of crops (regions, soil, climate)
  - Agriculture production systems and post-harvest processes
  - Unexpected weather conditions (climate change and diseases)
  - Use of technologies to support Agri-Food Decision-Making
  - Logistic and packaging requirements (picking, routing, delivery)

- **What still requires analysis**
  - If all previous aspects are known, why there are still inefficiencies and waste in the Agri-Food Supply Chains domain?
  - Why technology is not accessible 100% to every farmer?
  - Why Innovations processes still seems far away from end-users requirements?
  - Why Risk and Uncertainty is vaguely covered in Agri-Food?

So, what is the real meaning of applied research?

The proposed RUC-ASP framework



Horizon 2020
European Union funding
for Research & Innovation
MARIE CURIE ACTIONS

The RUC-APS Strategy

REVIEW RUC-APS MISSION

"SUPPORT FARMERS DECISION-MAKING ONCE THEY ARE FACING HIGH UNCERTAINTY AND RISK WITHIN A VALUE CHAIN VIEW"

REVIEW RUC-APS VISION

"TO BE A CONSOLIDATED AND COMPETITIVE INTERNATIONAL AND MULTIDISCIPLINARY CONSORTIUM TO PROVIDE PARTICIPATORY AND COLLABORATIVE SOLUTIONS TO UP-TO-DATE AGRICULTURE VALUE CHAIN STAKEHOLDERS CHALLENGES AND REQUIREMENTS"

Horizon 2020
European Union funding
for Research & Innovation
MARIE CURIE ACTIONS

The RUC-APS consortium

Country	Acronym	Participant
	ULIV	Management School - University of Liverpool
	ULIV	Institute for Risk and Uncertainty - University of Liverpool
	ULIV	Integrative Biology Institute - University of Liverpool
	UoP	Business School - University of Plymouth
	IFA	Innovation for Agriculture, the Royal Agriculture Society of England
	RP	Riviera Produce
	ALSIA	Agenzia Lucana di Sviluppo e di Innovazione in Agricoltura
	CNR- ISPA	CNR - Istituto di Scienze delle Produzioni Alimentari
	AINIA	Food Innovation Technology Center
	FEDACOVA	Valencian Agri-Food Business Federation
	UPV	Universitat Politècnica de València

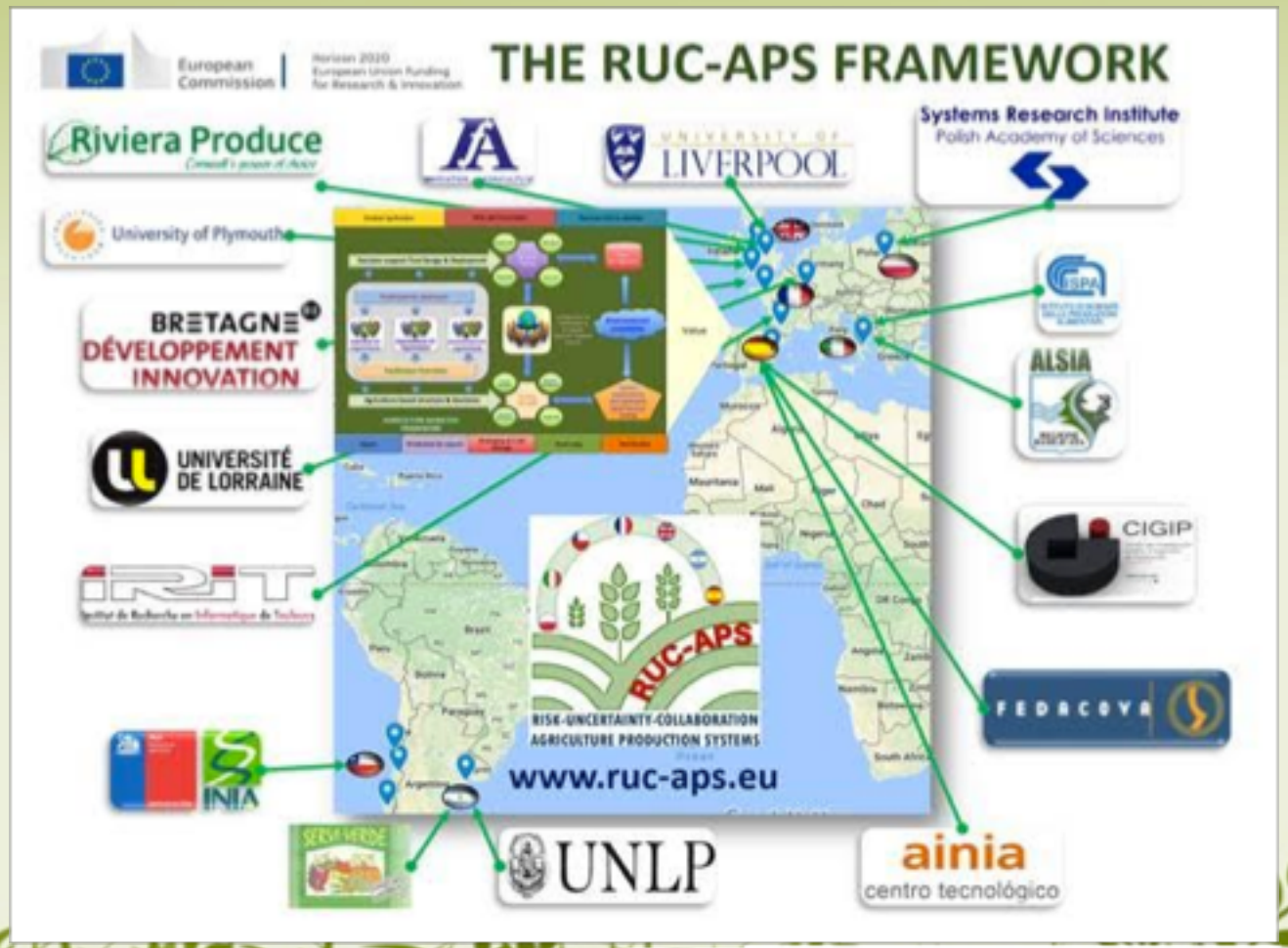
Country	Acronym	Participant
	BDI	Bretagne Development Innovation
	UL	TELECOM Nancy - University of Lorraine
	UTC1	Université Toulouse 1 Capitole
	ISBPAN	Intelligent Systems Laboratory - Systems Research Institute Polish Academy of Science
	INIA	La Platina - National Agriculture Institute of Chile
	INIA	Carillanca - National Agriculture Institute of Chile
	UNLP	Faculty of informatics - Universidad de La Plata
	UNLP	Faculty of Agronomy and Natural Sciences - Universidad de La Plata
	SV	ServiVerde

+ new Chilean institutions

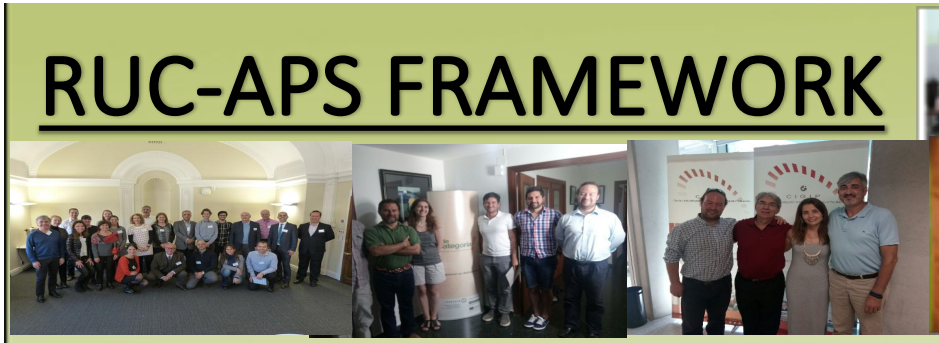
Horizon 2020 European Union funding for Research & Innovation MARIE CURIE ACTIONS

INDUSTRY/PUBLIC SECTOR INVOLVEMENT

- ✓ 16 Institutions
- ✓ > 100 researchers
- ✓ 500 Agri-Food stakeholders
- ✓ Ministries and local governments in agriculture involved



RUC-APS FRAMEWORK



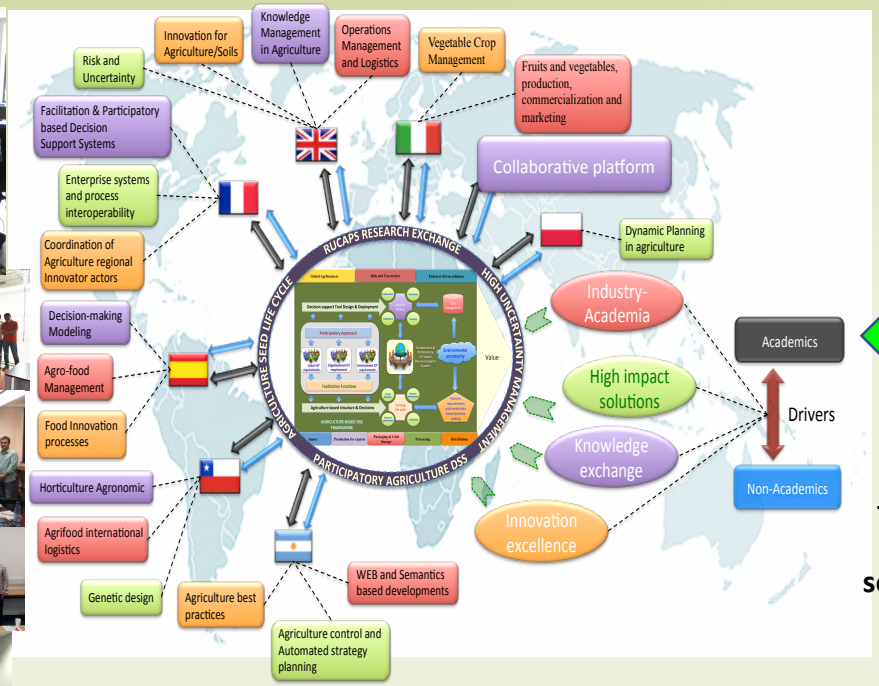


Figure 1. RUC-APS International Platform

> 200
- Meetings
- field visits
- Workshops in EU & south América

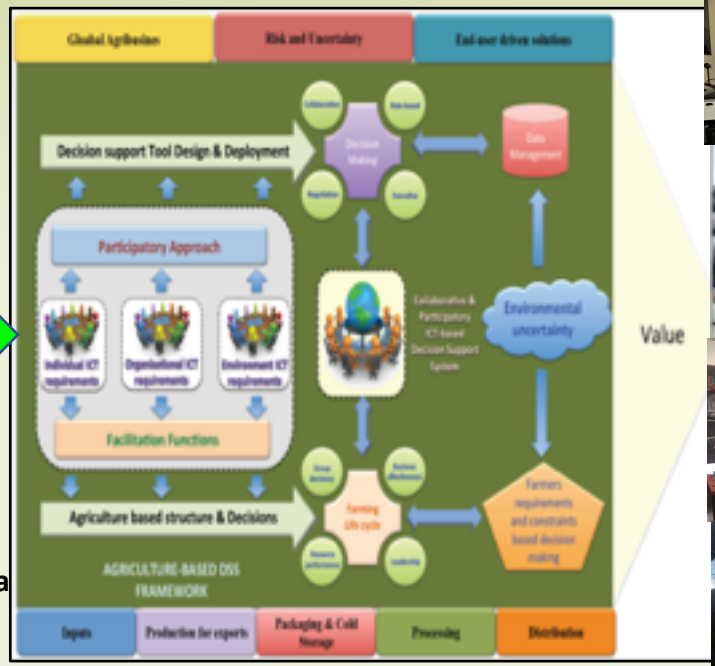


Figure 2. The RUC-APS Framework

#RUCAPS, #RUCAPS2020 **www.ruc-aps.eu**

EVIDENCE - Global challenges facing food and agriculture (FAO, 2017)

- Sustainably improving agricultural productivity to meet increasing demand.
- Ensuring a sustainable natural resource base.
- Addressing climate change and intensification of natural hazards.
- Eradicating extreme poverty and reducing inequality.
- Ending hunger and all forms of malnutrition.
- Making food systems more efficient, inclusive and resilient.
- Improving income earning opportunities in rural areas and addressing the root causes of migration.
- Building resilience to protracted crises, disasters and conflicts.
- Preventing transboundary and emerging agriculture and food system threats.

Key research Activities & outcomes

Journals Publications (ISI Q1)

1. Esteso A., Alemany MME, Ortiz A. (2018) "Conceptual Framework for Designing Agri-Food Supply Chains under Uncertainty by Mathematical Programming Models", **International Journal of Production Research** (**accepted for publication**)
2. Huilan Chen, Shaofeng Liu and Festus Oderanti, 2017. A Knowledge Network and Mobilisation Framework for Lean Supply Chain Decisions in Agri-food Industry. International Journal of Decision Support System Technology 9(4): 37-48. DOI: 10.4018/IJDSST.2017100103
3. Janusz Kacprzyk, Jan W. Owsiński, Stanislau Shyrai, Eulalia Szmidt, Dmitri A. Viattchenin, Jorge Hernandez Hormazabal. A Heuristic Algorithm Of Possibilistic Clustering With Partial Supervision For Classification Of The Intuitionistic Fuzzy Data. To appear **in Journal of Multi-valued Logic and Soft Computing**
4. Morteza Yazdani, Pascale Zaraté, Adama Coulibaly, Edmundas Kazimieras Zavadskas. A group decision making support system in logistics and supply chain management. In : **Expert systems with Applications**, Elsevier, Vol. 88, p. 376-392, décembre / december 2017.

Key research Activities & outcomes

Book Chapters

1. Esteso A., Alemany M.M.E., Ortiz A. (2017) Conceptual Framework for Managing Uncertainty in a Collaborative Agri-Food Supply Chain Context. In: Camarinha-Matos L., Afsarmanesh H., Fornasiero R. (eds) Collaboration in a Data-Rich World. PRO-VE 2017. IFIP Advances in Information and Communication Technology, vol 506. Springer, Cham.
2. Guoqing Zhao, Shaofeng Liu and Carmen Lopez, 2017. A literature review on risk sources and resilience factors in agri-food supply chains. The 18th Working Conference on Virtual Enterprise (PRO-VE 2017), 18-20 September 2017, Vicenza, Italy. In IFIP Advances in Information and Communication Technology Vol. 506
3. Hernandez, J. E., Kacprzyk, J., Panetto, H., Fernandez, A., Liu, S., Ortiz, A., & De-Angelis, M. (2017). Challenges and solutions for enhancing agriculture value chain decision-making. A short review. In IFIP Advances in Information and Communication Technology Vol. 506 (pp. 761-774). doi:10.1007/978-3-319-65151-4_68.

Horizon 2020 European Union funding for Research & Innovation MARIE CURIE ACTIONS

Key research Activities & outcomes

Conference publications

1. Bosetti, G., Firmenich, S., Fernandez, A., Winckler, M., & Rossi, G. (2017). From Search Engines to Augmented Search Services: An End-User Development Approach. In J. Cabot, R. De Virgilio, & R. Torlone (Eds.), Web Engineering: 17th International Conference, ICWE 2017, Rome, Italy, June 5-8, 2017, Proceedings (pp. 115–133). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-60131-1_7
2. A. Esteso, MME Alemany, A. Ortiz, Fuzzy MILP Model for Increasing Vegetables Quality with a Collaboration Program under Uncertainty (accepted) for the 29th Conference on Operational Research, Valencia 8-11 July 2018.
3. Esteso A., Alemany MME, Ortiz A., Improving Vegetables Quality in Small-Scale Farms Through Stakeholders Collaboration, (Submitted (under review) to the 12th International Conference on Industrial Engineering and Industrial Management (ICIEM) (12th and 13th July 2018).

Horizon 2020 European Union funding for Research & Innovation MARIE CURIE ACTIONS

Key research Activities & outcomes

Conference publications

4. Esteso A., Alemany M.M.E., Ortiz A. (2017) Conceptual Framework for Managing Uncertainty in a Collaborative Agri-Food Supply Chain Context. Working Conference on Virtual Enterprises PRO-VE 2017: Collaboration in a Data-Rich World pp 715-724.
5. Jorge Hernandez, Cecile Sauvage, Jonathan Rushton, Andy Lyons, Paul Drake, Manish Shukla (2018). Understanding and Gathering Decision-Making Challenges in EU Agri-Food Systems with Uncertain Regulations. A MCDM-AHP analysis. (**To be presented at N8 Conference, June 2018, Liverpool, UK**)
6. Jorge E. Hernández, Janusz Kacprzyk, Andrew Lyons, Angel Ortiz and Hervé Panetto (2018). Review on Operational Research Advances in Agri-Food Supply Chains and societal challenges (**To be presented at EURO 2018, July 2018, Valencia, Spain**)

Horizon 2020 European Union funding for Research & Innovation MARIE CURIE ACTIONS

Key research Activities & outcomes

Conference publications

7. Hernandez JE , Mortimer M , Patelli E , Liu S , Drummond C , Kehr E , Calabrese N , Inaconne R , Kacprzyk J , Alemany M , Gardner D , Fernandez A , Panetto H , Zarate P , Martinez D , Simontti A , Guyon C , Sauvage C. (2017). RUC-APS: Enhancing and implementing Knowledge based ICT solutions within high Risk and Uncertain Conditions for Agriculture Production Systems. 11th International Conference on Industrial Engineering and Industrial Management, Valencia, Spain.
8. Ortiz, A., Alarcón, F., Pérez, D. and Alemany M.M.E (2017). "Identifying the main uncertainties in the Agri-Food Supply Chain". Presented at International Join Conference 2017 (ADINGOR, ABEPRO, IISE AND ASEM). UPV-VALENCIA (Spain) 6th-7th July 2017. To be published on SPRINGER in 2018.
9. Pérez D., Alarcón F., Drummond, C. and Ortiz, A. (2017). "Towards a Sustainable Agri-food Supply Chain model. The case of LEAF". Presented at CIO 2017: XXI Congreso de Ingeniería de Organización and 11th International Conference on Industrial Engineering and Industrial Management. UPV-VALENCIA (Spain) 5th-6th July 2017. To be published on SPRINGER in 2018.

Horizon 2020 European Union funding for Research & Innovation MARIE CURIE ACTIONS

Key research Activities & outcomes

Conference publications

8. Verdecho, MJ; Alfaro-Saiz, JJ; Rodríguez-Rodríguez, R. Integrating business process interoperability into an inter-enterprise performance management system. (In this paper there is an application of the developed performance management framework for an agri-food supply chain) (accepted) for the IESA18 Interoperability for Enterprise Systems and Applications (22nd and 23rd March 2018):
9. Verdecho, MJ; Alarcón, F; Pérez Perales, D. Proposal of a Customer-Oriented Sustainable Balanced Scorecard for Agri-food Supply Chains (Submitted (under review) to the 12th International Conference on Industrial Engineering and Industrial Management (ICIEM) (12th and 13th July 2018):
10. Verdecho, MJ; Alarcón, F; Pérez Perales, D; Alfaro-Saiz, JJ; Rodríguez-Rodríguez, R. A multi-criteria methodology to select suppliers for sustainable supply chains (Submitted (under review) to the 12th International Conference on Industrial Engineering and Industrial Management (ICIEM) (12th and 13th July 2018):

Horizon 2020 European Union funding for Research & Innovation MARIE CURIE ACTIONS

Key research Activities & outcomes

Conference publications

11. V.S. Fuertes-Miquel, L. Cuenca, A. Boza, C. Guyon, MME Alemany, "Conceptual Framework for the characterization of Vegetable Breton Supply Chain Sustainability in an Uncertain Context" (Submitted (under review) to the 12th International Conference on Industrial Engineering and Industrial Management (ICIEM) (12th and 13th July 2018).
12. A. Esteso, MME Alemany, A. Ortiz, C. Guyon. A Collaborative Model to Improve Farmers' Skill Level by Investments in an Uncertain Context. Submitted (under review) to the PRO-VE 2018, 19th IFIP / SOCOLNET, Working Conference on Virtual Enterprises 17-19 September 2018 – Cardiff, UK.
13. Gabriel Leal, Wided Guédria, Hervé Panetto, Assessing interoperability requirements in networked enterprises: A model-based system engineering approach, INSIGHT - International Council on Systems Engineering (INCOSE), Wiley, 2017, 20 (4), pp.15-18. 〈10.1002/inst.12174〉

Horizon 2020 European Union funding for Research & Innovation MARIE CURIE ACTIONS

Key research Activities & outcomes

Conference publications

14. Gabriel Leal, Wided Guédria, Hervé Panetto, Erik Proper, An approach for interoperability assessment in networked enterprises, 20th IFAC World Congress, IFAC 2017, Jul 2017, Toulouse, France
15. Hernandez, J.E., Kacprzyk, J., Panetto, H., De Angelis, M., Fernandez, A., Ortiz, A. (2017). Challenges and solutions for enhancing Agriculture Value Chain Decision-making. A short review

Horizon 2020 European Union funding for Research & Innovation MARIE CURIE ACTIONS

Key research Activities & outcomes

Conference publications

16. Illescas Espinoza W.H., Fernandez A., Torres D. (2017) The Semantic Web as a Platform Against Risk and Uncertainty in Agriculture. In: Camarinha-Matos L., Afsarmanesh H., Fornasiero R. (eds) Collaboration in a Data-Rich World. PRO-VE 2017. IFIP Advances in Information and Communication Technology, vol 506. Springer, Cham.
17. Leandro Antonelli, Alejandro Fernández, Jorge E. Hernández. The use of glossaries to define consistent models on agricultural contexts. Euro2018. Valencia, Spain. July 2018.
18. Leandro Antonelli, Guy Camilleri, Julián Grigera, Mariángeles Hozikian, Cécile Sauvage and Pascale Zarate. A Modelling Approach to Generating User Acceptance Tests. ICDSST2018, Heraklion, Greece, 22-25 May 2018, submitted.

Horizon 2020 European Union funding for Research & Innovation MARIE CURIE ACTIONS

Key research Activities & outcomes

Conference publications

19. Urbieta, M., Firmenich, S., Maglione, P., Rossi, G., & Olivero, M. A. (2017). A Model-Driven Approach for Empowering Advance Web augmentation -From client-side to Server-side support. In Proceedings of the 13th International Conference on Web Information Systems and Technologies. Porto, PT.
20. Pascale Zaraté, Amir Sakka. How to support Decision Making Processes in Agribusiness through the GRUS system. 29th European Conference on Operational Research, special session "OR ADVANCES IN AGRIBUSINESS", Valencia, July 8-11 2018, accepted.

Horizon 2020 European Union funding for Research & Innovation MARIE CURIE ACTIONS

Key research Activities & outcomes

Conference publications

21. Huilan Chen, Shaofeng Liu and Festus Oderanti, Exploring the relationship between knowledge network/ mobilisation and lean performance in agri-food chain context: A fuzzy-set qualitative comparative analysis. 2017 International Conference of Global Innovation and Knowledge Academy (GIKA). 28-30 June 2017, Lisbon, Portugal.
22. Biljana Mileva Boshkoska, Shaofeng Liu, Huilan Chen, 2018. Towards a knowledge management framework for crossing knowledge boundaries in agricultural value chain. The 19th Open Conference of the IFIP WG8.3 on Decision Support Systems (IFIP DSS 2018). The theme of the conference is "DSS Research Delivering High Impacts to Business and Society".13-15 June 2018 in Ljubljana, Slovenia. (accepted to be published in JDS Special Issue)
23. Guoqing Zhao, Shaofeng Liu and Carmen Lopez, 2018. Building theory of agri-food supply chain resilience using total interpretive structural modelling. The 4th International Conference on Decision Support System Technology–ICDSST2018 & PROMETHEE DAYS 2018, Heraklion, Greece, 22-25 May 2018.

Horizon 2020 European Union funding for Research & Innovation MARIE CURIE ACTIONS

Key research Activities & outcomes

Conference publications

24. Huilan Chen, Shaofeng Liu and Festus Oderanti, 2018. Theoretical and Empirical Evidence of a Knowledge Mobilization Framework for Lean Supply Chain Decisions in Agri-food Industry. The 4th International Conference on Decision Support System Technology–ICDSST2018 & PROMETHEE DAYS 2018, Heraklion, Greece, 22-25 May 2018.

Horizon 2020
European Union funding
for Research & Innovation
MARIE CURIE ACTIONS

Key research Activities & outcomes

In preparation for submission in 2018

1. Hernandez J., Kacprzyk, J., Ianaconne, R., Fernandez A., Zarate, P. "Collaborative Decision Support Systems to enhance Agribusiness Innovation and Value Chain decision-Making. A Review". (**In preparation**)
2. Hernandez J., Butel L., Alemany M. "A reference model to support collaborative Agriculture Production and Transport planning". (**In preparation**)
3. Hernandez, J., Kehr E., Saavedra, G., Zarate, P. "Using a multi-criteria decision making approach to evaluate Agriculture variety selection under uncertainty". (**In preparation**)
4. Elgueta, S., Hernandez, J.E., Iannacone, R. Assessing leafy vegetables Quality standards through a System dynamic approach. A case study in Chile (**In preparation**)

Horizon 2020
European Union funding
for Research & Innovation
MARIE CURIE ACTIONS

Conclusions

- Current growing in risk and uncertainty is affecting affects agribusiness stakeholders' decision-making, especially in terms of dealing with the key commodities, such as price.
- The major reasons causing information sharing issues are that producers not always have access to the right ICT, hence access to the right information, timely, is not that straight.

Horizon 2020
European Union funding
for Research & Innovation
MARIE CURIE ACTIONS

Conclusions

- Due to climate change, a higher need for collaboration is required to overcome the main uncertainties, in special amongst stakeholders from similar latitudes.
- Interoperability issues are still far away to be solved in agriculture, which is paradoxical considering the amount of technology available.

Horizon 2020
European Union funding
for Research & Innovation
MARIE CURIE ACTIONS

www.ruc-aps.eu, #RUCAPS2020

MAKING AN IMPACT

Agri-Food Value Chain Decision-Making under high risk and uncertainties; an H2020 grant to support joint EU and South American Agriculture strategies

Dr. Jorge Hernandez

Director Proyecto H2020 RUC-APS