Report to CIGR: Working Groups
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The CIGR Working Groups are important building blocks of the CIGR organisation. In order to further enhance the important role of the WG in CIGR, CIGR Working Groups are encouraged to:

- Increase their visibility and functionality in CIGR;
- Establish more close links with CIGR Sections;
- Sponsor or co-organise relevant CIGR Section Symposiums;
- Organise WG national or international workshops;
- Publish CIGR Booklets/Handbook on WG area of interests;
- Organise Special Issue in your WG area for CIGR E-Journal; and
- Conduct actively other relevant activities.

A key pending task is the alignment of the WGs with the strategic goals of CIGR. Preliminary strategic goals drafted at the Antalya meeting 2018, form the basis for this work. Further elaborations on the strategic goals will provide a precise base for the aligning the WGs with these.

Currently, 11 working groups are listed in CIGR:

- *Animal Housing in Hot Climate*
- *Cattle Housing*
- *Agricultural Engineering University Curricula Harmonization*
- *Rural Landscape, structures and infrastructure Planning and Valorization*
- *Image Analysis for Agricultural Processes and Products*
- *Food Safety*
- *Logistics*
- *Precision Aerial Application*
- *Plant Factory and Intelligent Greenhouse (PFIG)*
- *Funtional/Wellness Foods and Nutrition (FWFN)*
- *Rural Development and Preservation of Cultural Heritage*

Below are listed a status for the different WG's.

Table 1. Work group status

CIGR Working Groups	Active	Not active	Comments
1: Animal Housing in Hot Climate	x		
2: Cattle Housing	x		
3: Agricultural Engineering University Curricula Harmonization	x		
4: Rural Landscape, structures and infrastructure Planning and Valorization	x		
5: Image Analysis for Agricultural Processes and Products	x		
6: Food Safety	x		
7: Logistics	x		
8: Precision Aerial Application	x		
9: Plant Factory and Intelligent Greenhouse (PFIG)	x		

10: Funtional/Wellness Foods and Nutrition (FWFN)	x		
11: Rural Development and the Preservation of Cultural Heritages	x		

1. ANIMAL HOUSING IN HOT CLIMATE WORKING GROUP

Introduction

The group was established in 2003 by joining researchers from different institutions, countries and continents. The aim of the group enhancing CIGR actions on Animal Housing in hot climate by solving the problems in barns in hot regions. That per pass the different CIGR Sections considering different supply chains and systems, it aims at contributing with discussions, planning and actions to ensure good environmental for animals all over the world. The Hot Climate Working Group CIGR Section II is a worldwide group of experts interested solving problems related to managing livestock under hot climate conditions.

Mission

- To Improve understanding of controlling the animals environment
- To enhance the scientific knowledge and contribute to technological advances for assuring livestock under hot climate conditions
- To better understand the problems and improve environment basis.

Objectives

The CIGR-Section II Hot Climate WG has lead and organized a number of interesting workshops all over the world. However, the intention of the WG is to generate project opportunities based on funding available in countries that are faced with hot climate problem. The group might create visibility in the EU, America (North and South) and China to submit proposals for funding and generate some focused research to find implementable solutions.

Scope

- Technologies, methods, practices and analyses for ensuring interested solving problems related to managing livestock under hot climate conditions.
- Avoiding and /or minimizing and predicting risks related to hot climate, environment and gases hazards

Activities

- Member meeting was conducted in Iguassu Brazil in 2008.
- Member meeting was conducted in Valencia, Spain, July, 2012

The new focus of the Working Group will be on “application” and the next workshop will be an “extension related conference”.

Israeli colleagues at the Volcani Institute have been asked if they are willing to organize the fourth Hot Climate workshop. As an alternative, the workshop can also be organized by Prof. El Houssine Bartali from Morocco.

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2. CATTLE HOUSING WORKING GROUP

INTRODUCTION
The WG is composed of several experts (researchers, engineers, extension service persons) working in different fields (behavior, environment, climate conditions, construction…) around cattle housing. The aim of the WG is to analyze and provide references on housing conditions and building construction for cattle (dairy, beef, calves) in different climate regions of the world.

Mission

The aim of the WG is to analyze and provide references on housing conditions and building construction for cattle (dairy, beef, calves) in different climate regions of the world. The Cattle Housing Work Group writes comprehensive guide books for beef and dairy cattle housing and short notes on more specific technical topics.

Objectives

Provide references for cattle housing aspects usefull for extension services and farmers.

Scope

Cattle housing: dairy cows, beef and suckler cattle, calves. Topics worked on: behavioural needs of animals, general housing conditions, feeding, milking, handling equipment...

Dear to the COVID-19 situation, the Cattle Housing Group did not meet in the year 2020 and did not do any work.

Status: Active

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3. AGRICULTURAL ENGINEERING UNIVERSITY CURRICULA HARMONIZATION WORKING GROUP

INTRODUCTION

The process of international harmonization of the degree study programs in Agricultural/Biosystems Engineering (ABE) was started by Prof. Giuseppe Pellizzi during CIGR 1989 Conference and was continued by Prof. Pierluigi Febo in the EU, within EurAgEng SIG RD12 - Education and Communication, and also elsewhere, within CIGR WG1 - Agricultural Engineering University Curricula Harmonization.

Then, four thematic networks were effective:

1. USAEE-TN (University Studies of Agricultural Engineering in Europe - A Thematic Network), comprising 31 institutions from 27 countries, from 2002 to 2006;
2. Consortium POMSEBES (Policy Oriented Measures in Support of the Evolving Biosystems Engineering Studies in USA - EU), comprising eight EU and four USA institutions, from 2006 to 2008;

3. ERABEE-TN (Education and Research in Biosystems Engineering in Europe - A Thematic Network), comprising 35 institutions from 27 countries, from 2007 to 2010;
4. Consortium TABE.NET (Trans-Atlantic Biosystems Engineering Curriculum and Mobility), comprising four EU and two USA institutions, from 2009 to 2013.

Mission

The mission is to show the state of the art on Agricultural/Biosystems Engineering (ABE) degree study programs 20 years after the last overview, presented during AgEng2000 Conference. In fact, the book and CD-ROM “The University Structure and Curricula on Agricultural Engineering” - an overview of 36 countries were presented by Prof. Pierluigi Febo during the AgEng 2000 Conference, held in Warwick (UK).

Objectives

The major objectives achieved by the above thematic networks were to:

- define and develop core curricula of 1st and 2nd cycles, to be used as benchmarks for degree study
- programs in Agricultural Engineering in Europe (USAEE-TN);
- develop a web-based database including the courses or modules of the above degree study programs, in order to facilitate the recognition of the core curricula and, therefore, promote the student mobility in the EU (USAEE-TN);
- perform studies on accreditation procedures of the above degree programs in the EU (USAEE-TN);
- perform studies on the transition of curricula from the traditional Agricultural Engineering to the broader Biosystems Engineering (ERABEE-TN);
- establish the recognition procedures of new European degree study programs in Biosystems Engineering by FEANI and EurAgEng, based on the core curricula developed by USAEE-TN (ERABEE-TN);
- promote the mobility of researchers and students within the EU, as a consequence of the development of compatible degree study programs in Biosystems Engineering and the enhancement of their attractiveness (ERABEE-TN);
- define and develop 11 Agricultural/Biosystems Engineering degree study programs, satisfying FEANI (European Federation of National Associations of Engineers) and EurAgEng criteria, in the EU (ERABEE-TN).

Scope

The scope is the state of the art on Agricultural/Biosystems Engineering (ABE) degree study programs.

Activities

Some examples of significant changes relevant to ABE degree study programs occurred in the EU after the end of ERABEE-TN project are the curricula established by the Higher Education Institutions (HEIs) of seven countries.

Even if the monitoring of ABE degree study programs in the EU is still in progress, the Universities of some countries (e.g. Czech Republic, France, Germany, Lithuania, Netherlands, Norway and Portugal) offer BSc. and MSc. curricula in this area, while the HEIs of other countries (e.g. Austria, Denmark, Finland and Italy) offer BSc. and MSc. curricula including subjects related to Agricultural Engineering and Applied Agricultural Engineering as at least 30% of the total ECTS study load.

At present the harmonization process of Agricultural/Biosystems Engineering degree study programs in Europe benefits from the results of the projects of USAEE and ERABEE thematic networks.

Other important contributions towards the harmonization of the European curricula in Agricultural/Biosystems Engineering were achieved through the cooperation between EU and US Higher.

Education Area institutions, during the projects of POMSEBES consortium and TABE.NET one.

However, the above process is still in progress and will be also performed through the dissemination activities of ERABEE-TN and future projects, which will be submitted to the EU by the partners of this network.

Status: Active

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4. RURAL LANDSCAPE, STRUCTURES AND INFRASTRUCTURE PLANNING AND VALORIZATION

Status: Presumed inactive
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Mission statement
Landscape is about the relationship between people and place. Human impact on the place has changed the landscape. In the past, the rural landscape has been mostly influenced by farmers and landowners. Now, the landscape has more urban influences. The rural cultural landscape which is a product of environmental conditions and land use is vanishing. Rural landscape protection and valorization are needed. The Rural landscape protection and valorization should integrate natural conservation, farmland retention, historic preservation and so on. The Rural landscape protection and valorization should be linked to the social and economic needs. The Rural landscape protection and valorization should be sustainable. The mission of this working group is having the intensive discussion on the question how research might support rural landscape protection and valorization. The common understanding that can be shared and generalize the issue of the development of future rural landscapes is expected.

5. IMAGE ANALYSIS FOR AGRICULTURAL PROCESSES AND PRODUCTS WORKING GROUP

INTRODUCTION
Established in 2008 by joining researchers from different institutions, countries and continents with the aim of enhancing CIGR actions for the collaboration between institutions, enterprises and individuals in the field of computer vision and image analysis in agriculture. The WG is open to all researches interested in optical systems for agricultural products and processes. This technology has grown considerably in recent years due to the increase of their technological capacity and lower prices of equipment.

These systems allow the automation of tasks and analysis in regions of the electromagnetic spectrum that are invisible to the human eye, are capable of monitoring from far distances, can penetrate into the tissues and allow inspecting products at a high speed that would otherwise not be possible. There is a need to develop new methods, systems and algorithms capable of deal with the large amount of information provided by these systems, and to create innovative developments that can be transferred to the industry.

Mission

- To advance on new image processing technologies for the inspection of the quality and safety of agricultural products.
- To enhance the scientific knowledge and contribute to technological advances for field monitoring using remote sensing technologies.
- To facilitate the introduction of new technologies and applications based on computer vision in the agricultural processes, from the field to the table.

Objectives

- To meet recent demands on process monitoring in agricultural production, during storage and processing of raw material
- To develop objective, sensitive, and reliable optical tools for receiving analytical data in a non-destructive way

- Applications of machine vision and image processing in the agricultural and food industry

Scope

Monitoring

- Gathering recognition parameters for image processing in on-site monitoring of plants and animals
- Interdisciplinary exchange and development of advanced image processing methods in different applications
- Exchange between science and industry for bringing new optical compounds in the focus of scientific working groups supporting new applications
- Technologies: Fluorescence, near infrared, colour, real-time, multispectral, hyperspectral and thermal imaging, satellite imaging X-Rays, magnetic resonance imaging, microscopic imaging

Process management

- Terrestrial and aerial mapping of natural resources
- Non-destructive, on-site inspection of product properties and quality control
- Crop monitoring, precision agriculture, precision horticulture and automatic guidance
- Robotics or any other process automation
- Changes of recognized parameters in on-site monitoring as a function of time
- Livestock farming (both on and off farm applications)
- Classification in processing lines based on external and internal quality
- Real-time automatic inspection of fresh and processed agricultural products
- Image processing with respect to geometric and structure analyses
- Development of phantoms (gold standards)

Activities

- Organization and contribution with events together with CIGR Sections and other organizations
- Organise and operate groups of discussion
- Capture the state-of-the-art of image analyses applications in agronomy
- Enhancement of the collaboration of industry and scientists
- Publication of recent trends and future needs of industry on Image Processing in Agriculture under the guidelines of the CIGR
- Promote research partnership

A new website has been developed that can be visited at http://cigr-imageanalysis.com. All information about the working group, including past and future events organized by the working group and also others closely related to our activities are listed. In addition, the articles presented in the workshops that have been organized by the working group to the present are available for download in pdf format. Also, software and image databases are available for free download from this website.

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6. FOOD SAFETY WORKING GROUP

Mission

- To Improve understanding of hazards and their risks and control measures along food production chains
- To enhance the scientific knowledge and contribute to technological advances for assuring food safety
- To better understand the consumer perception of risks and improve risk communication

Objectives

- Gathering, generating and disseminating information on predicting and monitoring the behaviour and fate of emerging biological and chemical hazard
- Divulging advances on risk assessment and risk-benefit evaluation
- Disseminating information on tools, preservation practices and processes to ensure safety along the food chain
- Understanding and addressing consumer concerns with food safety issues

Scope

- Technologies, methods, practices and analyses for ensuring food safety from farm to fork;
- Avoiding and /or minimizing and predicting risks related to biological, chemical and physical hazards

Activities

- Organization and contribution with events together with CIGR Sections and other organizations
- Organise and operate groups of discussion;
- Promote research partnership

Status: Active

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7. LOGISTICS WORKING GROUP

Mission

In-farm, extra farm and regional logistics

- Service operation logistics
- Biomass & forage supply-chain
- Grain supply-chain
- Slurry management
- Storage and operation design

Delivery of high-value produce through the supply-chain

- Local produce
- Information sharing

Information streaming along the supply-chain

- Traceability performance for the supply chain

Objectives

- To meet recent demands on machinery management in complex agricultural operations related to harvest, distribution and transport of produce (grain, biomass, slurry)
- To share the state-of-the art technology for the optimal management of on-farm, extra-farm and regional logistic operations
- To develop methods and tools to improve the efficiency of the logistic operations
- To set-up standard parameter for comparison of logistic operations
- To optimize, with a system approach, the performance of the working chains, under many viewpoints, considering technical, economic and environmental aspects.

Scope

- To organize within CIGR specific workshops on the topic
- To interact with other CIGR Working Groups and Sections
- To provide reports on state-of-the-art of the topics
- To develop a network among the people working on logistic topics within CIGR
- Cooperate with E-Journal with papers on the topic and with a pool of expert reviewers for the subject
- To promote the activity among industry researchers and agriculture extension services specialists
- To develop contacts with similar international organization

Activities

The WG will discuss and promote the following methods and techniques (and will not be limited to):

- Set-up of field trials with standard conditions

- Intermodal operation (e.g. wagon-truck, truck-barge, etc)
- Innovative handling systems and technologies
- Storage management and agricultural facility planning
- Euristic and scheduling tools
- Discrete event simulation modeling
- Linear, mixed, integer programming
- Analytical models, statistical tools
- Vehicle route planning and logistic networks
- Management resource planning and JIT methodologies
- Lean Thinking applied to streaming of information and goods

The WG has a website, cigrlogistics.org.

Status: Active but under evaluation

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8. PRECISION AERIAL APPLICATION WORKING GROUP

Mission

The mission of the Precision Aerial Application Working Group is to develop and implement new and improved precision aerial application equipment for safe, efficient, and sustainable crop production and protection.

Objectives

The overall objective of this group is to provide precision aerial application solutions for aerial applicators using cutting edge technologies. The first variable-rate aerial application system was developed about a decade ago in the USA and since then, precision aerial application has benefitted from these technologies. Many areas around the world rely on readily available agricultural airplanes or helicopters for pest management, and variable-rate aerial application provides a way of making effective and precise application of agrochemicals. In the context of precision aerial application, variable-rate control can simply mean terminating spray over field areas that do not require inputs, terminating spray near pre-defined buffer areas determined by Global Positioning, or applying multiple rates to meet the

variable needs of the crop. Prescription maps for precision aerial application are developed using remote sensing, Global Positioning, and Geographic Information System technologies. Precision aerial application technology has the potential to benefit the agricultural aviation industry by saving operators and farmers time and money.

Scope

As the first International Precision Aerial Application Group, this new CIGR working group will serve as a valuable resource to the aerial application community. By coordinating research projects across multiple institutions, the role and impact of precision application will increase in aerial application situations.

Status: Active

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9. PLANT FACTORY AND INTELLIGENT GREENHOUSE (PFIG) WORKING GROUP

Mission

1. Improve understanding of the uniqueness of agricultural production including facilities, instrumentations, energy and water use in plant factory and intelligent greenhouse.
2. Improve understanding of plant's environmental response under artificial growing conditions, which must be investigated from the point of view of plant physiology and ecology.
3. Improve understanding of the importance of mechanization and automation to improve labor productivity in plant factory and intelligent greenhouse.
4. Improve understanding of the effectiveness of computing and modeling to find a way to increase productivity in plant factory and intelligent greenhouse.
5. Improve understanding of the availability of cutting-edge information technologies, i.e. artificial intelligence and bioinformatics, in plant factory and intelligent greenhouse.

Objectives

The objective of this working group is to provide an open platform for researchers who are interested in the agricultural production of plant factory and intelligent greenhouse. And this working group aims to promote R&D, communication and education in this field by enhancing information sharing among the researchers, relevant professionals, and consumers and eventually promote the international standing of the CIGR's plant factory and intelligent greenhouse working group in the field. Furthermore, younger generation play an important role in such a new agricultural production in plant factory and intelligent greenhouse, therefore the younger generation initiated researches and communications are strongly encouraged.

Scope

By organizing workshops and seminars on plant factory and intelligent greenhouse, effective collaborative R&D among industry-academia-government must be accelerated. Furthermore, activity of younger generation researchers in this field would be enhanced.

1. By publishing special issues in CIGR-Journal on plant factory and intelligent greenhouse, understanding of agricultural production in plant factory and intelligent greenhouse will be improved.
2. By updating the working group website, prompt sharing of up-to-date knowledge in this field is ensured.
3. Increase in the number of individual member associate with CIGR.

Activities

The plant factory and intelligent greenhouse (PFIG) working group is responsible for all the activities relating to plant factory and intelligent greenhouse in CIGR with close relationships with the existing TSs and WGs. The relevant TSs are TS II, TS III and TS VII. The TS II "Structure and Environment" put attention on traditional structure and environment for

animal husbandry and cattle housing (our PFIG working group can provide a specific information on plant factory and intelligent greenhouse), the TS III provides technology and equipment for wide-range of plant production (our PFIG working group can promote the plant production under artificially controlled environment), the TS VII covers all the information technology (our PFIG working group intensively deals with application and implementation of information technology to plant factory and intelligent greenhouse). The chairs and the key steering committee members will create and activate a new PFIG working group to accomplish the above mentioned purposes through the following activities:

1. Workshops/Seminars: The events will be held every two years, covering the main trends and new developments in the field worldwide. Internationally prominent experts in the field will be invited as invited speakers. Some sessions might be organized by younger generation researchers. Generally, the events will be held in the form of on-site meetings.
2. Website: The website of PFIG working group will be created on the web server of the research center for high-technology greenhouse plant production in Ehime University (JAPAN) and linked to the main CIGR website. The PFIG working group website consist of R&D trends, technical reports, events, networks, information on trainings and courses, case studies, links to relevant websites.
3. Working group activities: Regular group meeting is conducted by skype and email to discuss the action plan of working group and share the latest information.
4. Administration support for the development of outreach materials/activities, partnerships and collaborations.

Website
http://jsabees.org/CIGR-PFIG/index.html

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10. FUNCTIONAL/WELLNESS FOODS AND NUTRITION (FWFN) WORKING GROUP

INTRODUCTION

Globally, human populations pursue overall well-being, independence and quality of life. Front-end innovation in the food industry is essential to achieve these outcomes.

Growing and aging global population, hectic life schedules, increasing healthcare costs, global food security challenges, consumer's awareness of the close relationship between diet and health stimulate the transformation of traditional everyday foods into new category foods that promote nutritional well-being and reduce the effects of stress and disease. "Functional/wellness foods" hold enormous promise in this regard. These foods are an important part of an overall healthy lifestyle, and their abilities to influence human wellness are closely associated with their interactions with other constituents in the diet, as well as the consumer's physical state, behavior, lifestyle and genetics.

Nutrition is crucial to maintaining lifelong health and wellness. Consumers respond differently to diet/foods, and sucg responses vary with their genetic, epigenetic and metabolic phenotype status as well as lifestyle and environment factors. Personalized nutrition represents a promising approach and "the way forward" research area for addressing individual needs. There has been a significant shift in consumers' dietary food choices from personal preference to personal health. Personalised nutrition is on the rise.

Mission

Promoting nutritional well-being through incorporating "functional/wellness foods" into a balanced diet and lifestyle is imperative to all populations. However, translating relevant scientific advances into real consumer products in the form of "functional/wellness foods" is highly challenging. Our vision is to establish a global Functional/Wellness Food & Nutrition platform, in which academic and industry professionals as well as consumers will have access to our scientific publications, information, products, services and activities related to functional/wellness food R&D and regulation.

Objectives

- Improve understanding of the specific role of individual bioactive components for their health-promoting, performance-improving or disease/illness-preventing function, as well as relevant metabolic kinetics, ethical or toxicological issues.
- Improve understanding of the interactions among the dietary constituents in a single functional/wellness food, and the ultimate contribution of such interactions to the overall efficacy of the whole diet.
- Improve understanding of consumer acceptance and biological availability of the physiologically active components in various functional/wellness foods based on individual physiological, metabolic, psychological, cultural and social differences.
- Improve understanding of the nutritional requirements for the modern populations who differ in age, physical state, behavior, lifestyle and genetics, and how functional/wellness foods satisfy the requirements of different populations.

Scope

The Overarching Objective of this working group is to provide leadership and oversight to create a professional network for R&D professionals and specialists in the field of Functional/Wellness Foods & Nutrition, to guide R&D direction and trends in the field, to promote R&D, communication and education in the field, to capture frontier discoveries and

the latest advancements/trends related to foods for human health and wellness, to recognize individual or team achievements and capabilities in the field, to foster joint research and other forms of collaboration across sectors and countries, and ultimately, to improve the international standing of the CIGR's FWFN Working Group in the field.

The Working Group is responsible for the overall administration of all the Functional/Wellness Food & Nutrition Programmes for CIGR, in close association with Technical Sections (e.g. Section VI "Bioprocesses"), as well as other Working Groups (e.g. Food Safety Working Group).

Activities

We promote R&D and education across countries in the area of Functional/Wellness Foods & Nutrition through workshops/seminars (e.g. as part of CIGR congress or CIGR Technical Symposium), digital newsletters (e.g. as part of the Working Group or CIGR newsletters), website (e.g. as part of the CIGR website), and other working group activities (including face-to-face meetings, skype meetings, webinars, joint publications, and joint funding applications).

FWFN working group members have promoted our working group inside and outside CIGR, and established collaborations among the FWFN working group members and with wider CIGR members. Since 2016, FWFN working group have generated 5 book chapters through collaborations, and had a strong presence at CIGR and non-CIGR conferences through keynote/invited speeches, concurrent oral papers, poster presentations, and session chairship.

Chair: Dr. Dongxiao Sun-Waterhouse (New Zealand and China; Email address: dxsun72@hotmail.com).

Vice-Chair: Dr. Jozef Grochowicz, University of Hotel Management, Catering Industry and Tourism, Chodakowska 50, 03-816 Warsaw, Poland
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Secretary: Dr. Yukiharu Ogawa
Bioresource Science Course, Graduate School of Horticulture, Chiba University, Japan
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Steering Committee Members: To be appointed.

Current members (in alphabetical order by surname):

- Dr. Margaret Barth (Appalachian State University, USA)
- Dr. Sara Bußler (Leibniz Institute for Agricultural Engineering, Germany)
- Dr. Rosires Deliza (Embrapa, Brazil)
- Dr. Karina dos Santos (Embrapa, Brazil)
- Dr. Adam Ekielski (Warsaw University of Life Sciences, Poland)
- Dr. Teodoro Espinosa-Solares (Universidad Autónoma Chapingo, Mexico)
- Dr. Tatiana Koutchma (Agriculture and Agri-Food Canada, Canada)

- Dr. Yukiharu Ogawa (Chiba University, Japan)
- Dr. Svetlana Rodgers (South Australian Research and Development Institute, Australia)

According to our WG's objectives and work plan, I have been working with my WG members to promote the “Functional/Wellness Food & Nutrition” platform inside and outside CIGR. And I’ve facilitated the collaborations among this WG members and with wider CIGR members.

2019 September – 2020 November Activities of WG10 Functional/Wellness Foods and Nutrition (FWFN) Working Group reported by Prof. Dongxiao Sun-Waterhouse on 2020-11-26:

1. The “2019 International Joint Conference on JSAM, SASJ and 13th CIGR VI Technical Symposium joining FWFNWG and FSWG workshops” (September 3rd-6th 2019, Sapporo, Japan): FWFN Working Group worked closely with Technical Section VI “Bioprocesses” and “Food Safety” (FS) Working Group to organize this conference . The conference covered research areas such as “Postharvest Machinery”, “Postharvest Facility”, “Postharvest/Food Technology and Process Engineering”, “Food Quality”, “Food Safety”, “Food Function/Nutrition”.

- Chair of FWFN Working Group Prof. Dongxiao Sun-Waterhouse also acted as a Honorary Chair, FWFN Working Group Secretary Dr. Yukiharu Ogawa acted as the Local Committee member, and Dr. Rosires Deliza, Prof. Adam Ekielsk and Prof. Teodoro Espinosa-Solares and Prof. Jozef Grochowicz acted as International Scientific Committee members (Prof. Jozef Grochowicz was unable to attend).
- Together with Vice Chair of Technical Section VI (Dr. Alaa El-Din Bekhit) and Chair of FS Working Group (Dr. Amauri Rosenthal), Dr. Dongxiao Sun-Waterhouse gave opening speeches in the Opening Ceremony.
- Prof. Dongxiao Sun-Waterhouse gave a Keynote Lecture “An Integrative R&D Approach for Addressing Ever-Increasing Consumer Demands for Food Nutrition and Safety”.
- Dr. Yukiharu Ogawa and his research group presented 15 oral presentations on various topics: “Effect of Processing Conditions on Bioactive Compounds and Antioxidant Activities of Tea Infusion” “In Vitro Release Characteristics of Sugars and Hydrolysis of Starch During Simulated Digestion of Saba banana at Different Maturity Stages”, “In Vitro Examination of Starch Digestibility and Antioxidant Activities of Amaranth Grains”, “Effects of Cell Structure Changes of Citrus Peel on the Digestibility of Intracellular Antioxidants during in vitro Digestion”, “Efficient Filtering of Live Escherichia coli by Using 60 GHz CMOS Sensor”,
- “Stationary Machine Vision Based RealTime Estimation of Japanese Black Cattle Serum Vitamin A using Eye Fundus Color”, “Myanmar Mango Maturity Prediction Based on Skin Color Using Machine Vision System”,
- “Measurement of Chicken Eggshell Optical Properties Using Terahertz Spectroscopy”, “Thermal oxidation stability assessment of extra virgin olive oil using fluorescence and transmittance imaging system”,
- “Chalkiness Index of Sake Rice “ Yamada Nishiki” Using Ultraviolet-Near-Infrared Transmission”, “Impact of Crystallinity Change During In Vitro Digestion on Starch Digestibility of Microwave- and Steam-Cooked Black Rice, “Study of Static In Vitro Digestion of Japanese Pickled Plums on the Change of Polyphenols and Antioxidant Activity”, and “Segmentation of common scab lesion on intact potatoes using single near-infrared image”.
- Dr. Rosires Deliza gave an oral presentation on “The Influence of The Front-of-Pack Nutrition Labelling Schemes on Helping Healthier Food Choices by Consumer”.
- Prof. Teodoro Espinosa-Solares gave an oral presentation on “Influence of Maturity Stages on Postharvest Respiration Rate and Mechanical Properties of Peach Fruit”.
- Prof. Adam Ekielsk gave a talk on “Key Process Variables Affecting the Formation of Chlormequat Compounds During Baking of Cereal Products”.
- Dr. Yukiharu Ogawa is continuously editing a special issue for this conference: This special issue will be published in the journal "Engineering in Agriculture, Environment and Food (EAEF)", published by the Asian Agricultural and Biological Engineering Association (AABEA) which is jointly organized by the CIAM (The Chinese Institute of Agricultural Machinery), JSAM (The Japanese Society of Agricultural Machinery) and KSAM (The Korean Society for Agricultural Machinery). It has accepted 13 papers by November 2020**.**

2. Other important activities:

- Prof. Dongxiao Sun-Waterhouse has been invited to give a Keynote Lecture on “The discovery, biological evaluation and biotechnological delivery of natural therapeutics for precision medicine & personalized healthcare” at the GBAS 2019 6th World Nobel Laureate Biomedical Summit on 21-22 September 21, 2019, China.
- In Autumn 2019, Prof. Jozef Grochowicz have organized in Myszyniec (with the local authority) II Regional Conference "Traditional and Regional Kurpian Food Products in Context of Culinary Heritage"
- (Grochowicz J., 2019: Kurpiowskie Produkty Tradycyjne i Regionalne w kontekście Ochrony Dziedzictwa Kulinarnego”), as the promotion of very specific, old historical Green Kurp's Regional cuisine, where his contribution "The role of culinary heritage , its promotion and influence on culinary tourism" is published in Proceedings. Myszyniec 2019, pp 11-24. ISBN 978-83-935646-8-2 (printed in Polish only).
- In October 2019 Prof. Jozef Grochowicz attended (also as the member of the scientific committee) II International Conference "Psyche and the Obesity" (Psychika a Otyłość, 26-10-2020) , where he presented a paper "The role and place of bioactive components in prevention and curing of the obesity" (E-book , ed.Palgan I. European University in Radom, 2019. ISBN: 978-83-956489-0-8).
- Prof. Jozef Grochowicz presented a keynote speech entitled "Actual state of the research and their implementation in manufacturing of functional food" at XXI National Conference "Advance in Food Engineering and Commercialization of Research" (Grochowicz J., 2019:Współczesny stan wiedzy i praktyki badawczo-wdrożeniowe w wytwarzaniu żywności funkcjonalnej dla seniorów.)
- Dr. Yukiharu Ogawa has been proceeding with a study connecting to the activity of our working group that is to control the starch digestibility of rice by a modification of heating treatment during a postharvest drying process. He has applied for the funding opportunity by JSPS, Japan, that can use for international research collaborations like this working group, book publication or organizing a special issue for the appropriate journal, etc.
- Dr. Rosires Deliza presented a paper “Trends and challenges in the food industry: from the selection of professionals to the application of new technologies” at the International Agribusiness Congress. Science, Technology and Innovation: From Field to Table, Online Conference, Brazil, 2020.
- Dr. Rosires Deliza presented a talk “Using emojis to assess emotional associations with foods with different nutritional labels” at Brazilian online Congress on Cereals and Bakery Technology, Brazil, 2020.
- Dr. Rosires Deliza presented a paper “Innovation in Sensory Analysis and Consumer Studies” at the National Symposium on Innovation in Engineering and Food Science, Brazil, 2020.
- Dr. Rosires Deliza presented a talk “Nutritional labelling: Contribution of Consumer Science to the formulation of public policies” at SenseLatam - LatinAmerican Congress on Sensory Sciences and Consumer.
- During 2019-2020, Prof. Adam Ekielsk and his research team has been developing a new method to obtain nanolignin and nanocellulose particles, and they use the NL and NC composites as a safe and cheap bioactive material for production of the food packaging. They are also using lignins as the key element of a biosensor (on the UV, D65 light and contact with formaldehyde resin) useful for the food control under food storage conditions. They have resolved the problem of poor mechanical properties of lignin composites through cross-linking of lignin compounds.

3. Journal publications:

- J Zhang, D Sun-Waterhouse, G Su, M Zhao. 2019. New insight into umami receptor, umami/umami-enhancing peptides and their derivatives: A review. Trends in Food Science & Technology 88, 429-438. (impact factor: 11.077)
- Z Qiu, Z Zheng, B Zhang, D Sun-Waterhouse, X Qiao. 2020. Formation, nutritional value, and enhancement of characteristic components in black garlic: A review for maximizing the goodness to humans. Comprehensive Reviews in Food Science and Food Safety 19, 801– 834. (impact factor: 9.912)
- X Rong, D Sun-Waterhouse, D Wang, Y Jiang, F Li, Y Chen, S Zhao, D Li. 2019. The significance of regulatory microRNAs: Their roles in toxicodynamics of mycotoxins and in the

protection offered by dietary therapeutics against mycotoxin-induced toxicity. Comprehensive Reviews in Food Science and Food Safety 18: 48-66. (impact factor: 9.912)

- C Chen, D Sun-Waterhouse, J Zhao, M Zhao, GIN Waterhouse, W Sun. 2020. Soybean protein isolate hydrolysates-liposomes interactions under oxidation: Mechanistic insights into system stability. Food Hydrocolloids 106336. https://doi.org/10.1016/j.foodhyd.2020.106336. (impact factor: 7.053)
- D Wang, Y Jiang, D Sun-Waterhouse, H Zhai, H Guan, X Rong, F Li, J Yu, D Li. 2020. MicroRNA-based regulatory mechanisms underlying the synergistic antioxidant action of quercetin and catechin in H2O2-stimulated HepG2 cells: Roles of BACH1 in Nrf2-dependent pathways. Free Radical Biology and Medicine 153, 2020, 122-131. (impact factor 6.170)
- G. Su, Xin Zheng, Jin Zou, GIN Waterhouse, D Sun-Waterhouse. 2020. Insight into the advantages of premixing yeast-wheat gluten and combining ultrasound and transglutaminase pretreatments in producing umami enzymatic protein hydrolysates. Food Chemistry 128317, https://doi.org/10.1016/j.foodchem.2020.128317. (impact factor: 6.306)
- J Lin, D Sun-Waterhouse, R Tang, C Cui, W Wang, J Xiong. 2020. The effect of γ-[Glu](1≤n≤5)-Gln on the physicochemical characteristics of frozen dough and the quality of baked bread. 128406, https://doi.org/10.1016/j.foodchem.2020.128406 (impact factor: 6.306)
- C Chen, D Sun-Waterhouse, Y Zhang, M Zhao, W Sun. 2020. The Chemistry behind the Antioxidant Actions of Soy Protein Isolate Hydrolysates in a Liposomal System: Their Performance in Aqueous Solutions and Liposomes. Food Chemistry, https://doi.org/10.1016/j.foodchem.2020.126789. (impact factor: 6.306)
- R Tang, D Sun-Waterhouse, J Xiong, C Cui, W Wang. 2020. Feasibility of synthesizing γ-[Glu](n≥1)-Gln using high solid concentrations and glutaminase from Bacillus amyloliquefaciens as the catalyst. Food Chemistry, 316, https://doi.org/10.1016/j.foodchem.2019.125920 (impact factor: 6.306)
- Y Hu, D Sun-Waterhouse, L Liu, W He, M Zhao, G Su. 2019. Modification of peanut protein isolate in glucose-containing solutions during simulated industrial thermal processes and gastric-duodenal sequential digestion. Food Chemistry, 295, 120-128. (impact factor: 6.306)
- J Lin, D Sun-Waterhouse, C Cui, H Lu. 2020. Increasing antioxidant activities of the glutamine-cysteine mixture by the glutaminase from Bacillus amyloliquefaciens. Food Chemistry, 308, (impact factor: 6.306), https://doi.org/10.1016/j.foodchem.2019.125701.
- Y Jiang, Y Zhu, F Li, J Du, Q Huang, D Sun-Waterhouse, D Li 2020. Antioxidative pectin from hawthorn wine pomace stabilizes and protects Pickering emulsions via forming zein-pectin gel-like shell structure. International Journal of Biological Macromolecules, 151, 193-203. (impact factor: 5.162)
- R Hao, J Ge, Y Ren, X Song, Y Jiang, D Sun-Waterhouse, F Li, D Li. 2020. 2021. Caffeic acid phenethyl ester mitigates cadmium-induced hepatotoxicity in mice: Role of miR-182-5p/TLR4 axis. Ecotoxicology and Environmental Safety, 207, 111578. https://doi.org/10.1016/j.ecoenv.2020.111578 (impact factor 4.872)
- R Hao, F Li, X Song, X Tan, D Sun-Waterhouse, D Li. 2020. Caffeic acid phenethyl ester against cadmium induced toxicity mediated by CircRNA modulates autophagy in HepG2 cells. Ecotoxicology and Environmental Safety 197, 110610. DOI: 10.1016/j.ecoenv.2020.110610. (impact factor 4.872)
- R Hao, X Song, F Li, XTan, D Sun-Waterhouse, D Li. 2020. Caffeic acid phenethyl ester reversed cadmium-induced cell death in hippocampus and cortex and subsequent cognitive disorders in mice: Involvements of AMPK/SIRT1 pathway and amyloid-tau-neuroinflammation axis. Food and Chemical Toxicology 144, 111636, DOI: 10.1016/j.fct.2020.111636. (impact factor 4.679)
- X Zhu, D Sun-Waterhouse, Q Tao, W Li, D Shu, C Cui. 2020. The enhanced serotonin (5-HT) synthesis and anti-oxidative roles of Trp oligopeptide in combating anxious depression C57BL/6 mice. Journal of Functional Foods 67, 103859. https://doi.org/10.1016/j.jff.2020.103859 (impact factor: 3.701)
- X Zhu, Q Tao, D Sun-Waterhouse, W Li, S Liu, C Cui. 2019. γ-[Glu]n-Trp ameliorates anxiety/depression-like behaviors and its anti-inflammatory effect in an animal model of anxiety/depression. Food & Function 10(9): 5544-5554. (Impact factor: 4.171)
- L Fang, H Xiang, D Sun-Waterhouse, C Cui, J Lin. 2020. Enhancing the usability of pea protein isolate in food applications through modifying its structural and sensory properties via deamidation by glutaminase. Journal of Agricultural and Food Chemistry 68, 6, 1691–1697. (impact factor: 4.192)

- Y Liu, D Sun-Waterhouse, C Cui, Y Hu, W Wang. 2020. Dealing with soy sauce precipitation at submicron-/nano-scale: An industrially feasible approach involving enzymolysis with protease and alkaline conditions. Food Research International 137, 109670, https://doi.org/10.1016/j.foodres.2020.109670. (impact factor: 4.972)
- H Xiang, D Sun-Waterhouse, P Liu, GIN Waterhouse, J Li, C Cui. 2020. Pancreatic lipase-inhibiting protein hydrolysate and peptides from seabuckthorn seed meal: Preparation optimization and inhibitory mechanism. LWT - Food Science and Technology DOI: 10.1016/j.lwt.2020.109870. (impact factor: 4.006)
- Y Sun, D Sun-Waterhouse, C Cui, Y Feng, W Wang. 2020. Utilization of undesirable heat-induced
- precipitates/sediments in soy sauce production to fabricate nanoparticles for curcumin delivery. LWT - Food Science and Technology https://doi.org/10.1016/j.lwt.2020.109551. (impact factor: 4.006)
- C Chen D Sun-Waterhouse, M Zhao, W Sun. 2020. Beyond antioxidant actions: Insights into the antioxidant activities of tyr-containing dipeptides in aqueous solution systems and liposomal systems. International Journal of Food Science & Technology https://doi.org/10.1111/ijfs.14585. (impact factor: 2.773)
  X Zhu, D Sun-Waterhouse, J Chen, C Cui, W Wang. 2020. Comparative study on the novel umami-active peptides of the whole soybeans and the defatted soybeans fermented soy sauce. Journal of the Science of Food and Agriculture, https://doi.org/10.1002/jsfa.10626. (impact factor: 2.614)
- J Wang, H Zhang, H Wang, J Wang, D Sun-Waterhouse, GIN Waterhouse, C Ma, W Kang. An immunomodulatory polysaccharide from blackberry seeds and its action on RAW 264.7 cells via activation of NF-κB/MAPK pathways. Food and Agricultural Immunology 31(1), 575-586. (impact factor: 2.150)
- H Xiang, D Sun-Waterhouse, C Cui. 2020. Hypoglycemic polysaccharides from Auricularia auricula and Auricularia polytricha inhibit oxidative stress, NF-κB signaling and proinflammatory cytokine production in streptozotocin-induced diabetic mice. Food Science and Human Wellness, 2020, https://doi.org/10.1016/j.fshw.2020.06.001. (impact factor: 2.455)
- H Xiang, D Sun-Waterhouse, G I.N. Waterhouse, C Cui, Z Ruan. 2019. Fermentation-enabled wellness foods: A fresh perspective. Food Science and Human Wellness, 8 (3), 203-243. (impact factor: 2.455)
- J Grochowicz. (2019). Chemical threats in thermally processed traditional food and possibilities of their reduction. Agricultural Engineering.Vol.23, 1(169) pp. 39-47. DOI: 10.1515/agriceng-2019-0004.
- A Dowgiałło, M Stachnik, J Grochowicz, M Jakubowski. (2019) : Modeling of compression pressure of heated raw fish during pressing liquid. . Journal of Food Engineering 276 (2020) 109888 , Available online 23 December 2019, https://doi.org/10.1016/j.jfoodeng.2019.109898. (140 pkt, impact factor: 3.625)
- M Lima, M de Alcantara, A Rosenthal, R Deliza. 2019. Effectiveness of traffic light system on Brazilian consumers perception of food healthfulness. Food Science and Human Wellness, 8 (4), 368-374. (impact factor: 2.455)
- R Deliza, M de Alcantara, R Pereira, G Ares. 2020. How do different warning signs compare with the guideline daily amount and traffic-light system? Food Quality and Preference, 80, p.103821. (Impact Factor: 4.842)
- Y Cai, W Qin, S Ketnawa, Y Ogawa. 2020. Impact of particle size of pulverized citrus peel tissue on changes in antioxidant properties of digested fluids during simulated in vitro digestion. Food Science and Human Wellness, 9 (1), 58-63. (impact factor: 2.455)
- Reginio, S Ketnawa, Y Ogawa. In vitro examination of starch digestibility of Saba banana [Musa ‘saba’(Musa acuminata × Musa balbisiana)]: impact of maturity and physical properties of digesta. Scientific Reports 10, 1811 (2020). https://doi.org/10.1038/s41598-020-58611-5 (impact factor: 4.120)
- S Ketnawa, Y Ogawa. 2019. Evaluation of protein digestibility of fermented soybeans and changes in biochemical characteristics of digested fractions. Journal of Functional Foods (impact factor: 3.701)

4. Other publications (including books and book chapters):

- Grochowicz J., Midura F., Chmiel A. (2018): Dziedzictwo kulturowo - kulinarne Kurpi Zielonych ,(Cultural and Culinary Heritage of Green Kurp's Region), Edit. Vistula University, pp. 148, ISBN 978-83-64614-46-0 AFIBV.

- Polsh Przetwórstwo Rolno - Spożywcze i Biogospodarka ("Agri - Food Processing and Bioeconomy") which is just in publication , Editors: Wojdalski J and Drożdz B., SGGW Warsaw, 2020 pp 346, ISBN 978-83-7583-981-4.

11. Rural Development and the Preservation of Cultural Heritages

Mission

Mission of the WG_RDPCH will be to consolidate, increase and exploit the role that Agricultural Engineering may play for the development of rural Society and its activities, in the framework of an enhanced preservation of cultural heritage and its related landscape in rural environment. Rural communities everywhere are indeed often susceptible to long slow declines, if agriculture is no longer economically viable and younger generations move to cities in search of better opportunities. Preserving a way of life and the identity of a community is more important than preserving only its physical form. Living, vibrant communities give meaning to their surroundings and create a sustainable environment for preserving culture. In this scenario, the role that would be played by Agricultural Engineers may reveal decisive for supporting the strategic technical and socio-economic development of rural areas, by proposing, testing and implementing new ways for the preservation and valorisation of their cultural heritage.

Objectives

The goal-oriented and measurable objectives for advancing the specific scientific area dealing with Rural Development and Preservation of Cultural Heritage (RDPCH) will be:

- an improvement in the number of academic courses dealing with RDPCH, targeted to University students, practitioners and other stakeholders;
- an increase in the number of scientific/technical publications produced by scientists working in the field of agricultural engineering, on topics relevant to RDPCH. A special attention will be focused on new opportunities, mostly based on the use of cutting-edge tools (ICT; IoT; etc.), for supporting the preservation and valorisation of cultural heritage in rural areas;
- the creation in each one of the participating Countries of a national cluster - leaded by the CIGR National representative of the Working Group RDPCH - belonging to the CIGR WG_RDPCH network. This cluster would be participated by every kind of interested relevant stakeholder belonging to the “Quadruple Helix”, i.e.: a) Public Institutions (Ministries; Regional/local Authorities; Relevant Agencies; etc.); b) RTD performers (Universities; Public/private research centers; Technological Parks; etc.); c) Private companies (Industries; SMEs; farmers; relevant associations; etc.); d) Civil society (NGOs; Citizen associations; etc.).

Scope

The main scope of the WG_RDPCH activities will be an improved contribution to the creation of outputs, outcomes and benefits aimed to an integrated management approach to Rural Development and Preservation of Cultural Heritage. The boundaries of these scientific areas and application domains would be efficiently addressed by Agricultural Engineers,

thanks to their aptitude to a multi-disciplinary approach to plan, organize and implement activities aimed to:

- Identify existing problems as well as assets;
- Discover innovative solutions and approaches from good practice examples;
- Uncover the elements and take the best from them;
- Adjust, combine and compile the good practice in a new scientific approach;
- Create a new good practice for regionally specific cases.

Activities

The activities will be planned according to the following Workplan, divided into five tasks:
Task 1) Identify issues through strategic problem statements
This activity would be planned in preparation for the next CIGR Conference in Canada, June 2020, when the general meeting of the WG will establish the detailed activities. During this Conference, the WG will schedule/organize regular telematic (e.g.: Skype/WebEx) and/or physical meetings as well.
Task 2) Define good practice and asset identification in the region of each participant to the WG
This activity will be performed by each one of the CIGR participants at national level - with support from the Steering Committee of the WG (Chair, Vice-chair, Secretary) - by implementing a national cluster, in which other relevant interested partners belonging to the Quadruple Helix in its own Country will be involved.
Task 3) Link the issues identified in one region to good practice from other regions
To this aim, each one of the participants will plan suitable actions aimed to exchange the results of the activities achieved at national level, through the use of a specific platform (e.g., LinkedIn) implemented by the WG.
Task 4) Draft Pilot Action implementation plans
Each one of the national clusters will prepare a Local Action Plan for its Country, clearly specifying the role of national stakeholders interested to participate, in order to:
a. Identify good practice examples to adopt;
b. Outline specific actions to adopt / adapt good practice;
c. Present possible Pilot Actions to colleagues, partners and communities.
Task 5) Disseminate and exploit the results of the WG at International level
a. The results of this WG will be disseminated to every stakeholder in the World. A special attention will be devoted to International Organizations involved in RDPCH, e.g.: ONU; FAO; UNESCO; IUCN; UNWTO; ICOMOS-IFLA; EU Landscape Convention; Getty Conservation Institute; etc.
b. The results of the WG will be exploited by organizing - under the CIGR coordination and with the envisaged patronage/financial support of some of the relevant above-mentioned International organizations - targeted events (workshops, seminars, Conferences, etc.), ICT/social media (Website, Facebook, etc.) and/or pilot actions aimed to capitalize and showcase the tangible results of the WG activities.

Expected outcome: (planned outcomes from group activities, dissemination, increase awareness of work group and CIGR in general, etc.)
The planned outcomes from the WG activities for a successful heritage and landscape rural development will be a significant increase in the awareness of every kind of stakeholder about the role that Agricultural Engineering may play for RDPCH. Such an outcome will contribute to bridge the gaps between:

- National and local government policy;
- People and institutions;
- Academic sphere and local stakeholders;
- Different disciplines (Agriculture; Engineering; Architecture; Economics; Archaeology; etc.);
- Policies of regional development (environmental, rural, cultural, housing, educational);
- Different technical/cultural approaches to address the most relevant issues identified (e.g. re-use of historic buildings; elaboration of new innovative financing models; systems of regular maintenance; new/integrated solutions for rural tourism; etc.).

The situation about the current status/activities of WG 11 - *Rural Development and Preservation of Cultural Heritage* (RDPCH) – is as follows:

- after the re-activation of this WG on last Autumn 2019, a first event has been programmed, aimed to assess the main features of this WG, *e.g.*: participants and affiliated institutions; relevant specific scientific/technical/cultural interests; availability to co-operate; *etc.* This event has been organized as a discussion panel (https://www.cigr2020.ca/en/program/discussion-panels/62-rural-development-and-the-preservation-of-cultural-heritages-cigr-working-group-11) to be held on June 2020, during the 5th CIGR International Conference 2020 in Québec (Canada). Unfortunately, due to the Covid-19 pandemic, this Conference has been postponed to May 2021. Hence, the activities of this WG could be relaunched according to the evolution of the pandemic and relevant participation to this new date.

Status: Active

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