



# EURO Summer Institute 2009

Lleida, Spain, July 25th-August 8th

## *OR in Agriculture and Forest Management*



**FINAL REPORT**

12 October 2009

# Contents

## **1. Introduction**

The EURO Summer Institute on OR in Agriculture and Forest Management (ESI 2009) was held in Lleida, Spain, between 26th of July and 8th of August 2009. In this document the Scientific and Organizing Committees present the final report of this EURO Institute, with emphasis to the most relevant goals, activities and outcomes. This is the first time that such a EURO Summer/Winter Institute is organised and it has been an exciting experience for all people involved in.

The ESI2009 was promoted by the EURO Working Group (EWG) on OR in Agriculture and Forest Management. The agreement to prepare such a proposal was taken in 2007 during the meeting of the EWG held in Prague within the XXII EURO Conference.

Spanning the bridge between optimization theory and primary sector applications (mainly Agriculture and Forestry, but also Fisheries and Natural Resources in general) is one of the big challenges for the operations research community. Stochastic optimization and modern software implementations have become an indispensable resource in engineering sciences and economics. This high demand in interdisciplinary collaboration is, however, not adequately covered in most of the current curricula programs in applied mathematics or (agronomic/forest) engineering.

Furthermore, nowadays, many Agricultural and Forest Management decision problems are imbedded in more global problems, particularly those found in Supply Chain Management and Logistics. Moreover, climate change, globalization, traceability of agricultural products, food safety and sustainability have led to extremely complex problems not only by their intrinsic characteristics but also by the amount of data that needs to be considered.

Having in mind all of the above mentioned aspects, the board of the EWG on Agriculture and Forest Management proposed in the third meeting of the EWG to apply for organizing a EURO Summer Institute on Agriculture and Forest Management. All participants agreed and the coordinator of the group on behalf of the board did present the application for preparing the ESI 2009 in Lleida (Spain).

This was the first EURO Institute combining pure OR topics of Mathematical Programming, Decision Graphs, Games Theory among others with decisional problems on Agriculture and Forest Management. It was an opportunity to encourage people from the two areas to exchange their experiences and stimulate networking research.

## **2. Venue**

The EURO Summer Institute on Agricultural and Forest Management was held in Lleida, which is a small town of the inland Catalonia, 160 kilometers away from Barcelona and 450 from Madrid (Figure 1). However two different locations and institutions were selected to hold the ESI2009:

- Lleida is a small town, it is the capital of the Province of the same name, surrounded by orchards and other crops and with a hot and dry weather in summer. The University of Lleida offered several facilities helping the organisation of this event. For instance, the campus of Cappeda has in a reduced area many buildings available for lectures, computer exercises and even the student's residence and many near restaurants.
- Solsona is a smaller town surrounded by forests belonging to the same province of Lleida. It is located near the Pyrenees with a mild weather in summer. The Forestry Technological Center of Catalonia (CTFC) is a Forest research institute settled in Solsona. The CTFC and Solsona offered also facilities to deploy all the activities needed for the ESI2009.

Several possibilities were analyzed. The preferred was to hold one week in Lleida and the second one in Solsona. This may give to the ESI2009 more attraction and keep the interest of participants in social aspects of the Spanish/Catalan society beyond the main academic activities. All facilities were guaranteed in Lleida for the two weeks if necessary since the summer of 2008. So, once the availability of accommodation in Solsona was guaranteed in February 2009 therefore Solsona was confirmed as the second location for ESI2009.

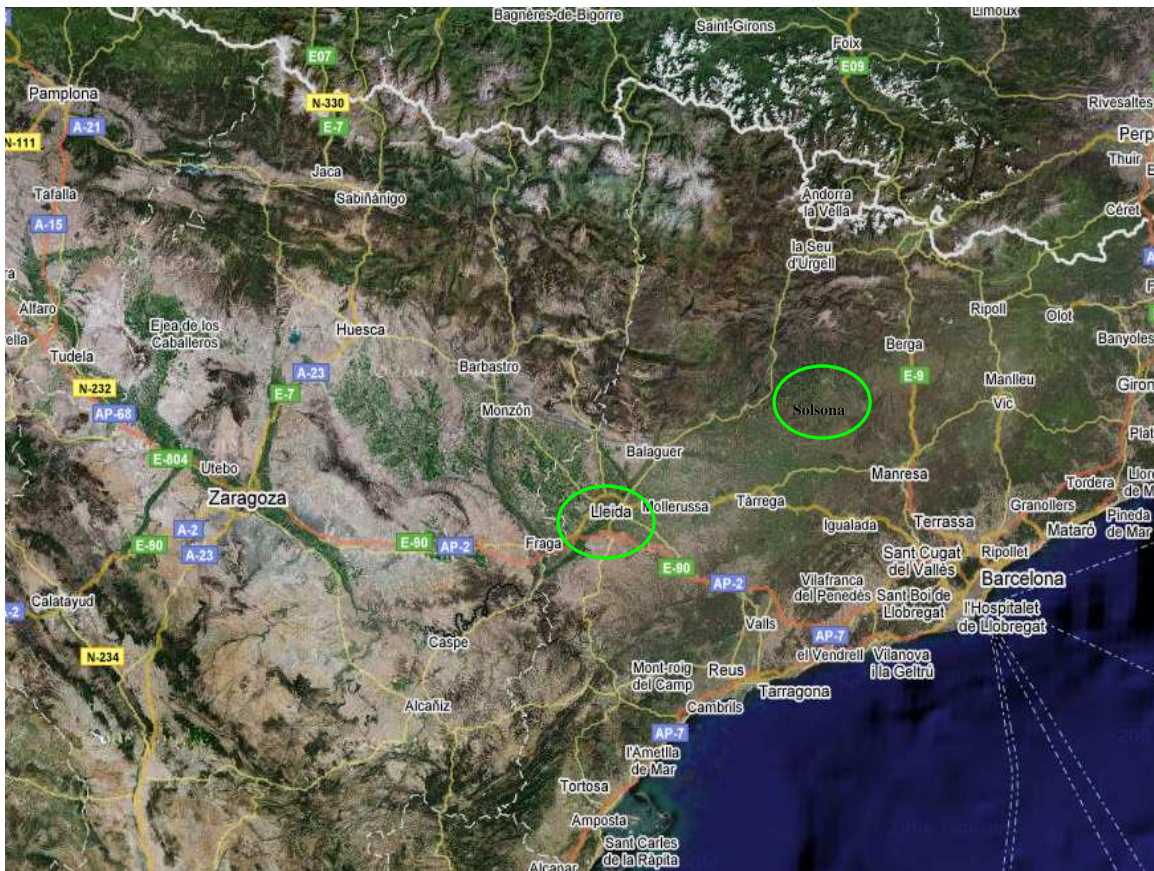
Transport to Lleida is easy either from Madrid or Barcelona. High speed trains were available to reach Lleida and recommended. The transport to Solsona of all the group was easy because it was combined with the social activities of the weekend of the ESI. The return to Lleida by bus was combined with the preparation of the banquet in Lleida. There was only an extra cost in the transfer of speakers from/to Solsona but it was affordable.

Different accommodations were agreed for the ESI depending on the goal:

- Student's residence in Lleida. From the arrival of participants to next Saturday. There were individual apartments with kitchen and air conditioning.
- The Crown Plaza Hotel, 5 star hotel in Andorra. It gave accommodation for Saturday night, the weekend of ESI2009.
- Solsona Centre Hotel, a new 2 star hotel. From Sunday to last Friday. Settled in a walking distance from the CTFC.
- Nastasi Spa Hotel, a 4 star hotel in Lleida where the banquet was held after participants were relaxed by using the spa facilities of the hotel.

Only in the Students' Residence were reserved individual rooms. In the rest, double rooms were reserved.

Figure 1: Lleida and Solsona.



### 3. Organization details

The application for organizing the EURO Summer Institute on OR in Agriculture and Forest Management was submitted at the beginning of December 2007. By the end of January 2008, the EURO Executive Committee was formally informed about the submission of the proposal by the corresponding EURO Vice-president. Later on, by the beginning of July 2008 the EURO Council formally approved the proposal and notified the Organizing Committee that the ESI2009 could be organized.

In the following weeks several actions were taken:

- A Confirmation of invited speakers was requested in view of a preliminary programme.
- A poster was created and distributed in several OR meetings.
- A web page was created (<http://www.esi2009.udl.cat>) and permanently updated in order to contain the most relevant up-to-date information.
- An e-mail account was created ([esi2009@matematica.udl.cat](mailto:esi2009@matematica.udl.cat)), which was checked on a daily basis so that all queries were promptly answered.
- A first Call for Papers (CfP) was issued to announce the ESI2009.

The Institute was largely advertised:

- All the national OR Societies belonging to EURO were contacted through the EURO Secretary in order to announce the event amongst their members;

- The CfP was available in the website of the ESI2009 and also through the website of the EWG-OR in Agriculture and Forest Management (<http://www.orafm.org>) where all members were advertised;
- Different mailing lists were contacted to distribute the CfP;
- The editor of the EURO Web site was contacted to announce the ESI2009 on the EURO web site;
- EFIMED society was contacted to offer collaboration in the organisation and financial support.

Several applications for financial support were submitted:

- \* University of Lleida, where the main ESI2009 activities were going to be developed.
- \* EFIMED society, managed from CTFC settled in Solsona.
- \* i-Math project, managing funds from the Spanish Ministry of Education to promote mathematical-related disciplines and innovative proposals.
- \* Local Administration (city/province council), supporting proposals seeking the international projection of the city and province of Lleida.

## **4. People involved**

The ESI2009 was possible to many people involved in the organisation and participation. All of them were taking part in one or more Committees or belonging to the final list of laureates or acting as invited lecturers of the EURO Summer Institute on OR in Agriculture and Forest Management.

### **4.1 Committees**

Two different committees were considered for the preparation of the ESI2009. A Scientific committee devoted to deal academic questions related with the selection of participants and the management of invitations for invited lecturers. This committee was integrated by the Advisory Board of the EWG-ORAFM plus the coordinator of the EWG and two reputed Spanish researchers also enrolled in the EWG. In total seven people were involved in this committee whose role was important during the reception and selection of applications.

The Scientific Committee was the following:

- Ljuk O. Ericsson(Sweden)
- Laureano Escudero (Spain)
- Frederik Garcia (France)
- Anders R. Kristensen (Denmark)
- Lluís M. Plà Aragonès (Spain)
- Carlos Romero (Spain)
- Andrés Weintraub (Chile)

The second committee created was the Local Committee that was in truth the organising committee of local activities, either social or academic. The Local Committee was integrated by people from the University of Lleida and from the CTFC in Solsona. The coordinator of the EWG-ORAFM was also part of this committee and acted as bridge between the two committees.

The Local Organizing Committee was the following:

Carles Capdevila Marques (UdL)  
Silvia Miquel Fernandez (UdL)  
Marc Palahí (CTFC)  
Sergio de Miguel (CTFC)  
Lluís M. Plà Aragonès (UdL)  
Hector Blanco de Frutos (UdL)  
Yulién Fernandez (UdL)  
Esteban López (UdL)

The resulting committees were led by Dr. Plà who coordinated all the actions developed by both committees. The inclusion in the local committee of colleagues and PhD. Students giving daily support to the organisation and more specifically to participants and invited lecturers at any moment was crucial for the success of the ESI2009.

## 4.2 Laureates

The deadline for the candidates to apply to the national OR societies was February 2008; the deadline for the national OR societies to notify the Scientific Committee of the ranking of the candidates approved in the corresponding countries was delayed to March the 31st.

Several applications were received directly to the ESI2009 website but they were suggested to redirect the applications to corresponding OR-Society. Similarly it happened with international applicants that were redirected to IFORS. In total 25 applications were received and forwarded to the Scientific Committee representing 17 countries: Austria, Belgium, Brazil (ALIO-IFORS), Chile (ALIO), Colombia (ALIO), Czech Republic, Egypt (IFORS), Finland, Greece, Iran (IFORS), Israel, Poland, Portugal, South-Africa (IFORS), Spain, and United Kingdom.

Five candidates were excluded by the Scientific Committee. The final list included 20 laureates:

1 Daniel Sandars	UK
2 Maria C. V. Nascimento	IFORS-Brasil
3 Johannes Schmidt	Austria
4 Dimitris Fotakis	Greece
5 Liliana Catarina Rosa Ferreira	Portugal
6 Ilan Halachmi	Israel
7 Tabitha Gathoni Mundia	IFORS-SouthAfrica
8 Aapo Rautiainen	Finland
9 Jitka Janová	Czech
10 Kari Hyytiäinen	Finland
11 Anna Stygar	Poland
12 Pablo Fernando Vanegas Peralta	Belgium
13 Juan Espejo Torres	Spain
14 Sara V. Rodriguez Sanchez	Spain
15 Jose R. González Olabarria	EFIMED-Spain
16 Jordi Garcia Gonzalo	EFIMED-Portugal
17 Alysson M. Costa	ALIO-Brasil
18 Pamela Álvarez	ALIO-Chile
19 Juan Troncoso	ALIO-Chile
20 Cesar Polanco	ALIO-Colombia

By the end of May Aapo Rautiainen notified the Committees the cancellation of his participation at ESI2009 due to personal problems. The Finish OR Society proposed another applicant given the number of candidates it had. The new candidate, Janne Helin, was accepted. By the end of June, Juan Espejo Torres notified the Committees of his absence in Lleida due to personal reasons.

In the end, 19 laureates were expected to attend the ESI2009. The Scientific Committee was surprised by not having received applicants from Germany, Denmark, France, Italy and The Netherlands.

### **4.3 Invited lecturers**

The task of selecting invited lectures was a progressive refinement where topics and names lead one to another. A first brainstorming was done by Scientific Committee members where several names and topics of interest arise. These topics were:

- Stochastic Programming
- Dynamic Programming
- Simulation
- Games Theory
- Heuristics
- Forest and fire management
- Decision Graphs
- Supply Chain Management Optimisation
- Multicriteria decision methods

Therefore, the Scientific Committee had already in mind several renowned scientists covering some of these topics who were invited to make a high level tutorial during the Institute. Some of initial candidates declined the invitation for several reasons but proposed another colleague of the same research group or of the same level to cover the topic proposed. In the end, invited lectures who accepted the invitation were:

**Anders R. Kristensen**  
**Stef Tijs**  
**Laureano Escudero**  
**Eugene Levner**  
**Jack P.C. Kleijnen**  
**Stefan Nickel**  
**Carlos Romero**  
**Andres Weintraub**  
**Dave Martell**  
**Timo Pukkala**  
**Thomas D. Nielsen**

Eleven lecturers were invited preventing some unforeseen casualty. All the invited lecturers were invited to stay in Lleida or Solsona more than the necessary time to make their presentations. This way, it was assured that the laureates could interact with them for several days, exchanging ideas and deepening discussions that hardly could have been taken place during a 1-day visit to the ESI2009. By the beginning of June Stef Tijs and Laureano Escudero cancelled corresponding lectures by personal reasons. They



were substituted by Victor Alborno and Javier Faulin. On the other hand, Professor Kristensen requested the assistance of Dr. Lars Nielsen to give additional exercises in a computer room as complement of his talk and the Scientific and Local Committee accepted the proposal.

Furthermore, given the broad background of participants and the wide variety of interests, all invited lecturers were invited to give a speech longer than one hour. The emphasis was not to introduce additional concepts but allow a deeper understanding and involvement of participants. This was revealed very beneficial given the active discussions leading each invited lecture.

## **5. 'Towards' Lleida first and Solsona afterwards**

By the end of April all laureates were notified of their selection, as observed in past summer/winter Institutes the Local Organizing Committee tried to maintain regular contact with them and to make sure that they felt increasingly involved with the Institute. On the other hand the committee offered also support providing letters of acceptance to participants. This was specially requested by non EU-participants needing a VISA.

In order to prepare the meeting by the beginning of May the laureates were encouraged to make short introductions by e-mail. The idea was to give a scientific and personal portrait and wishes for the ESI2009. The result was very interesting and included suggestions for a football match and Salsa lessons that later were satisfied.

The web page of the Institute was permanently up-to-date with all the relevant information and venue details. Concerning accommodation, the idea that the laureates shared a room was considered but not possible given available facilities at the Students' Residence. However, the second week it was going to be mandatory share rooms, so this way the first week could serve to prepare people for share rooms in number of two and make natural groups. This didn't affect the chance to know well at least one other laureate.

On Sunday evening all participants except Anna Stygar and Cesar Polanco were arrived without problems to Lleida. Ana Stygar arrived on Monday as she had informed. At the end, Cesar Polanco didn't attend the ESI2009 nor never warned the organisation. A corresponding claim was sent to the ALIO representative.

## **6. Activities**

A clear goal of a EURO Summer Institute is to promote the exchange of scientific knowledge and experience between the laureates and between the laureates and the senior scientists. Another goal is to promote friendship, which can make it easy to raise future cooperation between the laureates.

The Local Committee assisted by the Scientific Committee considered these aspects when designing the program of the ESI2009. A balanced number of Scientific and social activities were organized. In the next subsections all the activities are described. An overview of the program can be seen in figures 3a) and 3b).

Lunch breaks were scheduled of one hour and a half. This was more or less respected in Lleida because the restaurant was in the same Campus and the menu was ordered in the morning so the Restaurant collaborated also with the organisation. It was not so in



Solsona where the restaurant was in a different Hotel and the service was slow. Moreover the lecture room was further than in Lleida. Therefore, the timetable was getting flexible according to lunchtime and avoiding the stress to the participants but fulfilling all commitments.

The rest of the meals, breakfast and dinner, were free without a specific time except in Solsona where the dinner was at the same time for everybody. However, the range of time where breakfast and dinner were available made in a natural way that people meet up around the table.

Figure 3a): ESI 2009 Program overview - first week.

Figure 3b): ESI 2009 Program overview - second week.

## 6.1. Scientific Activities

The scientific activities of the EURO Summer Institute on OR in Agriculture and Forest Management were the following:

- The talks of the laureates;
- Lectures presented by the invited speakers and by members of the Scientific Committee;
- Discussions;

### 6.1.1 Talks of the laureates

Each laureate had 1 hour for presenting his/her work (including time for immediate questions/discussion). These presentations referred to the original paper with which they applied to the ESI2009.

The fact that the Institute was held for two weeks made it possible to extend the discussions or other programmed activities by using other time when no activities were scheduled.

Taking example of some previous ESWI each laureate introduced the following laureate, chairing the corresponding session. As this was proposed from the first laureate introduced by professor Plà, the last laureate avoided to prepare an introduction.

The full list of papers presented by the laureates is the following:

<b>Daniel Sandars</b>	The financially rational provision of over-winter stubbles on UK arable farms to promote farmland birds
<b>Maria C. V. Nascimento</b>	A cluster analysis towards the productivity of sugarcane crops: a case study
<b>Johannes Schmidt</b>	The spatial distribution of heat demand and the technical and economical potentials for biomass fired combined heat and power plants in Austria
<b>Dimitris Fotakis</b>	A cellular automaton approach for resource allocation and land use planning
<b>Liliana Catarina Rosa Ferreira</b>	Optimizing pinus pinaster stand management scheduling, under the risk of fire
<b>Ilan Halachmi</b>	Mathematical optimization to improve cows' artificial insemination services
<b>Tabitha Gathoni Mundia</b>	Potential Role of Multiobjective Optimization Methods for water Resources Planning in Kenya
<b>Janne Helin</b>	Does geography matter in nutrient abatement? Bioeconomic model of heterogeneous farm nutrient loads

<b>Jitka Janová</b>	On a stochastic programming approach to production planning in agriculture
<b>Kari Hyytiäinen</b>	Combating eutrophication in coastal areas subject to risk of oil spills
<b>Anna Stygar</b>	Application of dynamic programming in determining the optimal strategy of heifer management in beef herd
<b>Pablo Fernando Vanegas Peralta</b>	Allocating Reforestation Areas for Sediment Flow Minimization: an Integer Programming Formulation and a Heuristic Solution Method
<b>Sara V. Rodriguez Sanchez</b>	A multistage stochastic programming model for tactical decision in sow farms
<b>Jose R. González Olabarria</b>	Using cellular automata to optimize forest management in Catalonia
<b>Jordi Garcia Gonzalo</b>	Integrating fire risk in stand management scheduling. An application to Maritime pine stands in Portugal
<b>Alysson M. Costa</b>	Sustainable vegetable crop supply problem with perishable stocks
<b>Pamela Álvarez</b>	Application of robust optimization to the sawmill planning problem
<b>Juan Troncoso</b>	A mathematical model to evaluate the push and pull strategies for the supply chain management: a case study of the Chilean forest industry

On the other hand the scheduling for participants' presentations combined with invited lectures resulting in the following schedule:

<b>Participant</b>	<b>Contribution</b>	<b>Week</b>	<b>Day</b>
<b>Sara V. Rodriguez Sanchez</b>	<b>1</b>	1st	Tuesday
<b>Anna Stygar</b>	<b>2</b>	1st	Tuesday
<b>Ilan Halachmi</b>	<b>3</b>	1st	Tuesday
<b>Kari Hyytiäinen</b>	<b>4</b>	1st	Wednesday
<b>Janne Helin</b>	<b>5</b>	1st	Wednesday
<b>Jitka Janová</b>	<b>6</b>	1st	Wednesday
<b>Tabitha Gathoni Mundia</b>	<b>7</b>	1st	Thursday
<b>Daniel Sandars</b>	<b>8</b>	1st	Thursday
<b>Alysson M. Costa</b>	<b>9</b>	1st	Friday
<b>Jose R. González Olabarria</b>	<b>10</b>	2nd	Monday
<b>Pamela Álvarez</b>	<b>11</b>	2nd	Monday
<b>Juan Troncoso</b>	<b>12</b>	2nd	Tuesday
<b>Maria C. V. Nascimento</b>	<b>13</b>	2nd	Tuesday
<b>Pablo Fernando Vanegas Peralta</b>	<b>14</b>	2nd	Tuesday
<b>Jordi Garcia Gonzalo</b>	<b>15</b>	2nd	Wednesday
<b>Johannes Schmidt</b>	<b>16</b>	2nd	Wednesday
<b>Liliana Catarina Rosa Ferreira</b>	<b>17</b>	2nd	Wednesday
<b>Dimitris Fotakis</b>	<b>18</b>	2nd	Thursday

### ***6.1.2 Lectures presented by the invited speakers***

In the preliminary programme each lecture had allocated one hour (including time for immediate questions/discussion) for presenting a lecture. However, in the final programme given that many lecturers asked for more time it was decided to offer an additional slot of time becoming two hours with a break in the middle. All speakers agreed except two. One of the talks, the first one (given by Professors Kristensen and Nielsen) took all the Monday sessions and combined methodological and practical sessions including computer exercises what was very much appreciated by participants. The second one took just one hour but this was fitted very well in the programme for the day this lecture was given. It was a last minute casualty of Dr Levner from Israel. He warned the organisation the same day he had felt bad in the moment to board the plane. He was urgently recognised by a doctor who detected fever and an infection needing

medical treatment at home. Last news said Dr. Levner was almost recovered and sad for this unforeseen incident. Thanks to the soon warning of Dr. Levner on Saturday when he would have to arrive the organisation managed to find a substitute. This was Angel Udías from University Rey Juan Carlos of Madrid. He belongs to the same Department of Dr. Laureano Escudero. The organisation is very grateful to the effort of Angel to prepare a presentation in this short period of time. Participants also appreciate the effort and the presentation. Finally, the lecturers (given in the programmed order) as well as the corresponding titles of the lecture were the following:

1. Anders R. Kristensen and Lars R. Nielsen: Markov decision processes for sequential decision problems in agriculture and forestry
2. Jack P.C. Kleijnen: Design Of Experiments: Overview
3. Victor Albornoz: Optimization under uncertainty and catch quotas in fisheries management
4. Angel Udías: Framework for Multi-Criteria Decision Management in Watershed Restoration
5. Stefan Nickel: Supply Chain design: models and methods
6. Carlos Romero: Multiple Criteria Decision Making in Forestry
7. David Martell: OR applications in forest fire management
8. Andres Weintraub: Incorporation of environmental issues and fire protection in spatial forest planning
9. Timo Pukkala: Optimising forest management at the stand and forest levels
10. Thomas D. Nielsen: Decision graphs: representation languages and solution algorithms
11. Javier Faulin: SimuRoute: Using Simulation to Provide Alternative Solutions to the Capacitated Vehicle Routing Problem

### ***6.1.3 Discussions***

Four discussions were organized by the Scientific Committee. None of the participants belonged to the EURO WG-ORAFM, so it was considered interesting to introduce several topics of interest for the ORAFM and discuss about. Then, the first discussion was devoted to explain the origin of the EWG- ORAFM, actual aims and goals as well as the number of members and affiliations. Participants were invited to join the EWG. A second discussion was focused in OR in Agriculture. The background of participants and actual research lines were taken as example for discussing and it resulted very fruitful. A third discussion in Solsona was not so because it was devoted to present the CTFC just to make participants to understand the surroundings where ESI2009 took place the second week. Finally, another exciting discussion was proposed around the role of OR in Forest Management. Like in the discussion of OR in Agriculture people were motivated to express his opinions in a constructive way. The opinions of invited lecturers were also of great value and appreciated by everybody. Each discussion was moderated by Prof. Plà. An additional discussion was programmed to extend previous ones if necessary but the allocated time was used to complete other activities.

## **6.2. Social Activities**

The social activities in a EURO Summer Institute are an essential component to make sure that strong links will emerge amongst the laureates and also between the laureates and the lecturers.

The social activities scheduled for the EURO Summer Institute on OR in Agriculture and Forest Management included:

- Registration and material;
- City tour (Lleida);
- Visit to the “Seu Vella” (Main attraction of Lleida);
- Visit to the “Museu Diocesà” of Lleida;
- Swimming in a city town swimming pool;
- Salsa lessons;
- ESI2009 party;
- Visit to Andorra including Caldea entry;
- Visit around Solsona including landscapes and a breeding Falcon center;
- City tour (Solsona);
- Football match;
- Swimming pool session;
- ESI2009 Banquet;

### ***6.2.1 Registration and material***

The initial idea of a Get together was abandoned. The first dinner on Sunday was done all together and first instructions given for the setting up of the ESI2009. The registration and material included handing out the documentation and badges and also a welcome reception (a t-shirt of the event, apples and some other promotional gifts). Some members of the local committee were also hosted at the same Residence as participants. There was always one of them available for any matter affecting participants and/or lecturers at any time. Their role was very important and appreciated (specially the support given by Esteban Lopez).

### ***6.2.2 City tour (Lleida)***

This tour was held on Monday the 27<sup>th</sup> of July once academic activities were over. The goal was to make sure that laureates knew better the surroundings of the Campus of Cappont and had a general idea of the city of Lleida. The tour was in bus, with English translation of a recorded system explaining main attractions of the city. It took one hour more or less and it linked with dinner time.

### ***6.2.3 Visit to the “Seu Vella” (Main attraction of Lleida)***

On Tuesday 28<sup>th</sup> July was the visit to the “Seu Vella”. It is the old cathedral of Lleida that was used as castle for three centuries and recovered last century as monument for the city. It was impossible to find a professional guide for the visit but the Local Committee managed to give essential explanations of the monument that leaved all participants satisfied.

The climbing to the top (by a stair of 264 narrow steps) of the tour was an adventure shared by the group. They got as reward an impressive view of the city and the surroundings.

### ***6.2.4 Visit to the “Museu diocesà” (Lleida)***

On Wednesday 29<sup>th</sup> July was the visit to the “Museu Diocesà”. It is the new museum of the province of Lleida but with many other historical references. That time, it was possible to have a guided visit in English. An old map of Europe was the attraction of the visit. Everybody tried to find his country, at least the European participants!

The evening, before having the dinner all went to a bar o relax and have something to dring. “Patatas bravas” were discovered and enjoyed by many laureates (sort of typical hot potatoes).

#### ***6.2.5 Swimming in a city town swimming pool***

Lleida is very hot in summer. The afternoon of Thursday 30<sup>th</sup> was devoted to go swimming in a nearby swimming pool. This activity was also repeated in Solsona on Thursday 6<sup>th</sup> August.

#### ***6.2.6 Salsa lessons and ESI2009 party***

This activities on Friday evening marked the end of the first week in Lleida. As learnt by other ESWI, all people were asked to bring something typical from their original country. Drink (wine, spirits or some typical drink from the corresponding countries) or some simple meals were the main contributions. It is worthy to note the enthusiasm of several laureates who were willing to cook for the dinner well in the room well in the kitchen of an organiser. Before, Salsa lessons took place in the same Residence given by a Brazilian teacher hired specially for the occasion. All in all, the goal was to make a 'multi-cultural' party. The party (dinner included) took place in the underground floor of the Residence. It started at 18:00 and the dinner at 20:30.

#### ***6.2.7 Visit to Andorra including Caldea entry***

Saturday in the morning, after the party, there was a visit to Andorra: the country of the Pyrenees. It was hard to have people awake and the bus leaved in delay, but in the end this didn't cause problems to the organisation. The group have the lunch in Caldea (the biggest Spa resort in Andorra) and afterwards, all people went to the Hotel to leave bags there and rest or go out walking/shopping in the downtown. The Hotel was excellent, a five stars Hotel with luxurious facilities and very big rooms (suites in fact) that impressed everybody. At 20:00 was the entry to Caldea for three hours. Different baths, pools, saunas and Spa facilities could be tested by participants who did it enthusiastically. The rest of the evening was free.

#### ***6.2.8 Visit around Solsona***

Sunday morning, after the breakfast, the group took the way to Solsona. The idea was to take profit of the journey visiting different places around Solsona county and getting an approximated idea of the surroundings of Solsona town. In the morning a “mirador” to observe the landscape was the first stop. Unfortunately the day was partially cloudy and the view was not as good as expected but people could get off the bus and walk for a while imaging the beauty of the landscape. Before dinner Cambrils, a village conserving very old salt evaporation ponds and facilities for extracting salt from salty water (content of 33% of salt melt in water), was visited before having lunch. Although commercial activity stopped 40 years ago nowadays it serves as a recent tourist attraction. The lunch was in a traditional restaurant by the road. The bravest participants tasted wild pork and other typical dishes of the inner Catalonia with different final opinions. To finish the journey, before reaching Solsona the “Roc Falcon”, an impressive breeding center for hawks, was visited. It was an amazing and surprising center whose main customers are princes of Arabian countries or airports of all around the world. The arrival to the Hotel was in the evening and people got free time to recover and dinner on their own.

#### ***6.2.9 City tour (Solsona)***

This tour was held on Monday the 3<sup>rd</sup> of August once academic activities were over. The city tour included a visit to the well for the ice of the town in the old days. The tour was in English and people can get a good idea of the life from the Middle Age till not so far days. The tour was on foot, with English translation explaining main attractions of the city. It took one hour more or less and it linked with dinner time.

#### ***6.2.10 Football match***

This activity was proposed by several laureates. In the end a match was agreed with a team from the CTFC. Of course, this team had trained and possessed noticeable advantage over the ESI2009 team; however we had Brazilian and Greek stars. Female players took also an active role during the match. In the end we scored although the result was the less important. The match served to amuse both the players and supporters.

#### ***6.2.11 ESI 2009 Banquet***

The ESI 2009 banquet took place in the Nastasi Spa Hotel in Lleida. After lunch in Solsona, the bus transferred all participants to the Hotel in Lleida to relax in the Spa facilities before the dinner. The Hotel was excellent, with many facilities and gifts in the room. At 21:00 was the banquet. As starter there was a sample of typical cuisine of Catalonia before the main course that every one could choose. Not all of the typical dishes were successful, for instance snails were not very popular. The room was exclusive for the group. On the other hand, the banquet was very emotional in the end because participants wanted to thank the organisation of ESI2009 and there were talks and thanks giving in all senses. It was a sample of the hopes of going on touch after the end of ESI2009. After the banquet some people went to rest and other to have some drink. Accommodation was also booked in the Hotel so, the following morning, after a delicious breakfast people say goodbye to each other.

#### ***6.2.12 Non-scheduled activities***

Apart from all the organized activities prepared by the Organizing Committee, the atmosphere in ESI2009 became extremely friendly and in a couple of days laureates started to go out together.

In Solsona, the Sputnik Pub became very familiar as a way of ending the day before going to bed. Keynote speakers and laureates shared together the spare time together at night till a reasonable time.

In the end of ESI2009, it was agreed by all participants to create a mail list of participants, a special group in Facebook and keep the contact for future collaborations.

### 6.3. Detailed Program

The detailed program drawn by the Scientific and Organizing Committees of the EURO Summer Institute on OR in Agriculture and Forest Management was the following:

First week in Lleida

Saturday and Sunday: reception of participants at "Students Residence" in Cappont Campus.

Sunday 26th July: Get together and dinner from 20:00

Start	End	Monday	Tuesday	Wednesday	Thursday	Friday
9:00	9:30		Invited Talk 2 (Part I)	Invited Talk 3	Invited Talk 4 (Part I)	Invited Talk 5 (Part I)
9:30	10:00	Presentation				
10:00	11:00	Invited Talk 1 (Part I)	Invited Talk 2 (Part II)	Computer Lab	Invited Talk 4 (Part II)	Invited Talk 5 (Part II)
11:00	11:30	Coffe	Coffe	Coffe	Coffe	Coffe
11:30	12:00	Invited Talk 1 (Part II)	Contribution 1	Contribution 4	Contribution 7	Contribution 9
12:00	12:30					
12:30	13:00	Introduction to Computer Lab	Contribution 2	Contribution 5	Contribution 8	Discussion + Special Issue
13:00	13:30					
13:30	14:00	Lunch	Lunch	Lunch	Lunch	Lunch
14:00	15:00					
15:00	15:30	Invited Talk 1: Computer Lab and	Contribution 3	Contribution 6	Swimming pool	Free Time (Salsa lessons)
15:30	16:00					
16:00	16:30	Exercices	Discussion + EWG-ORAFM	Discussion + Debate OR in Agriculture		
16:30	17:00					
17:00	17:30	Coffe	Coffe	Coffe		
17:30	20:00	City Tour	Visit "Seu Vella"	Visit Museum		
20:00	21:30	Dinner	Dinner	Dinner	Dinner	Special Dinner

Saturday 1st August: Visit to Andorra. Entry to Caldea. Evening free.

Sunday 2nd August: Departure from Andorra to Solsona and Excursion around Solsona.



## Second week in Solsona

Start	End	Monday	Tuesday	Wednesday	Thursday	Friday
9:00	9:30	Invited Talk 6 (Part I)	Invited Talk 7 (Part I)	Invited Talk 8 (Part I)	Invited Talk 9 (Part I)	Invited Talk 10 (Part I)
9:30	10:00					
10:00	11:00	Invited Talk 6 (Part II)	Invited Talk 7 (Part II)	Invited Talk 8 (Part II)	Invited Talk 9 (Part II)	Invited Talk 10 (Part II)
11:00	11:30	Coffe	Coffe	Coffe	Coffe	Coffe
11:30	12:00	Contribution 10	Contribution 13	Contribution 16	Contribution 19	Evaluation and Future actions
12:00	12:30					
12:30	13:00	Contribution 11	Contribution 14	Contribution 17	Discussion	
13:00	13:30	Lunch	Lunch	Lunch	Lunch	
13:30	14:00					
14:00	15:00					
15:00	15:30	Contribution 12	Contribution 15	Contribution 18	Visit to swimming pool	Arrival to Leida. Banquet and closure of ESI2009
15:30	16:00					
16:00	16:30	Discussion + CTFC	Discussion	Discussion + Debate OR in Forestry		
16:30	17:00					
17:00	17:30	Coffe	Coffe	Coffe		
17:30	20:00	City Tour				
20:00	21:30	Dinner	Dinner	Dinner	Dinner	Dinner

Saturday 8th August: Departure of participants.

## 7. Outcomes

The main outcome of the ESI2009 is the friendship generated among participants. This could lead to fruitful collaborations. For instance, the laureate Ilan Halachmi is being preparing a proposal within the 7<sup>th</sup> Framework Programme in the EU and several people of ESI has been invited to take part.

On the other hand a CfP of a special volume in Annals of Operations Research is launched for publishing papers presented at ESI2009, although the volume is also open to other contributions in the related field. The call is entitled: "Methods and Applications in Natural Resources Management" and reachable at <http://www.springer.com/journal/10479/submission>

Finally, it was agreed by all participants to make efforts to meet each other again in next EURO Conference in Lisbon 2010. Exploring alternatives for repeating this or similar experiences for not loosing the contact and increase the visibility of the group was as well accepted.

## 8. Budget report: supports and expenses

The original budget presented at EURO was:

Incomes:

- EURO (14000€)
- The University of Lleida (4000€)
- The Forest Institute of Catalonia (4000€)
- i-Math (National project on Mathematics. 12000€)

Additional application:

- Spanish Ministry of Education (12000€)
- Local Administration (10000€)

Expected expenses:

- Keynote Speakers (16000€)
- Accommodation (6000€)
- Transport to and from Solsona (2000€)
- Banquet (4000€)
- Excursion and social events (6000€)
- Meals (6000€)

In the end these were the final results:

Incomes:

- |                            |          |
|----------------------------|----------|
| ▪ EURO                     | 14000€   |
| ▪ The University of Lleida | 4553,51€ |
| ▪ i-Math                   | 12000€   |
- (National project on Mathematics)

Expenses:

- |                                 |                 |
|---------------------------------|-----------------|
| ▪ Keynote Speakers              | 7408,22€        |
| ▪ Accommodation                 | 8874,58€        |
| ▪ Transport to and from Solsona | 2226,15€        |
| ▪ Banquet                       | 2445,39€        |
| ▪ Excursion and social events   | 3419,82€        |
| ▪ <u>Meals</u>                  | <u>6179,35€</u> |

Total: 30553,51€

Total per laureate (18): 1697,42€

About expected incomes due to the economic crisis restrictions made impossible to get financial support from other institutions as initially expected. This fact made to cancel gratuities reserved for keynote speakers. This aspect had been already stated in the letter of invitation. The unexpected casualty of Dr. Levner didn't cause an extra cost thanks to the availability of Dr. Udias from Universidad Rey Juan Carlos. Other speakers also contribute to lighten this chapter.

Therefore, about expenses in general, the week in Solsona was quite more expensive than this in Lleida. Not only due to transport expenses but also for accommodation and meals was that. However the overall quality was acknowledged by all participants.

There was the doubt of maintain all the ESI in Lleida, but it was decided to make the effort in benefit of participants and it was payable. All chapters were adjusted to needs but covering all what was planned since the beginning.

The lack of the two laureates that didn't attend the ESI represented an extra cost given that their places were already payed and no option to recover this money was possible.

## **9. Conclusion**

The final conclusion is positive, very positive experience for every body, even for the organisation. Many laureates were willing to repeat next year the experience!

It was detected the general interest on topics treated during ESI2009 and a lack of meeting points to deal with them under an OR perspective. There is a lot of work that OR people can do to improve decisions in agriculture, forest management and natural resources in general.

The organising committee would like to thank to the EURO Executive Committee members the trust and the opportunity you gave us of preparing such a rewarding event in many aspects.

Many thanks.

On behalf of the organising committee.

L.M. Plà  
Chair.