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TRAINING SCHOOL WG 3

REGENERATIVE CONSTRUCTION and OPERATION
From regenerative concepts and design to reality

COST Action CA166144 RESTORE

REthinking **S**ustainability **TO**wards a **R**egenerative **E**conomy

Training School Working Group 3

Bolzano (Italy)

11th – 14th March 2019

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CONTENT

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1 PEOPLE

International Speakers:

Carlo Battisti (Eurac Research, Bolzano/Italy), Paola Boarin (University of Auckland, New Zealand), Patrick Dallasega (University of Bozen/Italy), Carsten Druhmann (ZHAW Zürich/Switzerland), Steffen Feirabend (Hft Stuttgart, Werner Sobek Stuttgart/Germany), Camilla Follini (Fraunhofer Research Italia, Bolzano/Italy), Chris Havers (Acclaro Advisory/UK), Emanuele Naboni (KADK, Copenhagen/Denmark), Paola Penna (Fraunhofer Research Italia, Bolzano/Italy), Natalia Gonzales Pericot (European University of Madrid/Spain), Ralph Rheiter (PIANOo, Inkoop Bureau Midden Nederland/Nederland)

International Trainers:

Carlo Battisti (Eurac Research, Bolzano/Italy), Martin Brown (Fairsnape/UK), Carsten Druhmann (ZHAW Zürich/Switzerland), Emanuele Naboni (KADK, Copenhagen/Denmark), Indra Purs (University of Latvia), Paola Villoria (Universidad Politecnica de Madrid/Spain), Blerta Vula (Kolegji UBT/Kosovo)

Supporting Institutions:

Eurac Research, Bolzano/Italy

Organization:

Training School Chair: Giulia Peretti (Werner Sobek WSGreenTechnologies, Stuttgart/Germany)

Training School Coordinator: Dorin Beu (Green Building Council Romania President/Romania)

COST Action RESTORE Chair: Carlo Battisti (Eurac Research, Bolzano/Italy)

COST Action RESTORE Vice Chair: Martin Brown (Fairsnape/UK)

COST Action RESTORE Grant Manager: Gloria Peasso (Eurac Research, Bolzano/Italy)

2 KEY DATA

Title	Regenerative Construction and Operation – From Regenerative Concepts and Design to Reality
Goal	Bridging the gap between design and construction through the conveying of practical instruments and information for the implementation and operation of regenerative buildings.
Date	11th -14th March 2019
Location	NOI Techpark in Bolzano/Bozen. The city is the capital of South Tirol/Alto Adige on the southern face of the Alps and at the northern end of Upper Italy.
Output	A Sustainable and Regenerative Tool (SRT) to implement regenerative aspects in the different construction stages.
Format	Site visits and analysis of best practice examples, seminars and roundtables, workshops and competition
Participants	24
Tutors	7
Speaker	10
Language	English
Credits	6 LFA (Living Future Accreditation program)
Final Event	Restore Mid-Term (UN)conference
Online platform	https://drive.google.com/drive/folders/14lV32EaAAEnV9L3jy_6qLMv86fppMmKw?usp=sharing

3 INTRODUCTION TO THE TRAINING SCHOOL

Bolzano Training School is oriented to European professionals, researchers, PhD and master students from the construction and Facilities Management sector with the goal of providing them with the tools to include restorative concepts in their daily work. The aim is to bridge the gap between current common construction practice and the new sustainable construction process.

To attain this ambitious goal, the Training School has been designed to balance between the testimony of international experts in the field and the visit and assessment of best practices around Bolzano. The mix of site visits, seminars and workshops allows an active setup of the 4 days. For the detailed program, please refer to the complete program.

	Day 1	Day 2	Day 3	Day 4
09.00 - 10.45	Seminar 1 (SG 3.1) Regenerative Procurement	Seminar 3 (SG 3.3) Regenerative Operation	Seminar 5 Circular Economy	Final presentations
11.00 - 13.00	Case Study Visit *Markas Headquarter*	Case Study Visit *NOI Tech Park*	Competition - Workshop	Jury
13.00 - 14.00	Lunch Break	Lunch Break	Lunch Break	
14:00 - 17:00	Competition - Workshop	Competition - Workshop	Competition - Workshop	Competition Awards (16:00-17:00)
17.00 - 18.30	Seminar 2 (SG 3.2) Regenerative construction	Seminar 4 (SG 3.4) Future life		

- Seminars: are activities were a series of invited speakers - experts in procurement, construction, operation, second life or circular economy- will give a small presentation followed by a round table and debate. Through their input the teams will gain information about each topic.
- Case studies visits: The cases studies are best-practice examples of the implementation of regenerative/sustainable principles. Through the visit of the case study it will be shown how sustainability principles become reality and which are the barriers or challenges to overcome in the practice.
- Competition - workshop: There will be a competition between the teams to come up with a solution for a specific challenge described below. The workshops will contain team work activities which will be supported by trainers that will tutor the development of the work.

For the preparation to the Training School please refer to the list of the suggested readings .

The following sections will explain in detail each of the activities carried out in the Training School: competition-workshop; seminars and site visits

4 COMPETITION - WORKSHOP

Participants will take part in the competition in groups/teams. A total of 6 teams of 4 participants each was selected by the Training School Committee (see table below). The teams were formed considering a balance between participants' background so that each team has one person belonging to the topics of WP3 (procurement/pre-construction, construction, operation and second life), working experience and balancing professional and academics.

TEAM 1		
3.1 3.2 3.3 3.4		
TEAM 2		
3.1 3.2 3.3 3.4		
TEAM 3		
3.1 3.2 3.3 3.4		
TEAM 4		
3.1 3.2 3.3 3.4		
TEAM 5		
3.1 3.2 3.3 3.4		
TEAM 6		
3.1 3.2 3.3 3.4		

4.1 The challenge

Regenerative and sustainable buildings throughout their whole life cycle are nowadays one of the highest inspirations. However many factors can compromise their construction and operation. Thus, adequate guidelines and indicators to help designers, contractors and project management as well as the owners to implement and verify regenerative sustainability goals, are needed.

Therefore, the challenge of this competition is to develop a tool that can be used to implement regenerative sustainability aspects throughout the building process. This tool will be named "Sustainable Regenerative Tool (SRT)"

The SRT is an instrument for professionals of the construction and FM sector, which supports and guides the delivery of regenerative aspects in design and construction and their monitoring during the operation of the building and second life.

In the 4-day competition, each team will develop a Sustainable Regenerative Tool (SRT) based on a specific project (case study NOI Teck Park). This SRT should cover the entire building construction process: bidding/pre-construction, construction, operation and second life and address the key themes developed in WG 1 (Place, Energy, Water, Wellbeing, Carbon, Resources, Equity, and Education).

Although related to a specific project, the participants should think how to implement and use the developed tool also in other projects.

In order to develop this SRT, participants can take as a reference or example other tools, which are currently being used in a specific stage of the building process. Some examples of currently used tools are PQQ or SFMI (Sustainable Facilities Management Index). The SRT should integrate the principles of PQQ and SFMI, however the form/contents/evidence are open and must be developed by the trainees.

- PQQ sets out a series of questions for potential tenderers to answer regarding their level of experience and capacity focusing on restorative/regenerative/sustainability aspects.
- SFMI Checklists is an instrument to secure a sustainable operation of the building.

A short presentation to introduce these tools to the teams will be performed in the first day of the competition.

4.2 Guidelines to develop the Sustainable Regenerative Tool

The SRT must contain -but is not limited- following aspects:

- Consider the entire building construction process: bidding/pre-construction, construction, operation and second life.

- Address and consider the key themes and goals of Restore: Place, Energy, Water, Well-being, Carbon, Resources, Equity, and Education (see publication of WP 1: http://www.eurestore.eu/wp-content/uploads/2018/05/RESTORE_booklet_print_END.pdf)
- Evaluation and selection of the capability of the participants of the projects (design team, bidder, contractor, etc.)
- Measures to assure the implementation of the goals of Restore depending on the project stage
- Information and evidence to be provided by the people involved in the projects
- Indicators needed to check the operation of the building

The form of the SRT must be decided by the team. It can be a checklist, a guideline, software, an online tool.

The evaluation criteria of the SRT are, in order of importance:

- Comprehensibility of the structure of the SRT
- Scalability & replicability in other projects
- Creativity/Innovation
- Social, economic and environmental aspects considered
- Presentation and vote of the audience

4.3 Competition structure and programme

The competition is organized in four days as seen below.

	Day 1	Day 2	Day 3	Day 4
09.00 - 10.45	Seminar 1 (SG 3.1) Regenerative procurement	Seminar 3 (SG 3.3) Regenerative Operation	Seminar 5 Circular Economy	Final presenta-tions
11.00 - 13.00	Case Study Visit *Markas Headquarter*	Case Study Visit *NOI Tech Park*	Team work	
13.00 - 14.00	Lunch Break	Lunch Break	Lunch Break	
14:00 - 14:30	Introduction to the competition	Questions to the FM Team of NOI park	Team work	
14:30 - 15:00	Introduction to PQQ and FM checklist			
15:00 - 16:00	Team Work	Tutoring by Trainers	Tutoring by Trainers	
16:00 - 17:00		Team Work	Team work	Competition Awards
17.00 - 18.30	Seminar 2 (SG 3.2) Regenerative construction	Seminar 4 (SG 3.4) Future life		

Through a series of seminars, workshops and site visits, the teams will learn the skills necessary to successfully complete the challenge of the competition. The teams will be inspired by the site visits as well as by the input from the speakers of the seminars. The teams will put the new skills into practice and actively engage in developing the SRT to be implemented in each of the four life cycle stages.

To develop the SRT the teams will have the support of some trainers, which will tutor the development of the work, both from the technical and time-management point. The tutors are professionals specialized in one of the four stages of the construction process as well as are familiar with the approach of COST RESTORE and will allow the transmission of the findings of the WP 1 and WP 2.

The workshops with the trainers/tutors are interactive talks between trainers and trainee. On the second and third days sessions with the trainers are scheduled. Trainers are rotating and visiting the teams, so that during each session each team has 4 15-minutes meeting with a trainer.

Stage	**Trainers**
Procurement	Carlo Battisti Martin Brown
Construction	Blerta Vula Paola Villoria
Operation	Carsten Druhmann
Future life	Indra Purs Emanuele Naboni

Finally, the teams will have to present the final tool to a jury during the fourth day of the Training School and the best work will be awarded during the conclusive event.

The teams will have a total of 11.5 hours to work and the goals and activities to be performed in each day during the competition are described below:

Day 1: 3h

- We will start with a short introduction to the competition in order to have a common understanding of the aim and challenge of the competition and expected outputs.
- Then, an introduction to PQQ and SFMI will be given to help the teams in gaining knowledge about PQQ and SFMI as they can take them as examples to develop their SRT.
- Next, each team will get together and start working on the challenge. For instance, some of the activities or tasks that each team will need to address are:
    - Gain knowledge and understanding of the case study NOI Tech Park.
    - Define a template for the SRT.

- Start completing the SRT by including guidelines/recommendations for sustainable restorative aspects for the preconstruction stage.

Day 2: 3h

- We will start with a turn of Q&A with the FM team of NOI Tech Park in order to gain more knowledge of the operation and management. Carsten and Chris lead this session, which includes the analysis of the SFMI related to NOI Techpark.
- Then, there is a time slot for the tutoring of the teams, were the teams will be able to receive support from the trainers.
- Finally, the teams will be able to continue completing the SRT: including guidelines/recommendations for sustainable restorative aspects during: construction and operation stages.

Day 3: 6h

- We will start with a turn of Q&A with someone who was involved in the construction/refurbishment of the NOI Tech Park in order to gain more knowledge of the case study.
- Then, the teams will be able to continue completing the SRT by including guidelines/recommendations for sustainable restorative aspects regarding circular economy.
- After, there is a time slot for the tutoring of the teams where the teams will be able to receive support from the trainers.
- Finally, there is a time slot for team work were the teams will have time to complete the whole STR and prepare a 10-minutes presentation and the textual explication to be presented to the jury the day after.
- Each group must upload the presentations and the textual explications at least at 24:00

Day 4: 2h

- Team presentations and awards

4.4 Outputs and evaluation criteria

The groups will present in the fourth day, during the Mid Term Conference of RESTORE, their final proposal to a jury and the best output will be awarded during the afternoon.

For this, before the presentations, each team should hand in to the jury the following documents, uploading them on the Google Drive server at least Wednesday at 24:00:

1. A document containing the developed tool and a short description of it (between 500 and 1000 words).
2. The file of the presentation.

Then, the teams will have to present their work to the jury and will have a time slot of 10 minutes maximum. After the oral presentation, each team will be involved in a Q&A session in English with the Jury. This final, energizing event provides an opportunity for the teams to show what they have learned throughout the competition. Each trainee should vote his favourite SRT and presentation (the vote is anonymous). The vote of the audience flows into the final evaluation of the jury.

The works are evaluated according to a predefined scorecard by a 5-people jury, with expert from each of the content of the seminar as well as familiar with the approach of Restore.

Awards will be given to the teams that demonstrate the best innovation and learning. The evaluation criteria are as follows:

- 10%: Social aspects considered
- 10%: Economic aspects considered
- 10%: Environmental aspects considered
- 20%: Scalability & Replicability in other projects
- 15%: Creativity/Innovation
- 20%: Comprehensibility of the structure of the SRT
- 10%: Presentation
- 5%: Vote of the audience (see voting papers)

After the TS, and in addition to the materials produced within the teams, each participant must submit a small document (1000 words) regarding one of the key themes of WG1 addressing this topic from the perspective of his experience in one of the 4 themes of WP 3. The article will be included into a WG3 Regenerative Construction publication.
After submission of the document the trainee will be reimbursed.

During the TS each participant must select an option from the matrix grid, one trainee per option (the matrix is hanged in the TS room).

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		Themes of WG 3			
		Procurement (SG.1)	**Construction (SG.2)**	**Maintenance and operation (SG.3)**	**Second life (SG.4)**
Key themes of WG1	Place				
	Energy				
	Water				
	Wellbeing (working environment)				
	Wellbeing (biophilia)				
	Carbon				
	Resources (materials)				
	Resources (waste)				
	Equity				
	Education (learning)				
	Education (advocacy)				
	Economics				

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5 CASE STUDY VISITS

The case studies are best-practice example of implementation of the regenerative/sustainable principles. Through the visit of the case study it will be shown how sustainability principles becomes reality and which are the barriers or challenges in the practice. The case studies are successful examples of “good way to do things” and during their visit it is focused on specific stages of the life cycle. Active participants of the construction or operation process present the case study on site.

A brief description of the building can be found on the online platform (LINK).

Case study	Focus	
NOI Techpark (Lead by NOI AG)	**Future life.** Industrial building of the 30rties, which is converted into an innovation centre.	
	Operation. The new development is a high efficient and innovative building (NZEB energy standard, LEED neighbourhood certification) and represents an excellent example of knowledge-hub	
Markas Headquarter (Lead by Carlo Battisti)	**Operation.** Well certified building, high comfort for the users, continuous optimization to maximize the benefits for environment and users and assure that the initial state is maintained or enhanced	
	Pre-construction. Integration of sustainability/restorative aspects in the call for tenders, specification, procurement and contract stage	

6 SEMINARS

The format of the seminars is informal, dynamic and interactive, stimulating a brainstorming between the participants and the speakers. The speakers are expert in one of the life stages (bidding, construction, operation, future life and circular economy). The goal is having lectures /talk from the practice and industry (less academic). Through their input the participants gets information about the process and are inspired. There is a clear link between speakers' topics and expected outputs. In this way, participants will benefit from the speakers inputs.

For each seminar there is a time slot of 90 min with two presenters. The presentation/lecture of the speakers takes 30 min + 30 min and further 30 min are for a round table/question and answers between the participants and the experts.

The speakers and the related seminars are:

Seminar 1: Regenerative procurement, bidding and contractors

Chair: Giulia Peretti

The seminar investigates the requirements which should be set in the pre-construction stages to assure a regenerative construction process and operation. The seminar explores the bidding and management process from the prospective of delivering regenerative designs. It focuses on the application of regenerative thinking before and within the construction and operational phases, and within the supply chains. The topics discussed during the seminar are project management, pre-qualification, pre-selection, selection and evaluation process to assure the implementation of sustainable and regenerative buildings and processes.

Presenter	*Affiliation*	*Expertise*	*Title / Topic*
Ralph Rheiter	IBMN Nederland	Procurement manager	Sustainable procurement – The contradiction between (EU) tendering and sustainability: The realization of a sports Centre
Patrick Dallasega	University of Bolzano	Construction management, lean construction	Traditional Project Management vs. Lean Construction Project management: Towards a sustainable process

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Seminar 2: Regenerative Construction Process: Materials, Site Construction, Lean Construction, Waste Management

Chair: Carsten Druhmann

The seminar investigates technologies, instruments, approaches and procedures for the construction of regenerative building, from material and construction technologies up to construction sites. The aim is to trigger and inspire a paradigm shift in the construction sector, showing best practice examples as well as innovative approaches for the implementation of regenerative and sustainable technologies in the construction sector. The topics discussed in the seminar are: advanced and emerging materials and techniques, material and waste minimization (e.g. recycling, lightweight construction), sustainable construction site and Lean Construction.

Presenter	*Affiliation*	*Expertise*	*Title / Topic*
Steffen Feirabend	Hft Stuttgart, Werner Sobek Stuttgart	Engineering	Sustainable construction
Camilla Follini	Fraunhofer Research Italia, Bolzano/Italy	Process Engineering in Construction	Optimization of the construction process through continuous site monitoring following a lean approach and digital BIM-based tool

Seminar 3: Regenerative Operation

Chair: Giulia Peretti

The seminar focuses on the continuous optimization to maximize the benefits for environment and users and assure that the planned standard is maintained or enhanced. The topics discussed in the seminar are the measures for a regenerative Facility Management, resource management and systems for ongoing improvement, regenerative operational plan (e.g. recycling programs, social initiatives, sustainable stockpiling), net positive waste during the operation, performance monitoring of the restorative design targets (social, environmental and economic), feedback from the user.

Presenter	*Affiliation*	*Expertise*	*Title / Topic*
Chris Havers	SFMI - Acclaro Advisory	Facility Management	Facility Management Sustainability Index
Carsten Druhmann	ZHAW Zürich	Facility Management	Sustainable operation of buildings

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Seminar 4: Future Life, Regeneration of Existing Building and Restorative Refurbishment

Chair: Carsten Druhmann

The seminar focuses on the regeneration through retrofit and adaptive reuse of existing and historic buildings to improve their value for users and environment. The topics discussed in the seminar are the regenerative approach to existing building (retrofit vs new construction), the regeneration of physical and functional requirements, recycling and reuse of materials.

Presenter	*Affiliation*	*Expertise*	*Title / Topic*
Paola Penna	Fraunhofer Research Italia, Bolzano/Italy	Second life and refurbishment	Operational tools and business model for energy refurbishment – The Klimakit model
Carlo Battisti	Eurac Research, Bolzano/Italy	Sustainable Innovation Management	Historical buildings renovation using regenerative principles
Paola Boarin	*University of Auckland, New Zealand*	*Second life*	*Bridging the gap between historic preservation and Green Building practices*
Due to medical reasons the speech of Paola Boarin has been cancelled on short notice. Therefore the presentation will be integrated in the Training School and WP3 publication.			

Seminar 5: Circular Economy

Chair: Giulia Peretti

The seminar explores how to build circular economy thinking into construction projects and integrating circular economy principles to reduce waste and increase reuse of materials. The topics discussed during the seminar regard both the manufacturing of construction products (e.g. responsible sourcing of raw materials, designing to minimise waste in product refurbishment and maximise reuse) as well as design and construction strategies and technologies (e.g. designing out waste, designing for resource efficiency, designing for deconstruction and disassembly, reducing embodied carbon over a whole building lifecycle).

Presenter	*Affiliation*	*Expertise*	*Title / Topic*
Natalia Gonzalez Pericot	European University of Madrid	Circular economy	Rethinking construction under circular economy principles
Emanuele Naboni	KADK, Copenhagen	Circular Economy and Life Cycle Assessment by design	Experiments of Circular Economy

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MID-TERM (UN)-CONFERENCE

The RESTORE Challenge

Thursday 14th of March 2019 from 08:00 – 17:30

The international conference hosts a number of outstanding international professionals and researchers. It runs on the 14th of March and it is related to the 2030 Agenda for Sustainable Development Goals and the Training School.

During the conference the trainees will present their work and output of the Training School (SRT). The conference is open to the public and free.

Conference Schedule:

- 08:00-08:30, registration
- 08:30-08:45, welcome and introduction
- 08:45-10:15, RESTORE Training School #3 results, introduction
  Giulia Peretti, Werner Sobek WSGreenTechnologies
  Teams presentations
- 10:15-10:45, coffee break
- 10:45-11:15, 17 Sustainable Development Goals
- 11:15-11:30, workshop introduction
- 11:30-13:00, teamwork
- 13:00-14:00, (light) lunch break
- 14:00-14:30, teamwork
- 14:30-16:00, teams presentations
- 16:00-16:30, puzzle making
- 16:30-17:00, workshop conclusion
- Closing and next steps
- Restore Training School #3 Competition Award,
- Final remarks

Please note: The registration on eventbrite is necessary.

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