KA201: Exchange of good practices

"Teaching basic sciences to young people with fewer opportunities: towards inclusive education"

Dott.ssa Elena Sturchio

Researcher INAIL/DIT

TransNational Meeting and Staff Training

Roma, 06-09 November 2018

(Call: 2018, KA2 - Cooperation for Innovation and the Exchange of Good Practices, KA201 - Strategic Partnerships for school education)

Dipartimento Innovazioni Tecnologiche e Sicurezza degli Impianti Prodotti e insediamenti Antropici

1. Team
2. SPAIC Project
3. Ongoing Activity

Partners

France: LTP Nay-Baudreix (Nay)

France: CNEAP NOUVELLE AQUITAINE (Villenave D'Ornon)

Italy: CRF Cooperativa Ricerca Finalizzata Società Cooperativa (Rome)

Italy: ITA Emilio Sereni (Rome)

Italy: Liceo Scientifico Statale Benedetto Croce (Palermo)

Greece: 1er EPAL THESSALONIKIS (Salonicco)

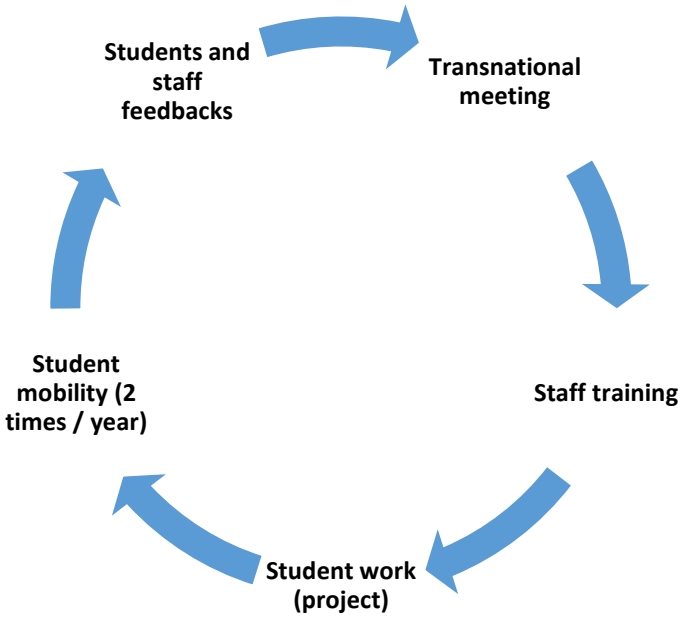
Bulgaria: Professional School of Ecology and Biotechnology (Sofia)

Project aims

LTP Nay Baudreix

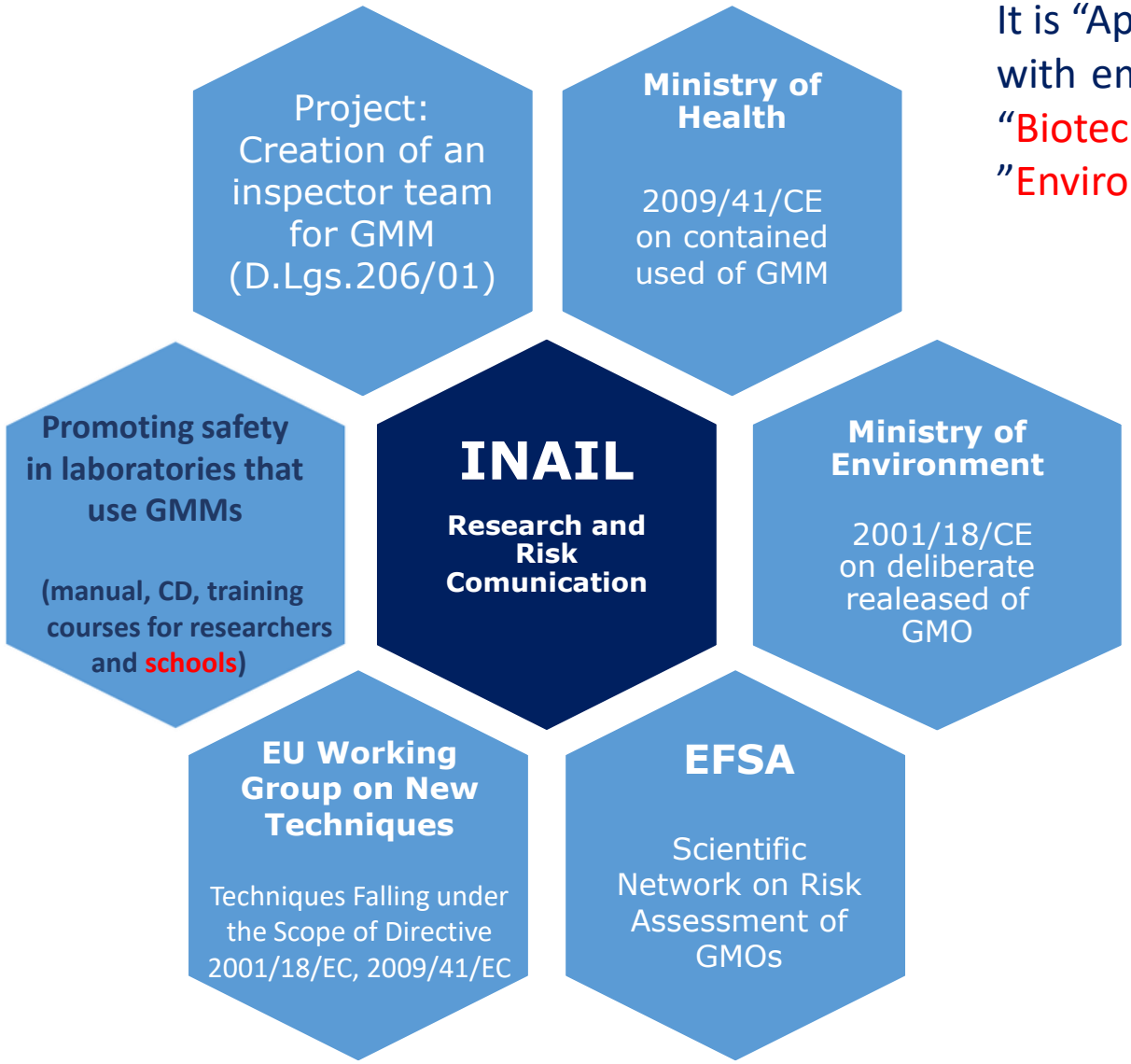
- **Develop new partnership between schools in Europe**
  - Staff meetings and mobilities
  - Students mobilities (~ 15 / partner / year)
- **Exchange of good practices**
  - How to deal with young people with fewer opportunities?
  - How to teach to these young people basic sciences ?
- **Development/adaptation of tools/methods to deal with these young people**
  - Teaching pedagogy (method and tools)
  - Student projects

Global organization



Education and Culture

It is “Applied-Research” and we deal with emerging issues in the field of “Biotechnology” and ”Environmental Sustainability”.



Third Mission of research aims to promote innovation and the dissemination of validated scientific knowledge

Group ISA,
48 Boulevard Vauban,
59046 Lille cedex

Università di Roma,
La Sapienza,
32 Viale Regina Elena,
00161 Roma

Intermediary Research Report

Optimization of the Comet Assay in Plant Cells

In preparation for getting a master's in sustainable management of pollution

For validation of M1

Internship supervisor, Università di Roma La Sapienza: Dr. Elena Sturchio

Internship supervisor, ISA: Dr. Bertrand Pourrut

VIJAYARAJ Vinita

September 2016

2015-2016

Erasmus+

Higher Education: Traineeship Certificate

Bertrand Pourrut ISA ENSAT

Inter-laboratory study → INAIL /DIT

We started a scientific collaboration between two research institutes (Italy-France) in order to study the inter-laboratory variation in DNA strand breaks in plants and identify key factors affecting comet assay performance through a pre-validation study.

Mutagenesis vol. 32 no. 6 pp. e1–e28 doi:10.1093/mutage/gex037

Abstracts of the 12th International Comet Assay Workshop held at the University of Navarra, Pamplona, Spain, 29–31 August 2017 (https://icaw.vito.be/)

hCOMET: a COST Action dedicated to the comet assay in human biomonitoring

Andrew Collins[1], on behalf of COST Action 15132
[1]*University of Oslo, Department of Nutrition, PB 1046 Blindern, 0316 Oslo, Norway*

The COST Action hCOMET has members from 23 countries, with a common interest in using the comet assay to measure DNA damage and repair in humans. The purpose of this Action is two-fold: first, to collect as much human comet assay data as possible into a single database so as to allow a pooled analysis; and second, to improve the inter-laboratory reproducibility of the assay. In the first year we have succeeded in creating the database, with DNA damage estimates for around 20,000 human samples; analysis is now proceeding, to determine which factors (smoking, age, nutrition, sex, occupational exposure etc.) affect DNA damage and repair, and to what extent.

To achieve the second aim, we need first to understand better the technical factors that affect assay performance, in measurement of both DNA damage and DNA repair, and working groups are actively engaged in these topics. Standardised methods will be tested in a ring study; and the findings of this will be incorporated into standard operating procedures that, we hope, will be adopted as best practice in future biomonitoring studies. Another working group is studying the applicability of the comet assay to different cell types, for example cells from normal and tumour tissue, isolated peripheral blood mononuclear cells (the most commonly used cells) compared with whole

found that consistency of removal is important, whereas lung and lung lavage less so.

Five cohorts of 10 animals in each (A, B, C, D and E) were tested in five independent experiments. In each cohort, five animals were dosed with the vehicle, 0.9% saline and five were dosed with the positive control EMS at 200 mg/kg b.w. Animals were dosed 3–4 hours prior to euthanasia. All animals were euthanized by CO_2 inhalation, nasal tissues (turbinate and septum lining) were collected. Tissues were minced with scissors and single cells were prepared and processed for the comet assay. EMS was dosed at 200 mg/kg b. w. The vehicle control was 0.9% saline (10 mL/kg). The positive control, EMS, was dissolved in 0.9% saline and was prepared fresh just prior to dosing. Vehicle control dosed male rats had % tail DNA values in all 5 cohorts ranging from 0.07 to 0.89 with a mean value of 0.30 ± 0.22 in nasal tissue.

Positive control EMS dosed male rats had % tail DNA values in all five cohorts ranging from 7.24 to 29.02 with a mean value of 15.73 ± 5.18 in nasal tissue. These values were statistically significant compared to the concurrent vehicle control values.

3D Skin comet assay: Genotoxicity assessment addressing the dermal route of exposure

Kerstin Reisinger[1], Joep Brinkmann[3], Tom Down[4], Anja Fischer[1], Andrea Haase[3], Frank Henkler[3], Sebastian Hoffmann[2], Manfred Liebsch[3], Andreas Luch[3], Claudia Petrick[1], Ralph Pirow[3], Astrid Reus[5], Andre Said[3,6], Monika Schäfer-Korting[6], Markus Schulz[7], Stefan Pfuhler[4]

LILLE ISA

Group ISA,
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INAIL
ISTITUTO NAZIONALE PER L'ASSICURAZIONE CONTRO GLI INFORTUNI SUL LAVORO

O25 - A PRE-VALIDATION STUDY OF COMET ASSAY ON PLANTS

Boccia Priscilla[1], Pourrut Bertrand[2], Miriam Zanellato[1], Julien Dubus[2], Vinita Vijayaraj[2], Sturchio Elena[1]
[1] *Italian Workers Compensation Authority (INAIL), Department of Technological Innovation and Safety of Plants, Product and Anthropic Settlements (DIT), Via R. Ferruzzi 38, Roma, Italy*
[2] *Yncrea Hauts de France – ISA Lille – LGCgE, 48 boulevard Vauban, Lille, France*

In the 1990s the comet assay began to be used in plant models, with several limitations in the protocol as a result of the differences in the structure of the plant cell as compared to the animal cell. Because of the conserved structure of plant genetic material, numerous varieties of species can be used in plant genotoxicity testing. In the case of plant cells, several discrepancies and dissimilarities in the protocol exist across labs, despite the fact that an optimized protocol was recently released [1]. In addition, several labs continue to adopt conventional methods into their protocol, which are both time-consuming and redundant, reducing the reliability of the assay.

The aim of this work was to initiate a collaboration between two research institutes in order to study the inter-laboratory variation in DNA strand breaks in plants and identify key factors affecting comet assay performance through a pre-validation study. Two model plants were selected; *Vicia faba* (broad bean) and *Trifolium repens* (white clover). Several optimizations in Pourrut's protocol were evaluated at different steps such as chopping, unwinding, and electrophoresis time [1]. Preliminary significant results have been obtained, identifying the extraction as the main critical step. The chopping method resulted in good efficiency of nuclei isolation in terms of integrity and yield obtained for *Trifolium repens* while not for *Vicia faba* variety used because of its cellular structure, as its larger nuclei, thus a different method of isolating nuclei from *Vicia faba* has been required.

Further research is required in order to optimize the same protocols using different sensitive plant species to ensure reliability as well as an extrapolation of results to provide a guideline for plant comet assay.

[1] Pourrut, B., Pinelli, E., Mendiola, V. C., Silvestre, J., Douay, F. (2015). Recommendations for increasing alkaline comet assay reliability in plants. Mutagenesis, 30, 37–43.

Proceedings of the 3rd World Congress on New Technologies (NewTech'17)
Rome, Italy – June 6 – 8, 2017
Paper No. ICEPR 123
ISSN: 2369-8128
DOI: 10.11159/icepr17.123

Use of Comet Assay as an Efficient Biomarker for Plant Biomonitoring and Phytomanagement of Contaminated Sites

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Extended Abstract

During the last decade plants have been increasingly used in ecotoxicological studies and environmental biomonitoring. In order to evaluate the impact of stress (biotic or abiotic) on plants, it is important to evaluate their health. This can be realized at the macroscopic scale (growth, dry or fresh weight…) or at the molecular scale, using biomarkers. During the same period, the application of the comet assay has been established as one of the most interesting techniques in eco-genotoxicology. It is a rapid, versatile, sensitive and relatively inexpensive method for measuring DNA damages and repairs in individual cells. The aim of this work was to evaluate the interest of the comet assay to monitor pollutant impacts on higher plants growing on contaminated sites and to select plant species to remediate contaminated areas.

In a first study, we investigated the potential impacts of contaminants from a hazardous waste site, in a controlled environment, on *Vicia faba*, as a bioindicator plant. Soil samples were collected from a former industrial area in Italy and their phytotoxicity and genotoxicity were investigated. In the case of the controlled environment we evaluated the environmental damage after a simulated accidental release of toxic substances in soil. In this case we evaluated the contamination effects on soil-plant system and detected DNA damages by short-term genotoxicity tests (comet assay and micronuclei tests) performed on polluted soils and on gravitational water. Our studies demonstrated that the comet assay is a sensitive, rapid and cost-effective technique for the detection of DNA damage, which is ideally suited as a biomarker of

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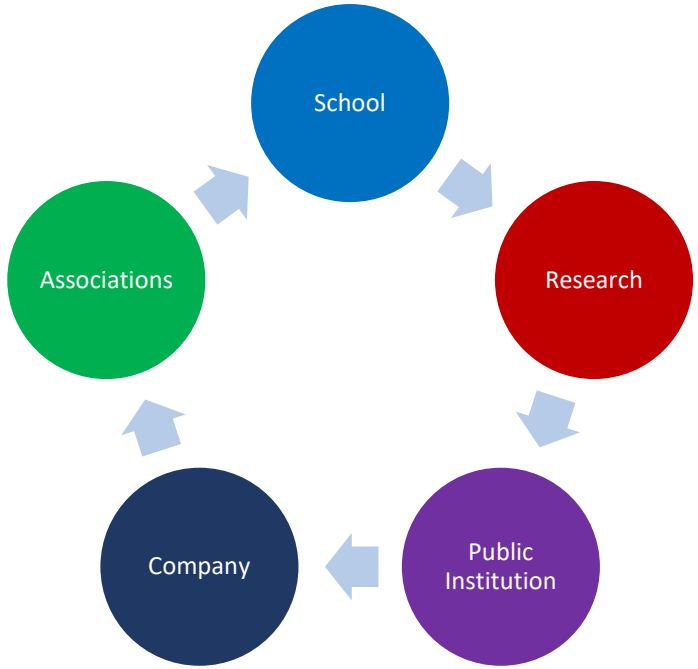
Outsourcer
Dott.ssa Claudia Meconi (biologa-nutrizion
Dott.ssa Viola Macino (psicologa)
Dott.ssa Laura Cellai (psicologa)
Paolo Abozzi (ludoformatore)

Collaboration with Italian National Institute of Health, Comitato per lo Sviluppo della Cultura Scientifica e Tecnologica, Ministry of Education and with DGPREV e DGISAN – Ministry of Health

Creating a Network on risk communication on Biotechnology



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Dr Miriam Zanellato	INAIL	Dr. Claudia Meconi	CRF
Dr. Luigi Santone	INAIL	Dr. Viola Macino	CRF
Dr.Mario Falciano	(Univ. "La Sapienza")	Dr. Laura Cellai	CRF
Dr. Laura Nicolini	(Italian National Institute of Health)	Paolo Abozzi	CRF

INAIL Projects concerning information and communication technologies to develop accessible **technical-scientific tutorial devices** that allow simulation of the work process to minimize the release of GMMs.

Collaboration with Italian National Institute of Health, Comitato per lo Sviluppo della Cultura Scientifica e Tecnologica, Ministry of Education and with DGPREV e DGISAN – Ministry of Health

INAIL Projects on Biotechnology and safety at work for High Schools. Application of the **life long learning methodology.**

Training courses and Workshops

NOVEMBER 2015

2013-2014

NOVEMBER 2013

NOVEMBER 2015

DECEMBER 2015

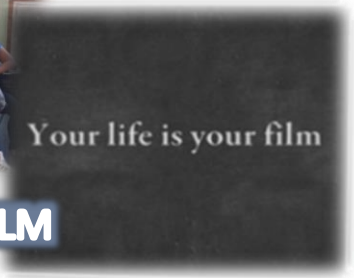
OCTOBER 2013

PRODUCTS

MULTIMEDIAL CD

RESEARCH&SCHOOL

WEB SITE



SHORT FILM

"Alimentare" i nostri geni

EXPO MILANO 2015

"Alimentare" i nostri geni
Padiglione Italia, 14 ottobre 2015
Orario: 15.30

Il Ministero della salute torna ad EXPO con il tema dell'epigenetica. La dottoressa ELENA Sturchio, ricercatrice INAIL, insieme ai ragazzi del Liceo scientifico de Sanctis e dell' IIS Di Vittorio - Lattanzio, presso lo spazio scuole di Padiglione Italia presenta i risultati del progetto "Epigenetica e Nutrizione". Questa nuova scienza evidenzia come dieta, stress, abitudini malsane, luogo di vita e di lavoro, possano influenzare significativamente i geni della persona, ancorché in assenza di alterazioni della sequenza del DNA. Questo cambiamento è dovuto a processi di regolazione dell'espressione genica e può essere trasmesso alla generazione successiva!

L'evento è ad ingresso libero per tutto il pubblico già in EXPO.

https://www.youtube.com/watch?v=wqwXSBvS9SM

EXPERIMENTA

PENSARE E FARE SCIENZA

HOME ARTICOLI CONTATTI

EXPERIMENTA 4: scuola e apprendimenti non formali della scienza e della tecnologia

Convegno del 29 e 30 settembre 2015 a Firenze presso Palazzo Medici Riccardi.

Programma del Convegno

Documento di Lavoro

Modulo di Registrazione

Esonero dall'obbligo di servizio

Documenti precedenti

Ministero dell'Istruzione, dell'Università e della Ricerca
Direzione Generale per gli Ordinamenti Scolastici e per l'Autonomia Scolastica

Comitato per lo sviluppo della Cultura Scientifica e Tecnologica
scienza e tecnologia


INCAIL
AUDITORIUM
Sede Centrale


PIERO
IACONO


GIUSEPPE
RUOCCO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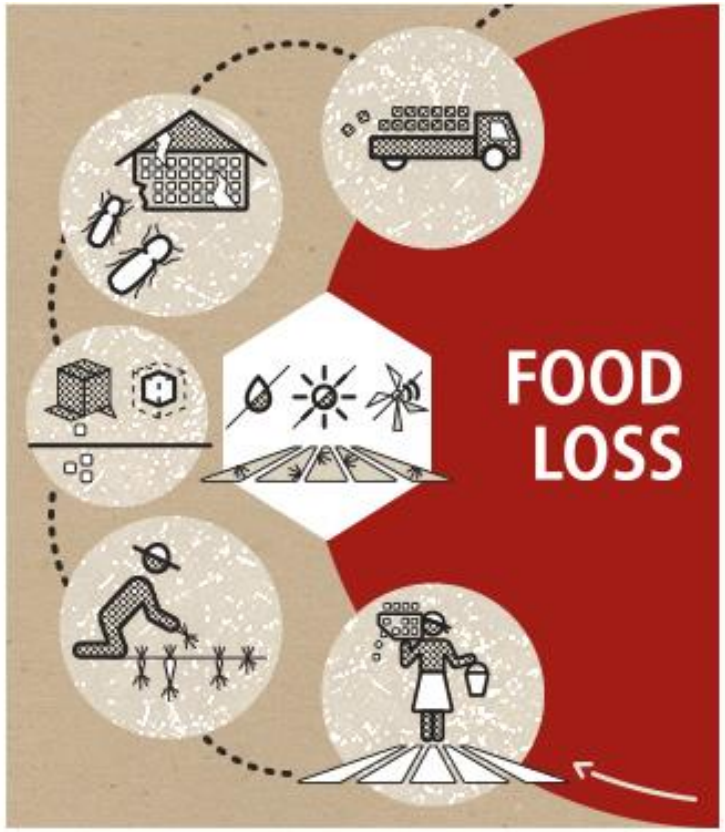
© Patrizia di Stefano

The cross-cutting theme of the project was «Protection of fragility»

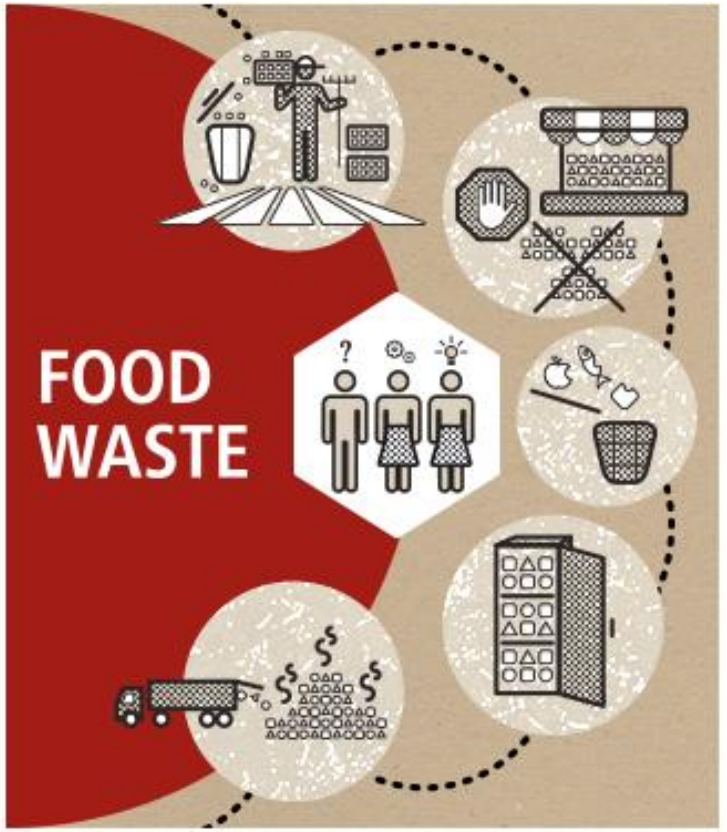
The Research Project titled “Food waste, consumer attitudes and behaviour” (SPAIC)

has been carrying out by INAIL/DIT, Ministry of Health/DGSAN and Research Organization (CRF) and 3 Italian High Schools

The aim of our Project is to focus on the consumption food waste for exploring the reasons of food waste on family level in order to overcome food wasting behavior and point out options to design prevention measures by the responsible involvement in analysis and possible solutions of the students of the “pre University” level, at the same time to point out the need of respecting nutritional rules to not “waste their health”.



Food loss is "decrease in quantity or quality of food" reflected in nutritional value, economic value or food safety of all food produced for human consumption but not eaten by humans (FAO, 2014). Measurement of food loss is a key component of any reduction intervention.



Food waste is part of food loss and refers to discarding or alternative (non-food) use of safe and nutritious food for human consumption all along food supply chains (FAO, 2014). Measurement of food waste is a key component of any reduction intervention.

Food waste is an issue of importance to global food security and good environmental governance, directly linked with environmental (e.g. energy, climate change, water, availability of resources), economic (e.g. resource efficiency, price volatility, increasing costs, consumption, waste management, commodity markets) and social (e.g. health, equality) impacts.

Different studies show that between 1/3 and 1/2 of the world food production is not consumed, leading to negative impacts throughout the food supply chain including households.

There is a pressing need to prevent and reduce food waste to make the transition to a resource efficient Europe

Analysis of data from across Europe generated an estimate of food waste in the EU of 88 million tonnes.

Table 1: Estimates of food waste in EU-28 in 2012 from this quantification study; includes food and inedible parts associated with food.

Sector	Food waste (million tonnes) with 95% CI*	Food waste (kg per person) with 95% CI*
Primary production	9.1 ± 1.5	18 ± 3
Processing	16.9± 12.7	33 ± 25
Wholesale and retail	4.6 ± 1.2	9 ± 2
Food service	10.5 ± 1.5	21 ± 3
Households	46.5 ±4.4	92 ± 9
Total food waste	**87.6 ± 13.7**	**173 ± 27**

**Confidence interval*

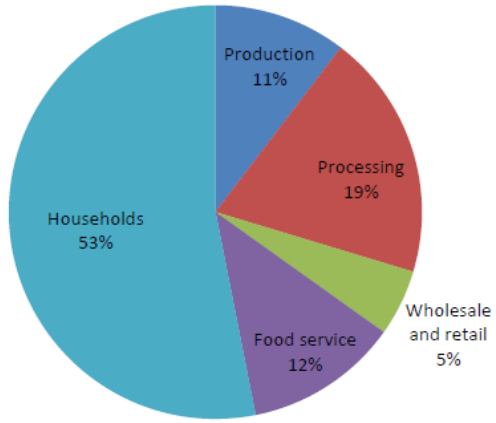


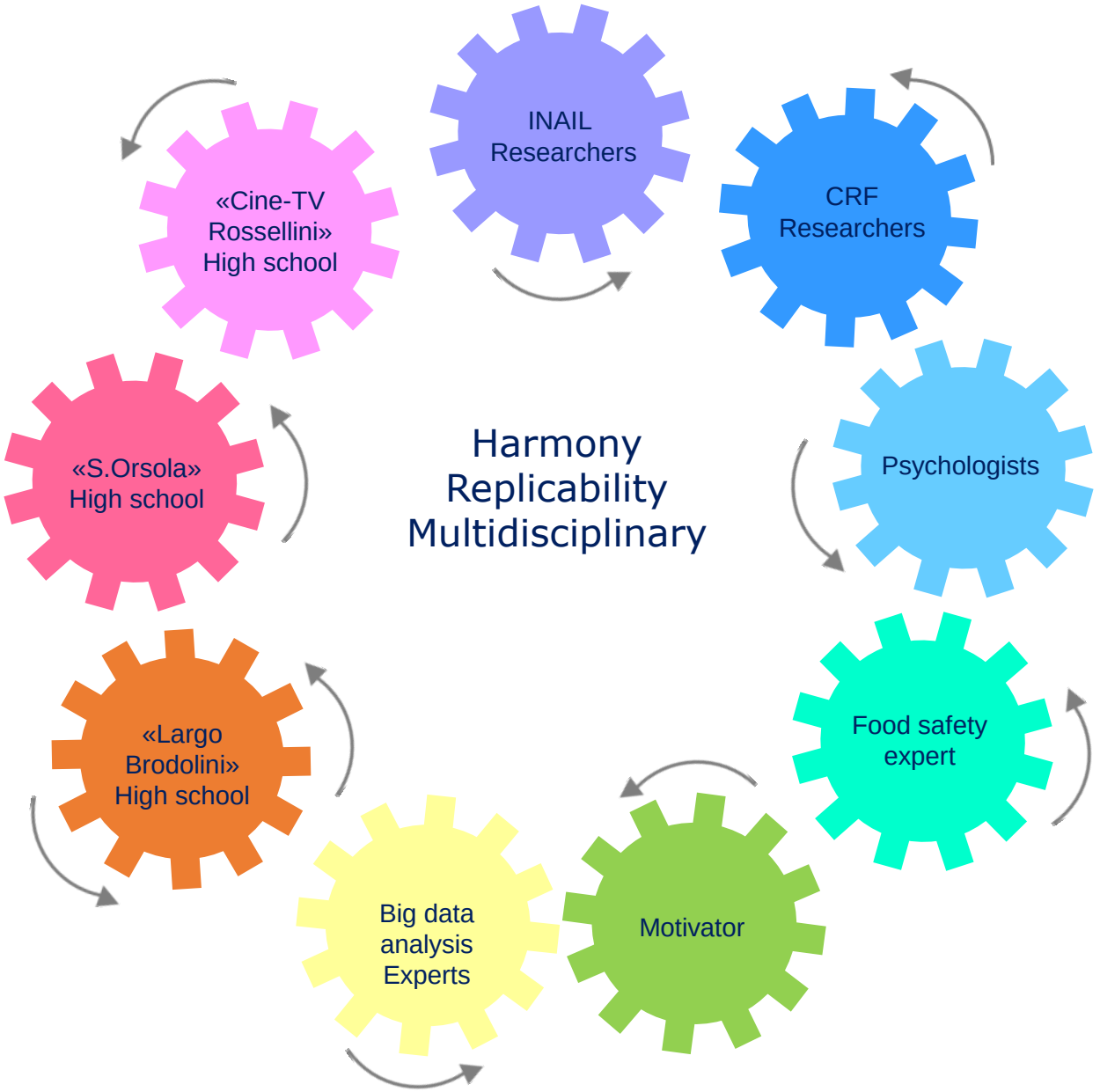
Figure 1: Split of EU-28 food waste in 2012 by sector; includes food and inedible parts associated with food.

This estimate is for 2012 and includes both edible food and inedible parts associated with food.
This equates to 173 kilograms of food waste per person in the EU-28.

The total amounts of food produced in EU for 2011 were around 865 kg / person2, this would mean that in total we are wasting 20 % of the total food produced.

The sector contributing the most to food waste is households (47 million tonnes ± 4 million tonnes).

TEAM


INAIL Researchers
CRF Researchers
Psychologists
Food safety expert
Motivator
Big data analysis Experts
«Largo Brodolini» High school
«S.Orsola» High school
«Cine-TV Rossellini» High school
Harmony
Replicability
Multidisciplinary

SPAIC Project (2016-2018)

"Food waste, consumer attitudes and behaviour"

The Project principally consists of two steps:

Fonte: BFNC (2012), *Food waste: causes, impacts and proposals*, Codice Edizioni

1) provide scientific information on "Food waste" that occurs at all stages of the food life cycle: starting from harvesting, through manufacturing and distributing and finally consumption, but the largest contribution to food waste occurs surprisingly at home in the developed countries.

2) disseminate good behavior model, in efficient and effective way, regarding the issue about food waste and respect of related nutrition rules, among classmates, youngsters and families, in a prevention perspective of the contribution to food waste at households and at the same time forming a specific conscience of the important role that new generations "have to" play in this field.

Three Italian High Schools

from Latium region were selected, characterized by different socioeconomic status and fields of education

“IIS Largo Brodolini-Pomezia”
(a biotechnology school in Rome province)
“IIS Cine TV Rossellini-Roma”
(a Cinematographic high school with a less central location)
“IIS Sant’Orsola-Roma”
(a private school of art situated in the centre of Rome)

I step

Consultation phase between experts, researchers and professors for the planning of activities

II step

Transfer the scientific knowledge to a pre-selected group of students involved in the proposed corrective actions

III step

Creative production, that transform the idea into concrete social utility tools

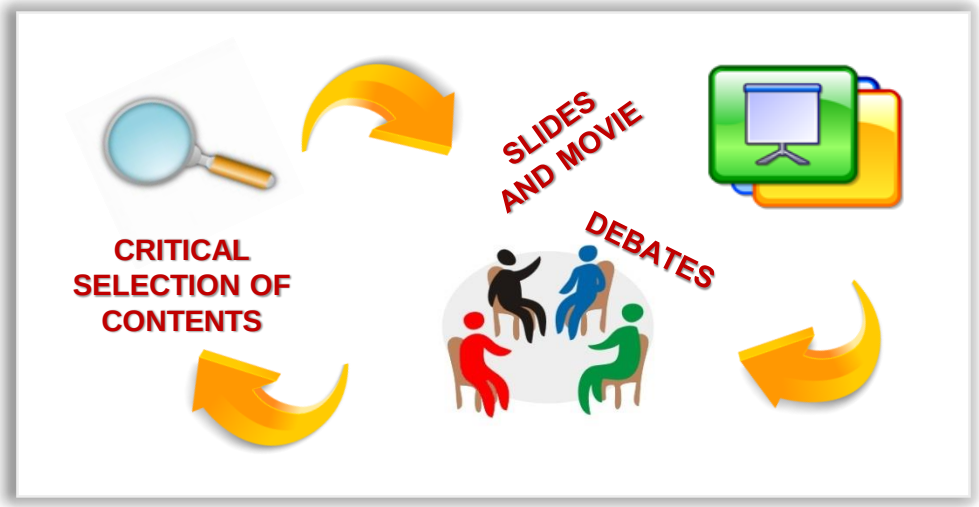
A lifelong learning methodology

Students, teachers and experts, defined the strategies and the method to be adopted to realise new products to induce correct behaviours regarding food waste.

Non formal and informal education

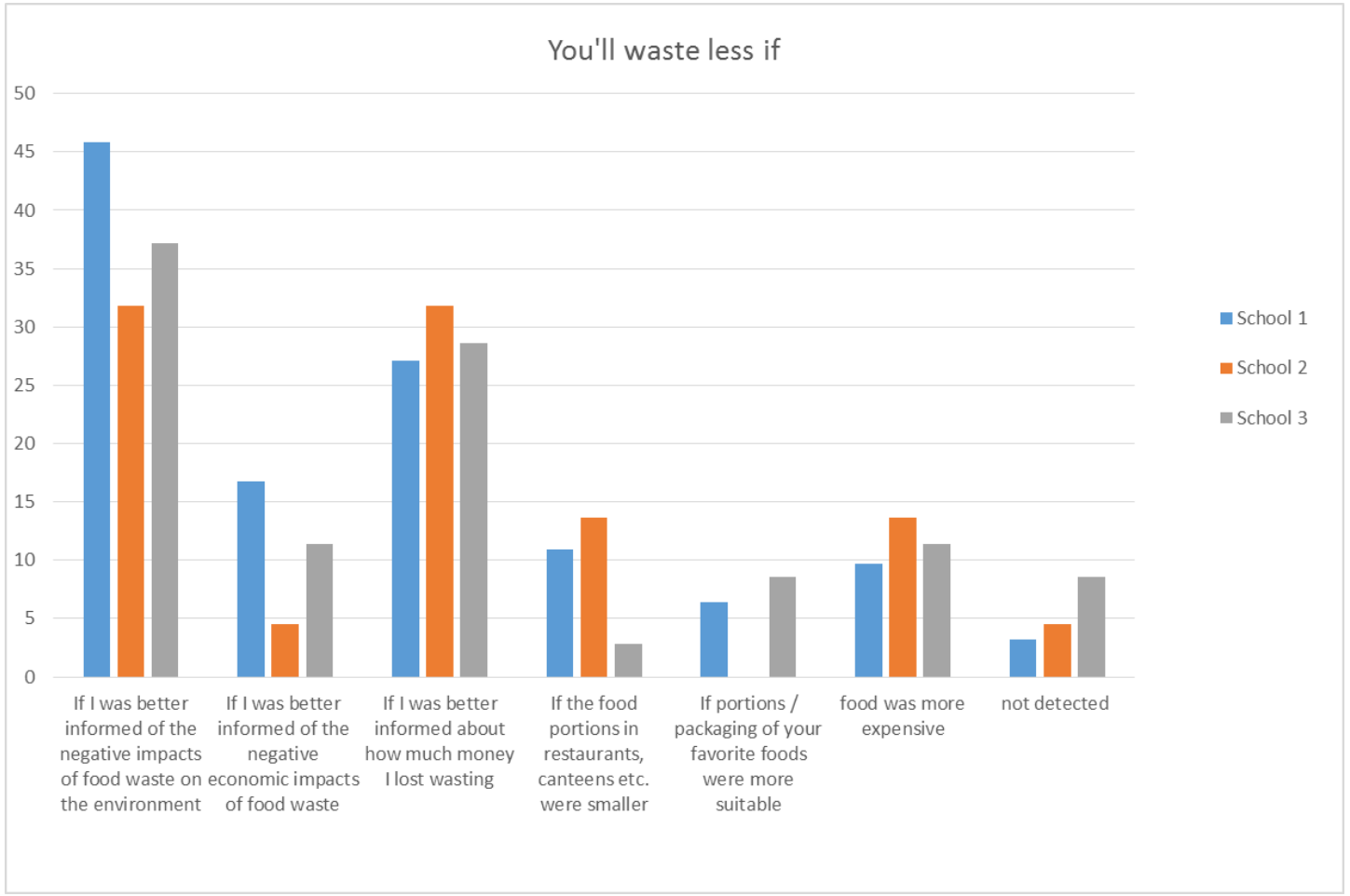
BRAINSTORMING
LEARNING BY DOING

Creative production



The knowledge is shared in a "horizontal" and "multidirectional" relationship among teachers, educators, experts and firstly students, that develop critical attitude of thought and an active participation.

Most of the students showed a clear willingness to be informed about environmental negative impacts of food waste



TRAINING ACTIVITIES

Food waste impacts on the enviroment, on loss of resources

Environmental impact

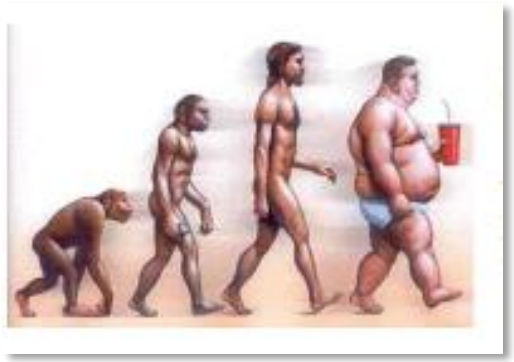
Correlating food waste to the concept of sustainability and underlining its negative economic, environmental and social impacts.

Fonte: BFNC (2012), *Food waste: causes, impacts and proposals*, Codice Edizioni

Source: FAO (2013), *Reducing the food wastage footprint. Toolkit*, Rome

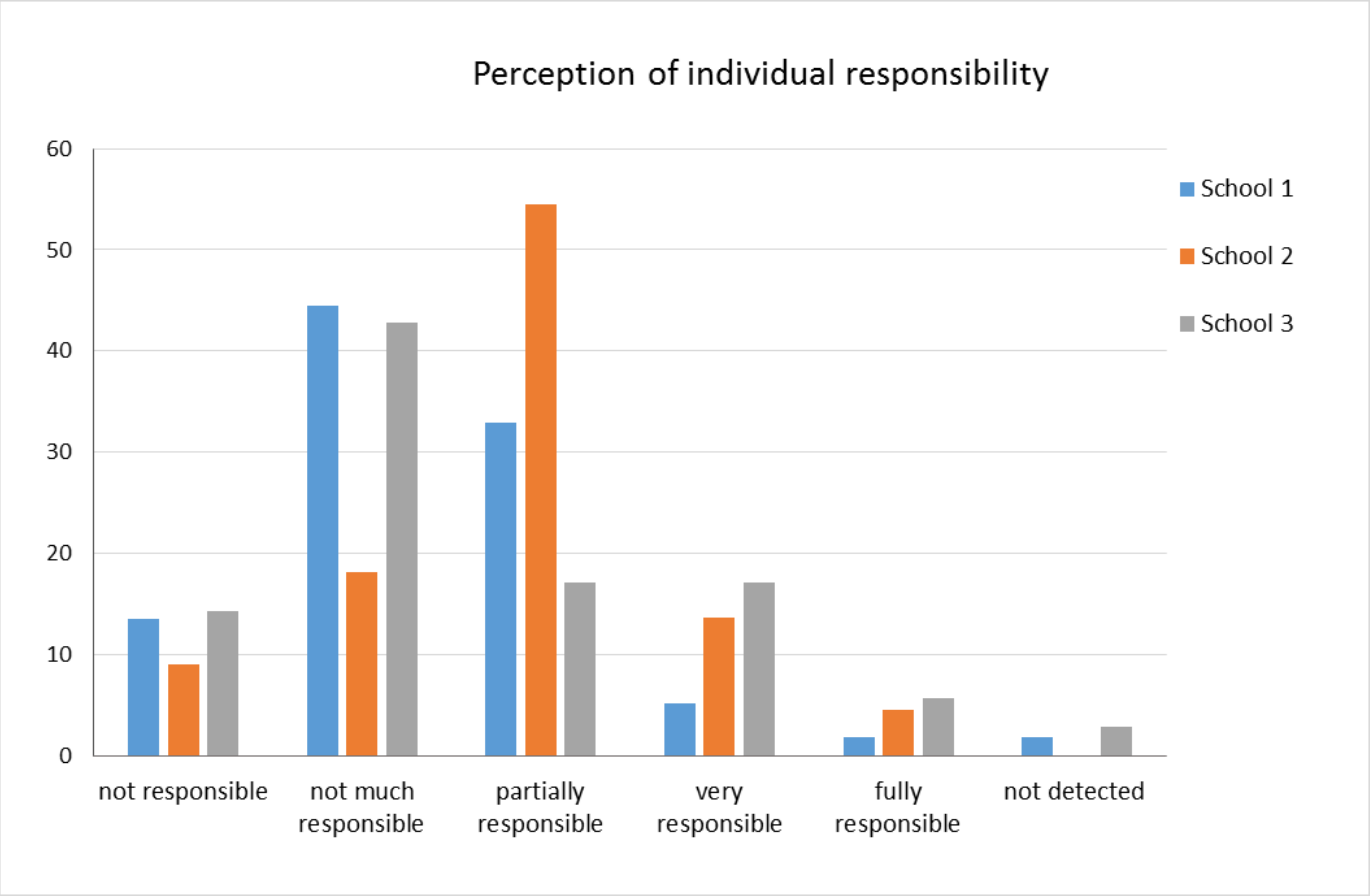
FOOD AND HEALTH

NO FOOD WASTE - NO JUNK FOOD



Nutrition, diet and Epigenetics

From a preliminary qualitative assessment of questionnaires of 30 questions, filled by the students at the beginning of the project, they would seem to have a low sense of responsibility for their own waste

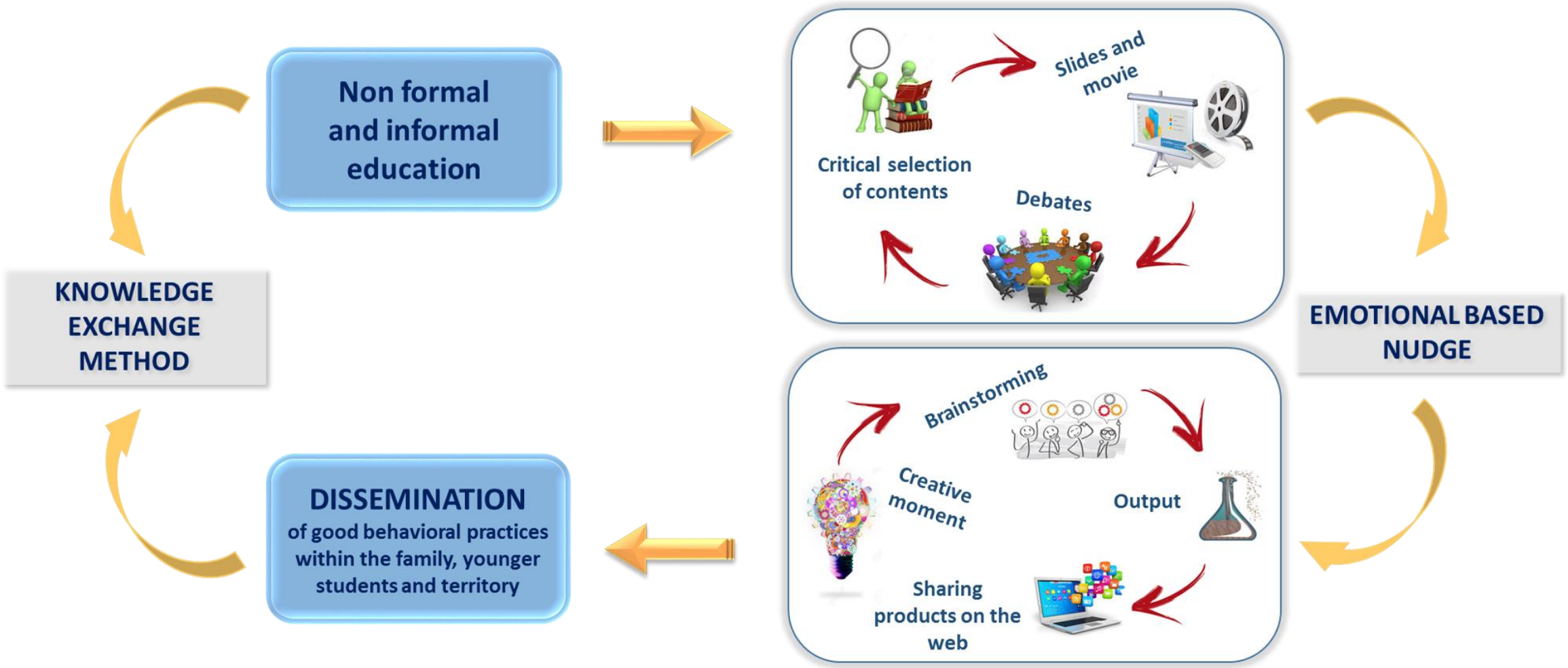


SPAIC project adopts the "nudging" methodology, also called "gentle push" that can offer a way to behave properly.

In the second step, the objective was to create effective communication products for dissemination of good behavioral practices within the family and territory, enhanced by peer tutoring activities directed to younger class-mates for food waste reduction and environmental and health risk prevention.

To encourage the students to be aware of their capabilities and achieve effective communication product, the support of expert researchers in the field of "nudging - gentle push" or a psycho-behavioural model it was necessary. The model drives the consumers to adopt best practices and good behaviour in daily life.

In fact, the application of the model aims to change behaviour for reducing food waste and its impacts both on people's health and on the environment, and it consists of a nudge based on motivational/emotional factors.


Non formal and informal education
Slides and movie
Critical selection of contents
Debates
EMOTIONAL BASED NUDGE
Brainstorming
Creative moment
Output
Sharing products on the web
DISSEMINATION
of good behavioral practices within the family, younger students and territory
KNOWLEDGE EXCHANGE METHOD

EMOTIONAL MEETING

The motivational/emotional based nudge consist of meetings with a motivator, a person who works with the students at an emotional and creative level to inspire them about their potential to be active participants in choices that are relevant for them and for the whole environment.

These meetings are designed to make students able to thrust in their capabilities to make important changes in their lives.

Following training and emotional meetings, students are producing social - network interactive products or video, for their classmates and youngsters with the intent to disseminate good practices on food waste in environmental and health risk prevention perspective.

Some of the products realized by students, to date, include:

leftover food recipes

RAP

Street interviews

SPAIC GAME

A short film

Values of the project

- Scientific training
- Lifelong learning
- Nudge method
- Innovation
- Cooperation
- Creating of a network

The project we evaluated that the active involvement of young people in products realization, should be acquired as a standard methodology in order to trigger their inherent ability to innovate in the world of work.

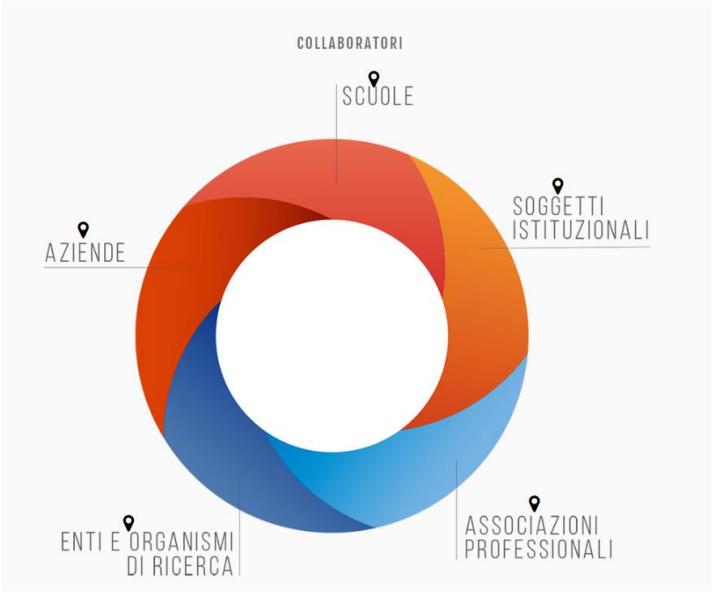
SPAIC Toolkit

A short film

SPAIC GAME

WEB SITE

www.innsite.it



INAIL

con il Patrocinio del

COMUNE DI TUSCANIA

Workshop

Sportello Innovativo per il trasferimento e la diffusione dell'innovazione tecnico-scientifica nel settore della sicurezza agroalimentare

Tuscania 20 Giugno 2016

"Chiesa di Santa Croce"
Piazza Basile - Tuscania (VT)

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ATTIVITÀ

SCUOLA

RICERCA

IMPRESA

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VAI AL PROGETTO

PROGETTI INAIL-CRF

VAI AL PROGETTO

PROGETTO OLI ESSENZIALI

VAI AL PROGETTO

Education and Culture

PROGETTO ERASMUS PLUS

VAI AL PROGETTO

PROGETTO COO.P

THANK FOR YOUR ATTENTION

Elena Sturchio
e.sturchio@inail.it