Co-funded by the Prevention of and Fight
against Crime Programme of the European Union

COLLECT, ANALYSE, ORGANIZE, EVALUATE, SHARE – A RESPONSE TO CHALLENGES IN FORENSIC DRUGS ANALYSES

project objectives and activities

EUROPEAN PROJECT RESPONSE
to challenges in forensic drugs analyses

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PARTNERS

- **Project was developed and will be implemented in close cooperation with ENFSI WORKING GROUP DRUGS**
- **Grant agreement number: *JUST/2013/ISEC/DRUGS/AG/6413***
  - Duration: from 5th January 2015 until 4th January 2017
  - Total project budget **:** 748.212,91 € (EU contribution: 90%, R Slovenia 10%)
- **Coordinator:**
  - Ministry of the Interior of the Republic Of Slovenia, Police – NATIONAL FORENSIC LABORATORY, Slovenia
- **Partners (co-beneficiaries):**
  - Ministry of the Interior, National Forensic Institute (INPS), France
  - Hungarian Institute for Forensic Sciences (HIFS), Hungary
  - National Institute of Criminalistics and Criminology (INCC), Belgium
  - Institute for Forensic Medicine, Aarhus (UNI Aarhus), Denmark
  - University of Copenhagen, Faculty of Health (UNI CPHG), Department of Forensic Medicine, Denmark
  - Ministry of the Interior of the Republic of Croatia, Forensic Science Centre (MUP RH), Croatia
  - University of Ljubljana, Faculty of Chemistry and Chemical Technology (FKKT), Slovenia

- **Associate partners:**
  - European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), Portugal
  - Forensic Science Lab, Dublin (FSL), R Ireland
  - Forensic Science and Toxicology Lab, State General Laboratory, Ministry of Health (FSTL), Cyprus
  - Judiciary Police, Scientific Police Laboratory (SPL), Portugal
  - National Investigation Service Norway (KRIPOS), Norway
  - National Institute for Public Health (NIJZ), Slovenia
  - University of Ljubljana, Faculty of Medicine, Department of Toxicology (UNI LJ FM DT), Slovenia
  - Association DrogArt (DrogArt) NGO, Slovenia

Project impact

- Forensic information is the key factor for the:
  - Strategic
  - Operational
  - Evidential
  - Judicial purposes

- And influences the:
  - Drug supply reduction
  - Planning
  - Risk assessment activities
  - Coordination of activities at all EU levels and wider

Response project organization chart

EUROPEAN PROJECT RESPONSE to challenges in forensic drugs analyses

WS 0: RESPONSE PROJECT MANGAMENT (team)

Project manager: dr. Klemenc (SI1)/ co-manager: dr. Gostič, (SI)/ financial manager: Melita Godeša (SI)

Steering committee (SC) - members by countries & EU agency: BE, DK1, DK2, FR, SI1, HR, HU and EMCDDA

WS 0: Management & combined activities

WS 0.0: Kick-off (Brussels)
WS 0.1 Kick-off (Ljubljana) core project team
WS 0.3: optional meetings (up to 8 persons individually or together - for unforeseen problems)

WS 0.6 and 0.7: project progress and final reports & financial report

WS 0.2: Management and dissemination/ BE, DK1, DK2, FR, SI1, HR, HU
3 x SC project coordination meetings combined with presentations of project progress and achievements at the ENFSI DWG conferences (2x) and EAFS meeting (1x)

WS 0.4: Dissemination of results related to WS2, WS3, WS4 / **SI1**

OOS-seminars (3x) for SI participants (law enforcement, judicial, EWS)

WS0.5: Dissemination and networking /SI1
Conference - ENFSI DWG network meeting in 2016 in SI

WS 1: STATE OF THE ART & PURCHASING

WS 1.1: SI1
Equipment
GC-MS; GC-MS-FTIR, FTIR-ATR
(will be used for chemical analyses – characterizations in WS2 and WS3)

WS 1.2 to WS 1.3: SI1
NPS materials
CRM-NPS and net-NPS

Screening the suppliers market for CRMs and internet market for net-NPS selection and purchasing.
Materials will be characterized in WS3 and obtained analytical data implemented in WS4.

WS 1.4: SI1/SI2/FR
General consumables

FR: for tasks in WS2
SI1: for tasks in WS 2 and WS 3.1
SI2: for tasks in WS 3.2

WS 2: PROFILING methodology & competencies

WS 2.1 to WS 2.4: FR/SI
Methodology development and implementation for SI 2.1 IT matters, 2.2 heroin methodology, 2.3 cocaine methodology, 2.4 ATS methodology

WS 2.5: FR/SI
Profiling methodology in SI lab
final evaluation

WS 2.6: FR/SI/BE/DK1
Enhance understanding and profiling competencies in EU ForL
Workshops (2x)

WS 2.7: FR/SI/BE/DK1
Dissemination of other results (through the events listed in WS0)

WS 3: CHEMICAL CHARACTERISATIONS (NPS) SI/ SI2

WS 3.1: SI1
Chemical analyses of CRM and net -NPS and some samples collected by NGO
(Different analytic methods)

WS 3.2: SI2
Chemical analyses (NMR) of net-NPS and some samples collected by NGO

WS 3.3: SI/SI2/HU/DK1/BE/ DK2/HR
Data
(Spectra) evaluation – peer review
and implementation in MS and FTIR databases
(see WS4)

WS 3.4: SI1
Monograph (with all net-NPS characterisation data)

WS 3.5: SI1
Dissemination of analytical amounts of »net-NPS" to partners

WS 4: FTIR and MS databases HU/ /SI1/HR

WS 4.1: HU

FTIR database development

WS 4.2: HU/BE/SI1
Database testes and Guidelines for FTIR database

WS 4.3: HU/SI1

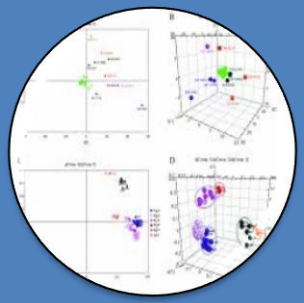
Import -FTIR spectra into database

WS 4.4: HU/DK1

Publish -FTIR databases (for download)

WS 4.5 to 4.6: SI1/HR/DK1/ DK2
Import - spectra into MS database and
Publishing for download;

MAIN FORENSIC MODULES



Drugs profiling

NPS identification – chemical characterisations

Data bases

PROFILING: heroin, cocaine, amphetamine

NPS: FTIR & MS

COLLECT, ANALYSE, ORGANIZE, EVALUATE, SHARE

Friends Always Share

Main objectives & target beneficieries (profiling)

To enhance understanding of profiling concepts in ForL, through a mentor based know-how transfer and workshop assisted learning.

To support the implementation of pact against drug trafficking and cross border law enforcement cooperation's.

To increase the evidential value of the profiling findings.
(for operational, strategic or judicial purposes)

PROFILING

Main objectives & target beneficieries (NPS)

To provide **essential, reliable data** (NPS spectra) and **tools** (electronic databases) to forensic community. By internet purchasing of NPS the project will aim at implementing a pro-active forensics respond to the NPS phenomena.

To strengthen NPS **information exchange** via EWS and **EMCDDA** or via police structure **EUROPOL, ENFSI** , other **RELATED NETWORKS, PROJECTS** and via public opened web tools.

To rise the awareness among drugs and NPS users in close cooperation by SI NGO organizations and EWS networks.

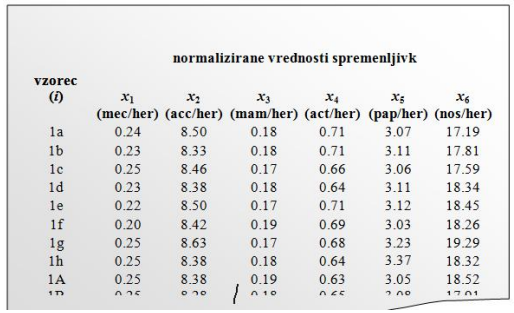
To enhance the analytical capacities and staff competencies in NFL.

N
P
S

Profiling – introduction

Comparison of chemical profiles for linking of samples (for operational, strategic and judicial purposes).

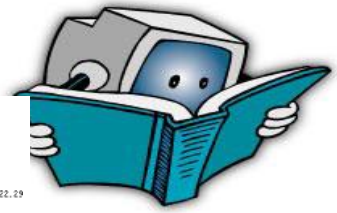
- different analytical methods can be applied… like HPLC, GC-FID,GC-MS, FTIR
- analytical methods can provide a huge amount of raw data in a short period of time
- with the increased number of samples (each one characterized by many variables) some problems become more and more evident:
  - how to convert raw analytical data into meaningful information (in real time)
  - how to minimize the subjective factor of interpretation
  - how to set up decision criteria

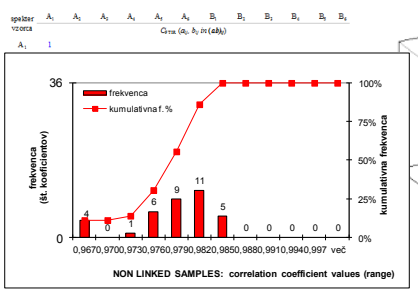


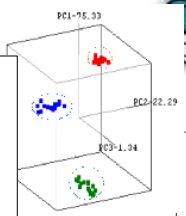
normalizirane vrednosti spremenljivk

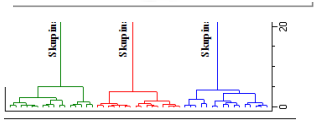
vzorec (i)	x_1 (mec/her)	x_2 (acc/her)	x_3 (mam/her)	x_4 (act/her)	x_5 (pap/her)	x_6 (nos/her)
1a	0.24	8.50	0.18	0.71	3.07	17.19
1b	0.23	8.33	0.18	0.71	3.11	17.81
1c	0.25	8.46	0.17	0.66	3.06	17.59
1d	0.23	8.38	0.18	0.64	3.11	18.34
1e	0.22	8.50	0.17	0.71	3.12	18.45
1f	0.20	8.42	0.19	0.69	3.03	18.26
1g	0.25	8.63	0.17	0.68	3.23	19.29
1h	0.25	8.38	0.18	0.64	3.37	18.32
1A	0.25	8.38	0.19	0.63	3.05	18.52

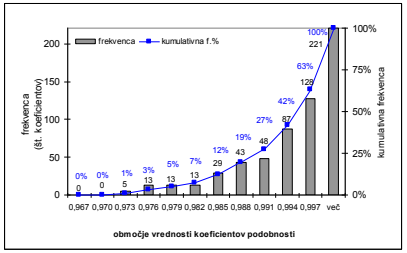
No of samples (n)	No. of cross comparisons $(n^2-n)/2$
10	45
20	190
50	1225

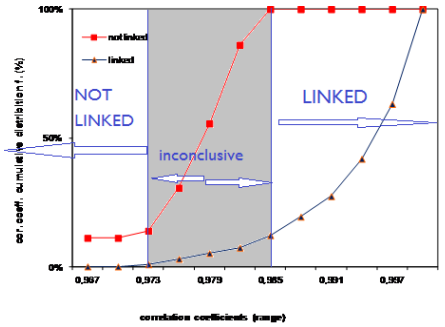








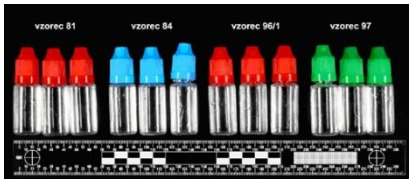




PROFILING (RESPONSE activities)

1. Mentor based approach of GC-MS (liquid injection and static head-space technique) methods development on the expert exchange basis (NFL SI/ INPS Lyon/France)
   - Experimental design and validation of analytical method (heroin, cocaine and amphetamine profiling)
   - Measurements (many sets of linked and unlinked samples shall be analysed) – to set up the decision thresholds
   - Data processing - chemometric evaluations (comparisons of chromatograms):
     - pre-processing of data (raw chromatographic results) – options: no pre-processing or use of normalization and/or scaling
     - choice of the appropriate metric /tool/ for the **intended purpose of use**
     - calculation of similarity (in NFL it will be expressed by correlation coefficient)
   - set up of the decision thresholds, i.e. criteria for reporting : linked or not linked samples or inconclusive findings
   - databases
2. Workshop assisted learning (2x) to rise the competencies and understanding of drugs profiling principles (how to evaluate multivariate data effectively (in real time) and on non-subjective basis) (workshops are mainly opened to ENFSI-DWG members- the task will be supported also by ENFSI-DWG.
3. One day one topic seminars 2x, for SI audience only (police, judicial)

NPS – introduction and some facts



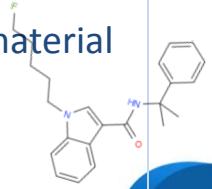
NPS market expands rapidly. It is clear that some immediate actions and activities are needed.

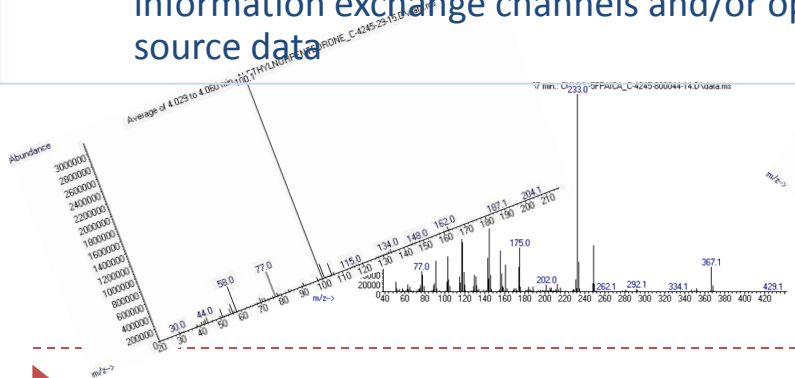
- NPS are mainly detected in forensic and customs labs.
- The difficulty lies in identifying them.
- To identify new substance reference material (RM)or special techniques are needed
- RM are not available (in real time)
- Most of laboratories have to rely on comparison of their results to available MS and/or FTIR spectra in searchable electronic libraries (not updated in real time) or existing information exchange channels and/or open source data

Along recently issued EMCDDA update (March 2015):

101 new compounds were reported in EWS for the first time in 2014

(http://www.emcdda.europa.eu/publications/2015/new-psychoactive-substances)





New psychoactive substances – (RESPONSE activities)

Activity	Issue
Collect/purchase NPS	Setting up a robust and efficient system for fast detection and collection of newly appearing compounds at the market.
Analyses	Chemical characterizations - core analytical techniques necessary for NPS identification structure elucidation
Evaluation	Validation procedures which guarantee scientifically valid results have been established at the first Kick of meeting.
Organize data & information	Integration of all analytical data available for the substance in analytical reports and development of databases and tools for implementation of acquired IR and MS spectra in ENFSI DWG databases.
Share	The main project objective is to share: - knowledge, information (& spectra) effectively through different communication platforms (as for example ENFSI, EMCDDA & EDND database, EUROPOL, other EU stakeholders, complementary EU projects and public opened information sources such as for example ChemSpider, RESPONSE project web, scientific conferences and literature..) - "project`s identification reference materials" among partner`s laboratories and wider

NPS characterizations (RESPONSE activities)

- Several types of materials will be characterized.

Type	Provider	Criteria	Analytical methods
Reference materials	Different vendors	Compounds reported in 2014 and newer	GC-MS, FTIR-ATR, GC-MS-FTIR-(condensed phase)
Seized samples	Police (SI), Customs (SI), p. partners, ENFSI - DWG, other networks and projects	Not yet reported within EWS (to EMCDDA-EDND) or reported recently	GC-MS, FTIR-ATR, GC-MS-FTIR-(condensed phase), HPLC-TOF, NMR
Collected samples	NGO (SI), other	Not yet reported within EWS (to EMCDDA-EDND) or reported recently	GC-MS, FTIR-ATR, GC-MS-FTIR-(condensed phase), HPLC-TOF, NMR
Test purchases (See the DK poster on the NPS searching strategy)	Internet shops	Not yet reported or reported recently (pro-active forensic approach)	GC-MS, FTIR-ATR, GC-MS-FTIR-(condensed phase), HPLC-TOF, NMR

Databases (in close cooperation with ENFSI DWG)

FTIR (under development)

- **Development of technically appropriate IR spectra database for new psychoactive substances**
- **Guidelines:**
  - Technical requirements for spectra acquisition.
  - 'Influencing factors of identification of NPSs by IR library search'. (joint DWG & RESPONSE project document).
- **Implementation of spectra acquired in the frame of project (and wider)**
- **FTIR database management (to implement (add/import) IR-spectra**
- **Four different formats of library**

MS (existing)

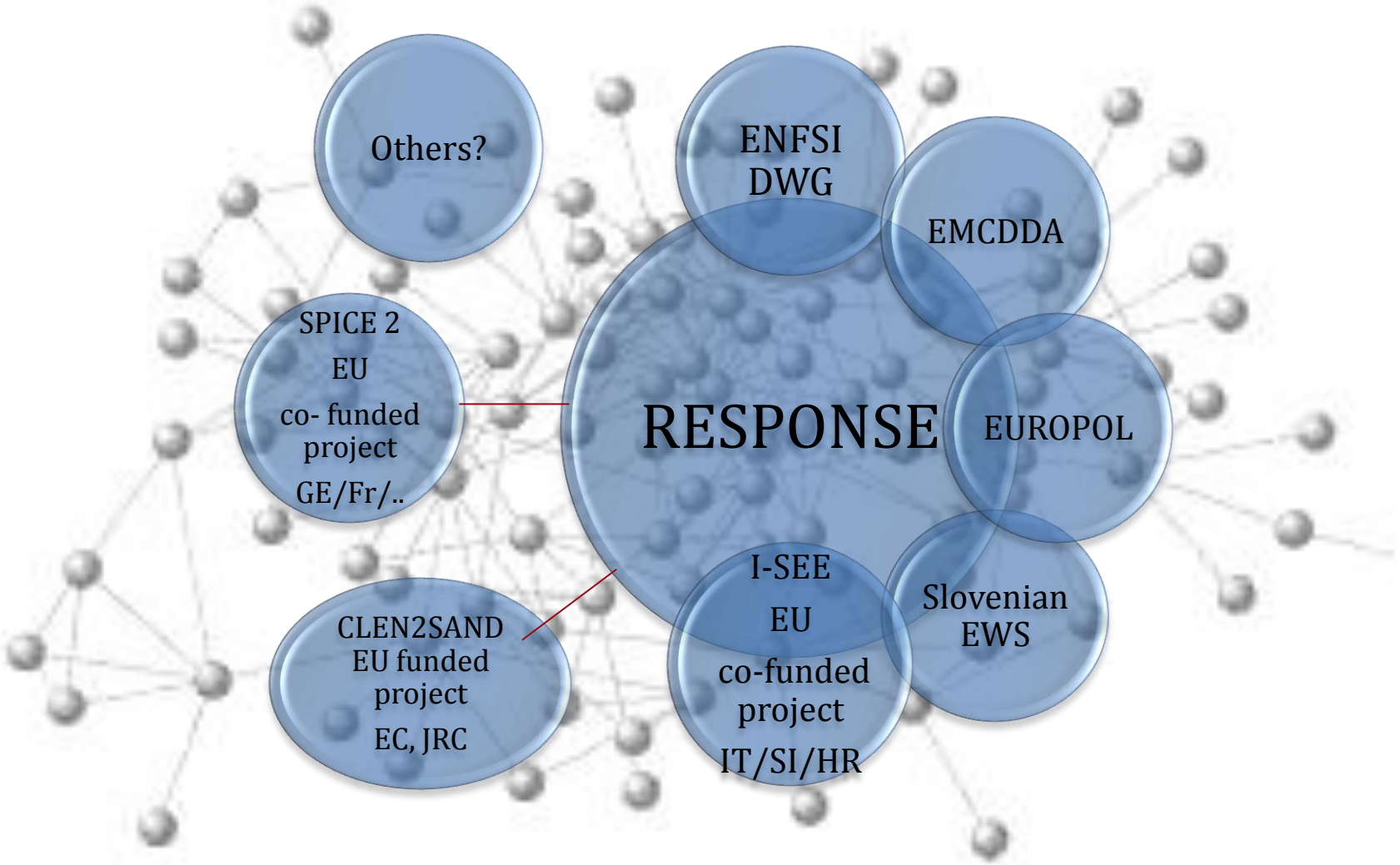
- **MS database management (to implement (add/import) all relevant MS-spectra acquired in NFL laboratory in the frame of the project .**

Share spectral databases with EU ForL and ENFSI-DWG membership and other interested stakeholders (EMCDDA, SWGDRUG…)
MS and FTIR databases will be managed and updated with new entries in the frame of ENFSI DWG.

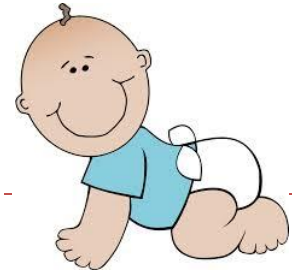
MAIN INTERNATIONAL EVENTS

activity closed	• Response project Steering Committee kick off meeting, January 29-30, 2015, Ljubljana, Slovenia
activity closed	• Kick of meeting project manager and financial manager , Brussels, February 10, 2015, BELGIUM
Now ☺	• Response project Steering Committee meeting (s) combined with dissemination and networking activities, May 5-7, 2015, Dublin, IRELAND
Registr. closed	• Profiling workshop 2015 (15 trainees + some from non EU member states), June 15-17, 2015, Ljubljana, Slovenia (registration closed)
schedulled	• Response project Steering Committee meeting combined with dissemination and networking activities at EAFS Prague, September 2015
schedulled	• ENFSI DWG meeting 2016 (organization activities started) & RESPONSE SC final meeting combined by dissemination and networking activities, May 10th-12th, 2016, Slovenia
schedulled	• Profiling workshop 2016 (15 trainees + some from non EU member states), dates yet to be defined, tentatively scheduled for June, Ljubljana, Slovenia

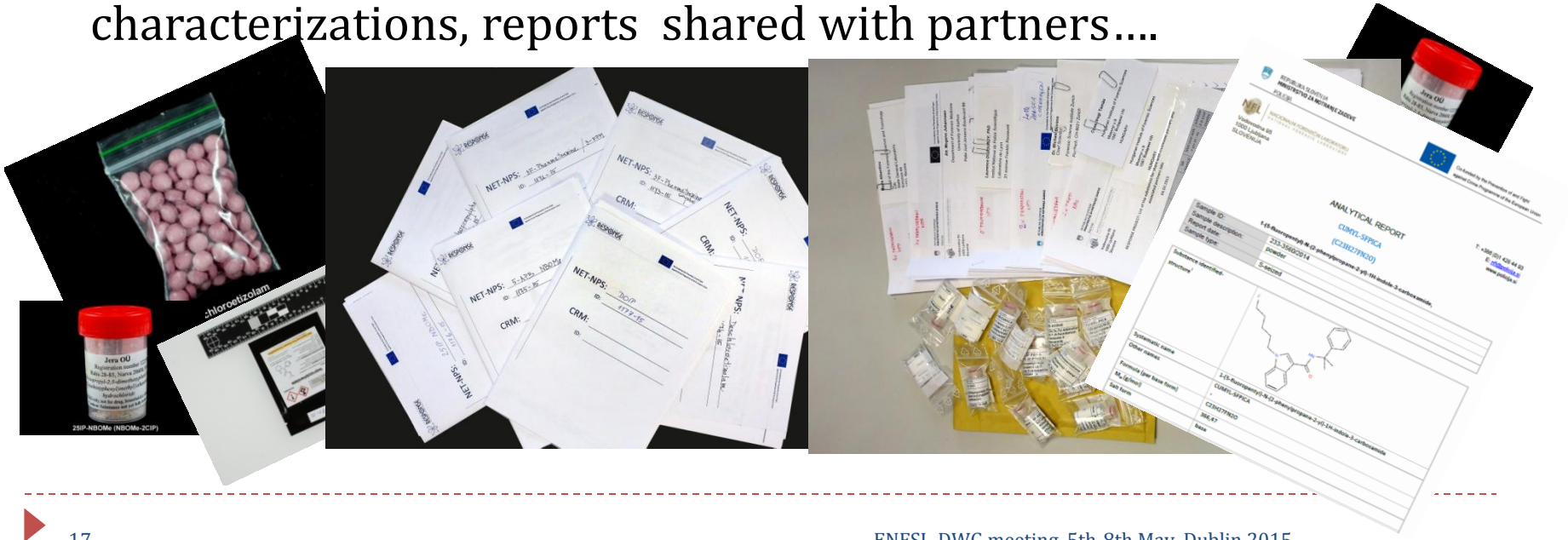
Networking


Others?
ENFSI DWG
EMCDDA
SPICE 2
EU
co- funded project
GE/Fr/..
RESPONSE
EUROPOL
I-SEE
EU
co-funded project
IT/SI/HR
Slovenian EWS
CLEN2SAND
EU funded project
EC, JRC

Some RESPONSE products ;-), so far



- Presentations
  - here
  - forthcoming (EAFS, 2015)
- Strategies (under developement): targeting and purchasing of upcoming NPS
- "Identification reference materials" -first internet purchases, characterizations, reports shared with partners….



Some RESPONSE products ;-), so far

- Tools & guidelines:
  - small RESPONSE project FTIR library & draft guidelines…

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FT-IR ATR_English	4.5.2015 18:38	Dokument progra...	749 KB

  - New tools (slaves & partners) in NFL

Thank you for your attention!