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## NOVE PSIHOAKTIVNE SUBSTANCE - ODZIV NA IZZIV - PREDSTAVITEV PROJEKTA RESPONSE IN NEKATERIH REZULTATOV



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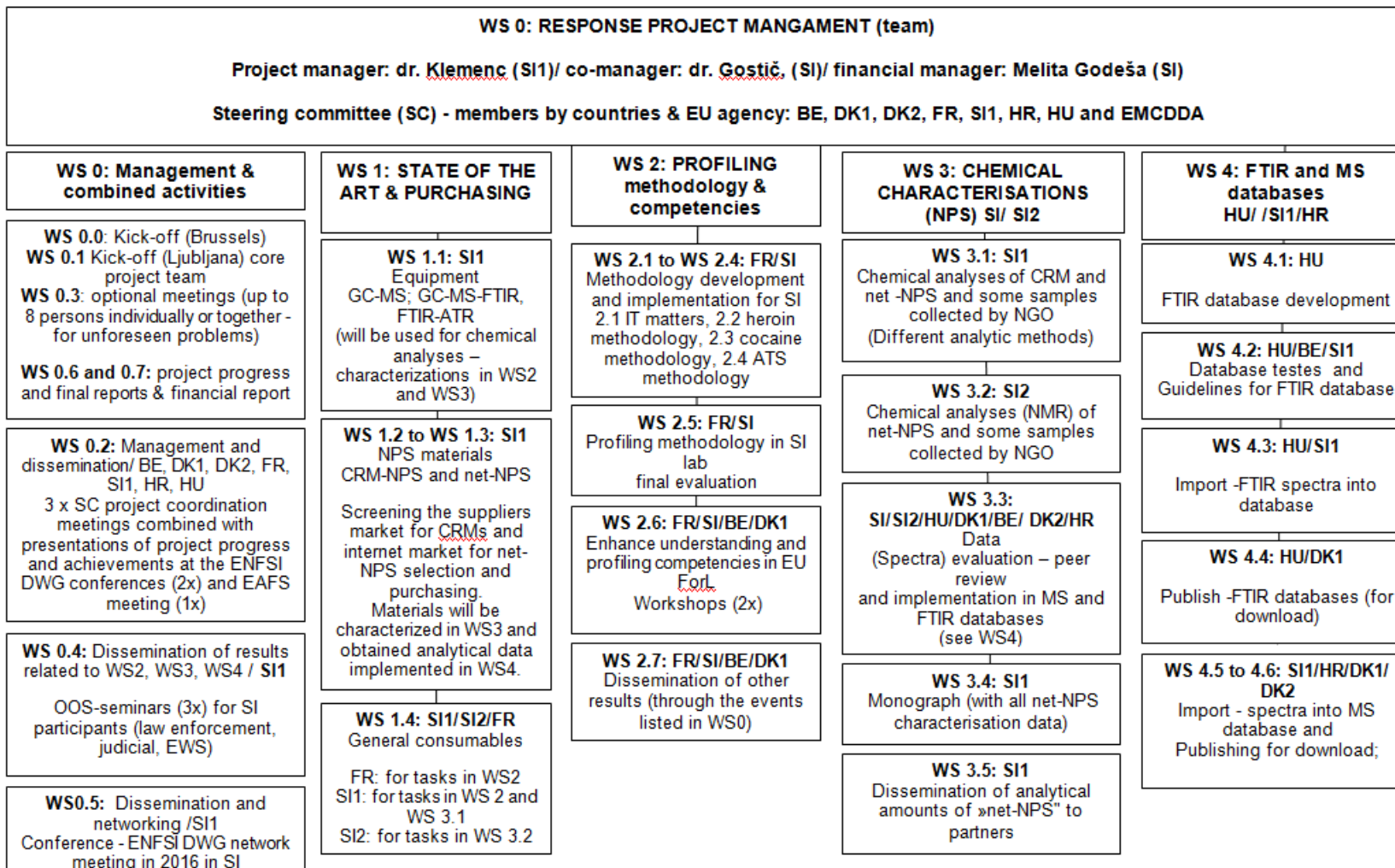


# PARTNERJI



- ▶ **Projekt je bil zasnovan in bo izpeljan v tesnem sodelovanju z [ENFSI WORKING GROUP DRUGS](#)**
- ▶ **Št. pogodbe: *JUST/2013/ISEC/DRUGS/AG/6413***
  - ▶ **Trajanje:** from 5<sup>th</sup> January 2015 until 4<sup>th</sup> January 2017
  - ▶ **Finančna sredstva:** 748.212,91 € (EU contribution: 90%, R Slovenia 10%)
- ▶ **Koordinator:**
  - ▶ [Ministry of the Interior of the Republic Of Slovenia, Police – NATIONAL FORENSIC LABORATORY](#), Slovenia
- ▶ **Partnerji (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
- ▶ **Pridruženi partnerji:**
  - ▶ [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

# Organizacijska shema projekta



# “RESPONSE” na kratko



**RESPONSE projekt** (<http://www.policija.si/eng/index.php/generalpolicedirectorate/1669-nfl-page-response> )

**naslavlja dve posebni temi forenzičnih preiskav s področja drog:**

**Identifikacijo novih psihoaktivnih substanc (NPS),** kjer glavne izzive predstavljajo

- ❑ nepričakovana rast tako v številu kot v kemijski raznolikosti NPSs [1]
- ❑ lahka dostopnost NPS, ki jih oglašujejo in prodajajo prek interneta
- ❑ pomankanje referenčnih materialov (RM) in baz podatkov z MS and FTIR spektri kot glavni problemi, s katerimi se srečujemo kemiki, ko želimo identificirati nove

NPS

- ❑ **Profiliranje drog,** kjer glavni problem predstavlja razkorak med pričakovanji in potrebami odjemalcev (organi odkrivanja, pregona, sodni sistem, oblikovalci EU politik) ter zmogljivostmi, razpoložljivimi metodologijami in kompetencami zaposlenih v forenzičnih laboratorijih.

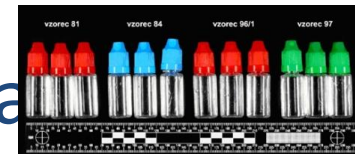
[1] New Psychoactive substances in Europe, EMCDDA, March 2015, (<http://www.emcdda.europa.eu/publications/2015/new-psychoactive-substances> )

# NPS dejstva

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- ▶ Ocenjeno je, da se na teden v EU pojavi od 2 do 5 novih spojin.
- ▶ Namen sinteze novih substanc je preoblikovati kemijsko.strukturo tako, da substanca ne bo regulirana, hkrati pa bo imela pričakovane psihoaktivne učinke.
- ▶ Glavni proizvajalec tovrstnih čistih snovi (koncentratov) je Kitajska.
- ▶ Snovi (koncentrati in tekoči ali rastlinski pripravki) se oglašujejo, prodajajo in kupujejo prek svetovnega spleta, pošiljke pa transportirajo s kurirsko pošto (npr. FEDEX, DHL..)
- ▶ **Dokler nova snov ni identificirana in zakonsko regulirana je legalna!**

# Detekcija in identifikacija NPS -cilji projekta



## DEJSTVA:

- ❑ NPS večinoma prvi **detektiramo (zaznamo)** v forenzičnih in carinskih laboratorijih.
- ❑ **Identificirati** NPS pomeni, določiti kemijsko strukturo spojine, ji dati kemijsko ime in formulo
- ❑ Za identifikacijo nove spojine je potreben referenčni material (**ki v realnem času ni na vojo**) ali pa je potrebna draga in sofisticirana oprema.
- ❑ Večina laboratorijev take opreme nima in so pri identifikaciji NPS odvisni od
  - ❑ razpoložljivih elektronskih baze – podatkov z **MS in/ali FTIR spektri v (te baze pa se v realnem času ne posodablajo)**
  - ❑ od obstoječih kanalov za izmenjavo informacij in/ali odprtih – javno dostopnih virov podatkov (spektrov)

## CILJI:

- ❑ Zagotoviti čim več **spektralnih podatkov MS, FTIR-ATR** in FTIR-condensed phase za “**ново prihajajoče**” NPS
- ❑ implementirati **spektre v elektronske baze podatkov** ENFSI - Drugs Working Group (ENFSI - DWG).
- ❑ Učinkovito posredovati analiske podatke, znanje in informacije prek različnih komunikacijskih platform (EMCDDA, Europol, sodelovanje / komunikacije z drugimi komplementarnimi projekti, spletne objave)
- ❑ Z internetnimi testnimi nakup novih spojin projekt deluje “**pro-aktivno**” – substance, ki se na novo pojavijo hočemo čim hitreje dobiti v laboratorij, jih okarakterizirati in dobiti spektralne podatke, ki jih uporabimo, ko se snov zaseže na terenu
- ❑ Ustvariti banko “**NPS identifikacijskih referenčnih materialov**” in materiale tudi posredovati partnerjem projekta.

# Kemijske karakterizacije in viri materialov

Viri materialov	Analizne metode
Reference materials (Different vendors; around 200 )	GC-MS, FTIR-ATR, GC-MS-FTIR-(condensed phase) - opcijsko
<b>Test purchases</b> (Internet based vendors; 200 to 300 samples)	GC-MS, FTIR-ATR, GC-(MS)-FTIR-(condensed phase), HPLC-TOF, NMR, for “unknowns” combined with ion chromatography for anions (IC)...
Seized samples (Police/ Customs)	
Collected samples (NGO/Policija – anonymous users, project partners, other)	

Vzorke karakteriziramo v NFL, strukturo dokončno potrdijo (ali pa tudi ne) z NMR na FKKT (SI), spektre posredujemo v ENFSI-DWG za implementacijo v elektronskih bazah podatkov. Svoje baze (NFL) posodabljammo sproti.

# Testni nakupi prek spleta



**Detektirati kaj je novega - strategija:** [L. Ask Reitzel et al, Systematical methodology for finding novel NPS (New Psychoactive Substances) over the Internet, EAFS-2015, Prague, 2015]



- use a Google engine and simple word search
- follow social networks related to recreational drugs (blogs/discussion forums/chats)

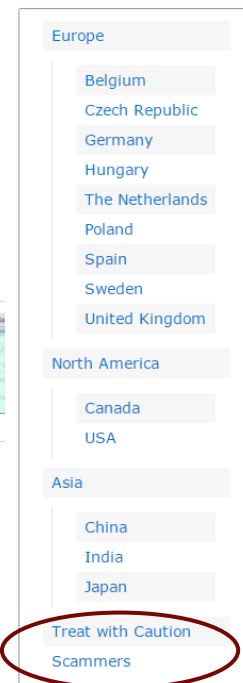
## Poiskati internetne ponudnike in evaluirati njihovo zanesljivost



- use information (and updates) from the internet
- check the payment options
- check minimum required order (some only sell bulk quantities)
- test vendors by small orders (few samples) first



<https://www.reddit.com/r/RCSources/wiki/vendors>



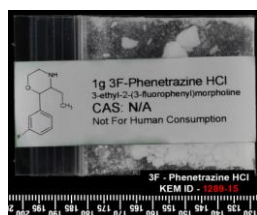
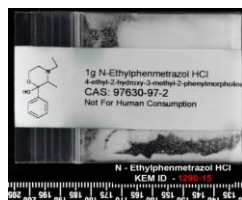
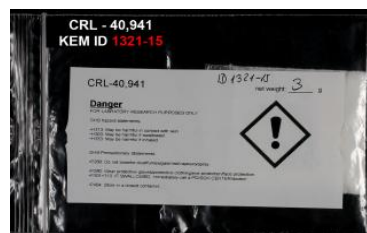
## Postopek nakupa:

- shall follow institutional and national rules (quite complicated)
- information exchange system between national authorities concerning internet orders has been established. (Police (NFL), Ministry of Health (general approval was issued before the project started, Customs (NFL informs about every purchase in advance and afterwards when samples are received)).



# Testni nakupi - izkušnje

- ▶ Do zdaj smo prek spleta kupili cca 150 vzorcev, ki tvorijo našo “NPS banko materialov”/ do zdaj samo 2x nismo dobili materiala
- ▶ Čas dobave (zelo različen – od nekaj dni do nekaj mesecev)
- ▶ Napačno oglaševane substance ( več kot 20%)
- ▶ Oznake in pakiranje zelo različno/odvisno od ponudnika

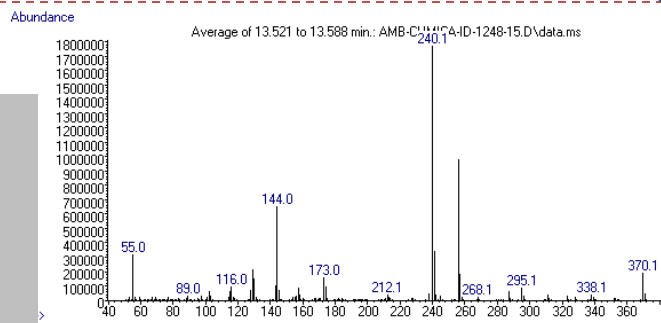


# Kemijske karakterizacije v praksi



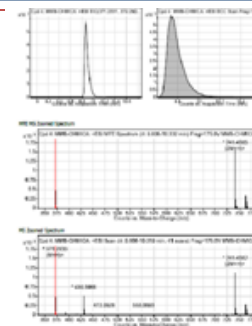
## GC-MS

Opazili smo en kromatografski vrh (Ni zadetkov v bazah)

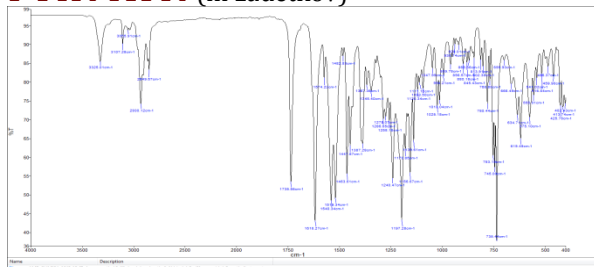


## HPLC-TOF

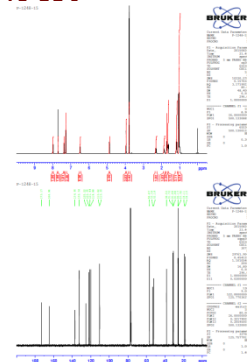
Mass: 370.493  
Exact mass: 370.2256  
Formula: C<sub>22</sub>H<sub>30</sub>N<sub>2</sub>O<sub>3</sub>



## FTIR-ATR (ni zadetkov)

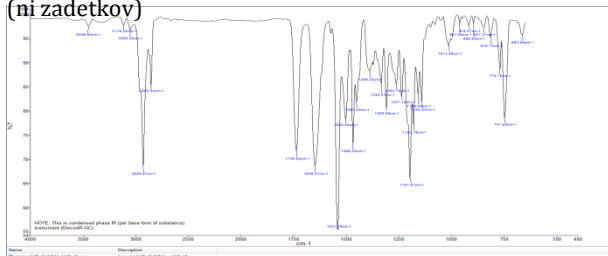


## NMR

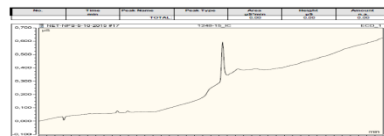


## GC-(MS)-IR-condensed phase

(ni zadetkov)



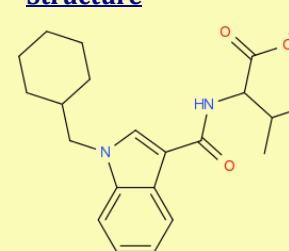
## IC -anioni



## NOVA SPOJINA JE IDENTIFICIRANA ☺

Formula: C<sub>22</sub>H<sub>30</sub>N<sub>2</sub>O<sub>3</sub>;  $M_w$ : 370.493 g/mol

### Structure



### Chemical name:

methyl 2-(1-(cyclohexylmethyl)-1H-indole-3-carbonylamino)-3-methylbutanoate

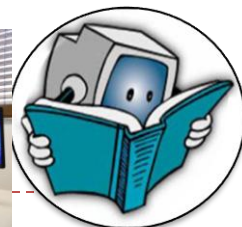
Nick name: AMB-CHMICA

StdInChIKey: [ROWZIXRLVUOMCJ-UHFFFAOYSA-N](#)



# Pravilnost rezultatov

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- ▶ **Usposobljeno osebje** v vseh stopnjah preiskave (priprava, analiza in interpretacija )
- ▶ **Inštrumentalne tehnike in metode validirane**
- ▶ Analizni postopek nadzorovan (uporaba kalibratorjev, kontrolnih vzorcev....)
- ▶ Uporaba računalniških in kem-informacijskih orodij za **interpretacijo rezultatov in validacijo**
- ▶ **Kvaliteta MS in FTIR spektrov** za baze podatkov se preverja še naknadno – neodvisno strani ENFSI-DWG (MS and FTIR urednika elektronskih baz podatkov)
- ▶ O vsakem vzorcu je pripravljeno **“Analizno poročilo”** z ustreznimi spremljajočimi informacijami

# Sistematična organizacija informacij



Sistem smo skušali postaviti tako, da bo čim bolj enostaven in učinkovit!

- ▶ Instrumental raw data (and internal libraries) we keep on instruments and backups are done regularly
- ▶ For every new NPS in our databases (RM, test purchase, seized or collected) we produce “Analytical report” which contains:
  - ▶ Information on sample & identified compound (1st page)
  - ▶ Information on analytical methods applied
  - ▶ Supporting analytical data

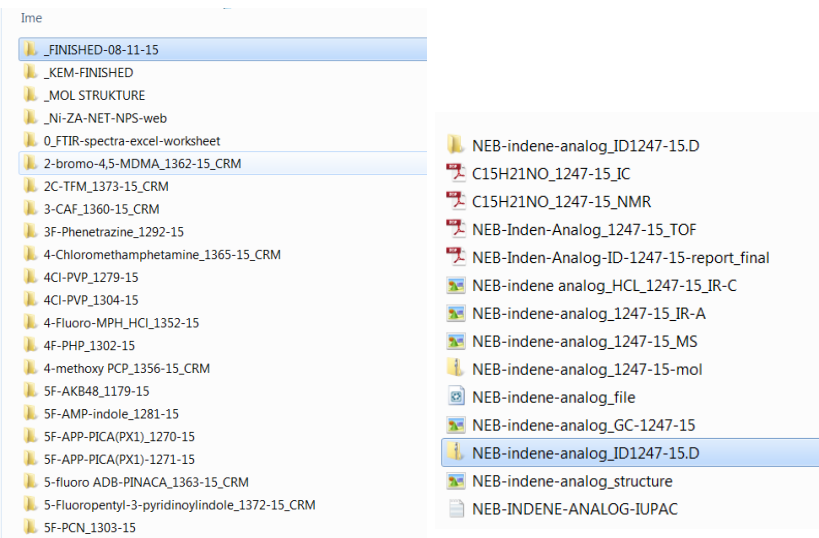


Analytical reports are generated “semi automatically”, from an excel worksheet. where some important data are summarized.



“Analizna poročila so dostopna tu:

[http://www.policija.si/apps/nfl\\_response\\_web/seznam.php](http://www.policija.si/apps/nfl_response_web/seznam.php)



# “Drugs monographs” baza podatkov

Show 15 entries

Search:

Substance class	substance (NPS) common name	structure (created by OPSIN free tool)	NPS1 systematic name	other names	Formula per base form	Mw (g/mol) per base form NPS1	MS (BP1)	MS (BP2)	MS (BP3)	GC-MS-RT NFLU/min	MS spectrum (picture)	StdIn ChIKey	Type of detection	comments	date of en
Piperidines & pyrrolidines	TH-PVP		2-(pyrrolidin-1-yl)-1-(5,6,7,8-tetrahydronaphthalen-2-yl)pentan-1-one		C19H27NO	285.43	126	127	91	8.79	<a href="#">show</a>	<a href="#">search</a>	test purchase	NWR-pending	2015-10-04
Cathinones	MDPHP		1-(1,3-benzodioxol-5-yl)-2-pyrrolidin-1-yl-hexan-1-one		C17H23NO3	289.37	140	141	149	8.40	<a href="#">show</a>	<a href="#">search</a>	test purchase	25% of an unknown organic impurity by NMR	2015-08-19
Arylalkylamines	5-APB NBOMe-HCl		1-(benzofuran-5-yl)-N-[2-methoxybenzyl]propan-2-amine		C19H21NO2	295.38	121	164	91	8.92	<a href="#">show</a>	<a href="#">search</a>	test purchase		2015-04-17
Others	2-MeO-diphenidine		1-(1-(2-methoxyphenyl)-2-phenylethyl)piperidine	Methoxyphenidine, MXP	C20H25NO	295.42	204	188	91	8.25	<a href="#">show</a>	<a href="#">search</a>	test purchase		2015-10-14
Others	2MeO-Diphenidine		1-(1-(2-methoxyphenyl)-2-phenylethyl)piperidine	Methoxyphenidine, MXP	C20H25NO	295.42	204	205	91	8.23	<a href="#">show</a>	<a href="#">search</a>	seized		2015-07-17
Piperazine derivatives	Methoxyphenidine		1-[1-(2-methoxyphenyl)-2-phenylethyl]piperidine	MXP, 2-MXD, 2-MeO-Diphenidine	C20H25NO	295.42	204	205	91	8.22	<a href="#">show</a>	<a href="#">search</a>	RM-reference material		2015-08-31
Benzodiazepines	Bentazepam		5-phenyl-3,5a,6,7,8,9-hexahydro-2H-[1]benzothieno[2,3-e][1,4]diazepin-2-one	Thiadipone	C17H16N2O5	296.39	267	296	268	11.49	<a href="#">show</a>	<a href="#">search</a>	RM-reference material		2015-08-31
Piperidines & pyrrolidines	HDEP-28		ethyl 2-(naphthalen-2-yl)-2-(piperidin-2-yl)acetate	ethylnaphtidate, HDEP-28, 2-(2-ethoxy-1-(naphthalen-2-yl)-2-oxoethyl)piperidin	C19H23NO2	297.17	180	214	181	9.58	<a href="#">show</a>	<a href="#">search</a>	test purchase	GC-RT and MS spectrum refers to HDEP-28-TFA derivative; for more information read the Analytical report	2015-08-19
Piperidines & pyrrolidines	HDEP-28-thermal-decomposition		ethyl 2-(naphthalen-2-yl)-2-(piperidin-2-yl)acetate	ethylnaphtidate, HDEP-28, 2-(2-ethoxy-1-(naphthalen-2-yl)-2-	C19H23NO2	297.17	141	214	115	5.65	<a href="#">show</a>	<a href="#">search</a>	test purchase	GC-RT and MS spectrum refers to HDEP-28 decomposition product; for more information	2015-08-19

[http://www.policija.si/apps/nfl\\_response/web/seznam.php](http://www.policija.si/apps/nfl_response/web/seznam.php)



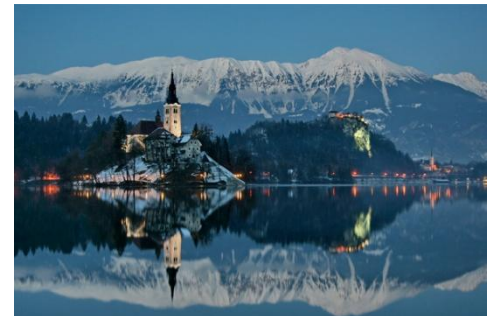
# Posredovanje informacij – komunikacijske platforme projekta (I)

- ▶ **ENFSI –DWG** (posredovanje in implementacija relevantnih spektrov v baze podatkov; (“urednika” MS and FTIR spektralnih baz sta projektna partnerja)
- ▶ **Produkti projekta in orodja:**
  - ▶ MS spektri (MS – Agilent Format) + spremljajoče informacije in kemijske strukture(mol format)
  - ▶ IR-ATR in IR-condensed phase (in dx format) + spremljajoče informacije
- ▶ **EMCDDA** (standardno poročilo, analizno poročilo in spremljajoči surovi podatki meritev, če je potrebno)
- ▶ **Produkti projekta:**
  - ▶ Standardno EMCDDA-EUROPOL poročilo, analizno poročilo in spremljajoči surovi podatki meritev, če je potrebno (substance prvič detektirane v SI)
  - ▶ druge informacije vključene v nacionalno poročilo
- ▶ **EUROPOL** relevantne informacije pošilja SI ENU ali/in tudi EMCDDA
- ▶ **Slovenskim deležnikom vključno z SI EWS and NGOs**
- ▶ **Prek neformalnih kontaktov z drugimi projekti:** SPICE2, CLEN, I-SEE..
- ▶ **Prezentacije na konferencah in sestankih:** (ENFSI-DWG, Maj 2015 (3), EMCDDA Junij 2015 (1), EAFS September 2015 (3), pisna poročila(3), CLEN, Bruselj (1))

## Posredovanje informacij – komunikacijske platforme projekta (II)

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- ▶ **RESPONSE PROJEKT SPLETNA STRAN:** public opened has been launched recently.
  - ▶ Splošne informacije:
    - ▶ <http://www.policija.si/eng/index.php/generalpolicedirectorate/1669-nfl-page-response>
  - ▶ Kemijske informacije (baza podatkov) - "Drugs Monographs" tool
    - ▶ [http://www.policija.si/apps/nfl\\_response\\_web/seznam.php](http://www.policija.si/apps/nfl_response_web/seznam.php)
- ▶ **NAPOVEDAN DOGODEK (May 2016): 22<sup>nd</sup> ENFSI Drugs Working Group (ENFSI DWG) konferenca**
  - ▶ <http://www.enfsidwg2016.com/invitation.html>



Hvala za vašo pozornost!