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Towards Harmonized TDS in Europe: Pilot Studies

Jiri Ruprich (SZU) et al.

Stakeholders' meeting
Brussels, October 8th 2015

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration (Grant Agreement no. 289108)

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STRATEGIC OBJECTIVES

Objective 1

To **harmonize** and **implement** basic TDS methodology on national or regional level in different European countries

Objective 2

To **perform** national or regional TDS **pilot studies** to collect practical information on **feasibility of harmonized TDS**.

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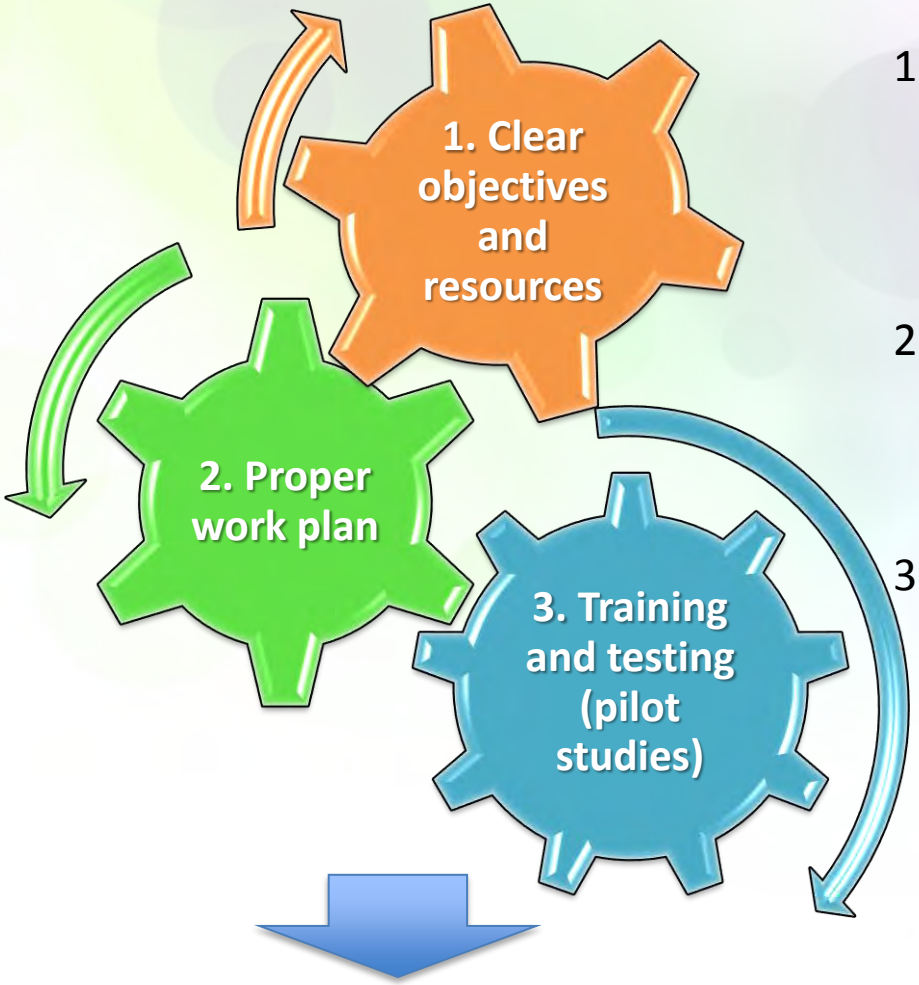
What to see behind a term *implementation of TDSs*



1. Resources limited just for pilot study, not for „full national TDS“

2. Work plan based on previous experience combined with outputs from other WPs

3. Harmonized work following SOPs and training how to use available instruments

e.g. setting of target LoQs, homogeneity testing, usage MCRA software followed by pilot study for the same food groups and chemical substances

Open door to deploy full national TDS based on newly harmonized principles.

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PARTNERS: 5+1 BENEFICIARIES

- SZU (CZ), BfR (DE), EVIRA (FI), MATIS (IS) INSA (PT) + RIVM (NL)

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RESULTS AND CONCLUSIONS
IN LOGICAL (*NOT CHRONOLOGICAL*) STEPS

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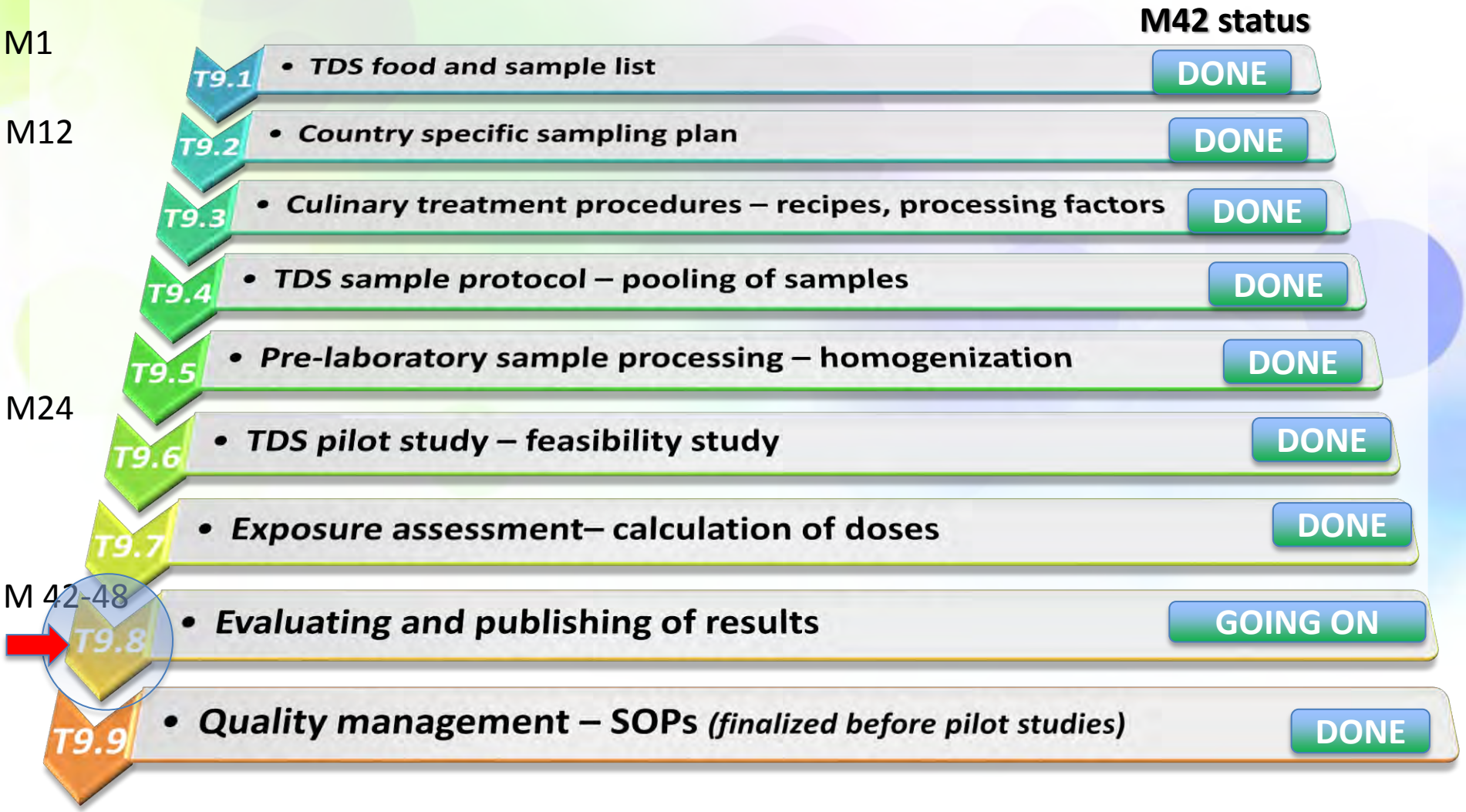
WORK ROAD MAP – ORGANIZED INTO 9 TASKS



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1. **TDS FOOD LIST**

1. How to understand each to other?
2. How to harmonize selection of foods into TDS lists?
3. How many TDS food lists we need?

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1. HOW TO UNDERSTAND EACH TO OTHER?

- **Standardized food classification/description system** developed by EFSA should be used obligatory for mutual „communication among MSs"

FoodEx2 allows:

- hierarchic food classification
  - 7 levels of details
- food description by facets
  - > 9 basic facets
  - e.g. cooking method, etc.

FoodEx2 = the key element for harmonization of TDS food/sample lists in EU.

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2. HOW TO HARMONIZE SELECTION OF FOODS INTO LISTS?

- **Used principles:**
  1. **To select foods for individual population groups = more TDS food lists possible**
  2. **To apply selection criteria for each foods group**

Decision to include food item into the TDS food list – selection criteria	
1	Yes, as part of 90% of average consumption of any of 4 population group
2	Yes, as expected major contributor to exposure of any of selected population group
3	Yes, other reason (e.g. % of consumers, etc.)
4	Combined into one item (various brands/similar foods together)
N	No, as not part of 90% of average consumption, nor expected major contributor

- **Advantage/disadvantage:**
  - *cover also minor food groups (e.g. spice)*
  - *TDS food list is longer/more complex*

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3. HOW MANY FOOD LISTS WE NEED?

- Theoretically – TDS food list should reflect specific TDS objectives (for population of interest/substances)
- **At least two TDS food lists are minimum (for small children 0-3y and others 4+y)**

Y. AKHANDAF, S. DE HENAUW, M. DOFKOVA, J. RUPRICH, A. PAPADOPOULOS, V. SIROT, M.C. KENNEDY, H. PINCHEN, K. BLUME, O. LINDTNER, A.L. BRANTSAETER, H.M. MELTZEG & I. SIOEN **Establishing a food list for a Total Diet Study: how does food consumption of specific subpopulations need to be considered?** Food Additives & Contaminants: Part A, 2015, 32 (1), 9-24

Usual population groups addressed during creation of TDS food lists

Infants	Toddlers	Other children		Adolescents		Adults		Elderly		Very elderly		Pregnant	Breastfeeding	Population
3-11M	12-35M	4-9Y	4-9Y	10-17Y	10-17Y	18-64Y	18-64Y	65-74Y	65-74Y	75+Y	75+Y			
M/F	M/F	M	F	M	F	M	F	M	F	M	F	F	F	M/F

Used for pilot studies

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2. TDS SAMPLE PROTOCOL – POOLING OF SAMPLES

1. How to pool individual foods into TDS samples?
2. How many subsamples should be minimally in one pooled TDS sample?
3. How to get better comparability of TDS food and sample lists among partners?

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1. HOW TO POOL INDIVIDUAL FOODS INTO TDS SAMPLES?

- **TDS sample is created by combination of individual food items into one pooled sample which can be simple or complex.**

„simple“ (individual food approach)

Preferred in TDS pilot studies

„complex“ (mixed food approach)

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2. HOW MANY SUBSAMPLES SHOULD BE MINIMALLY IN ONE POOLED TDS SAMPLE?

- Width of half of the 95% confidence intervals for estimates of mean ($\bar{x}$) concentrations obtained by TDS approach, based on given number of sub-samples pooled and given ratio of true standard deviation (σ) and true mean (μ) (low variability, σ:μ=1:3 and high variability, σ:μ=1:1). (MATIS, 2013)

Level of confidence = 95%		
	trueSD (σ):true mean (μ)	
n	1:3	1:1
20	±16%	±48%
15	±19%	±57%
12	±22%	±66%

Expected RSD = 33%

Expected RSD = 100%

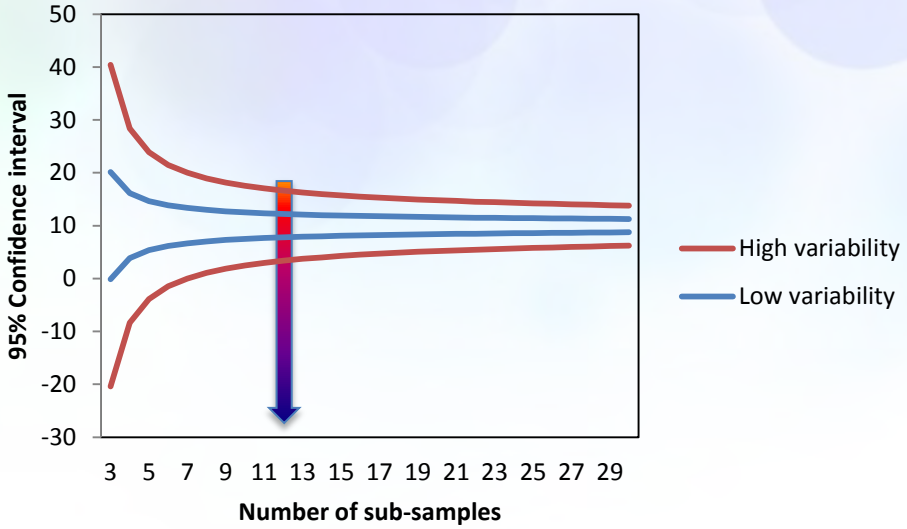

Figure 1. 95% confidence intervals around a sample mean ($\bar{x} = 10$) with high and low variability. (MATIS,2013)

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3. HOW TO GET BETTER COMPARABLITY OF TDS FOOD AND SAMPLE LISTS?

Work organized in 3 steps – versions of TDS sample/food lists - consultations:

- **Version 1**: original national suggestions of TDS sample food lists
- **Version 2**: „intra food group harmonization“based on comparison with results of other partners for particular food group
- **Version 3**: „inter food group harmonization“ based on comparison of whole TDS sample/food lists among countries

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FINAL (NATIONAL) TDS SAMPLE LISTS

Country	TDS samples defined	Food groups with the highest number of samples
CZ 	152	Meat (24), Grains (23), Vegetables (22)
PT 	166	Composite dishes (35), Fish (25), Vegetables (22)
DE 	243	Composite dishes (36), Meat (26), Vegetables (26)
FI 	128	Vegetables (19), Grains (13), Meat (13)
IS 	150	Grains (25), Meat (19), Fish (17)

Remark: number of TDS samples can be changed during the project.
Not all TDS samples will be analyzed during a pilot study.

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3. ANALYZED CHEMICAL SUBSTANCES + COUNTRY SPECIFIC SAMPLING PLANS

1. What chemical substances will be analyzed?
2. What are the main drivers of exposure for selected substances?
3. What food groups will be analyzed?

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1. WHAT CHEMICAL SUBSTANCES WILL BE ANALYZED?

- **Which elements were measured?**

Country	Core analytes (obligatory)				Additional Analytes (ICP-MS)															
CZ	Cu	Hg	Mn	Se	Al	As		Cd		Cr	Fe	K		Mg	Na	Ni	P	Pb			Zn
DE	Cu	Hg	Mn	-	Al			Cd										Pb			
FI	Cu	Hg	Mn	Se				Cd		Cr						Ni		Pb			Zn
IS	Cu	Hg	Mn	Se	Al	As	Ba	Cd										Pb			
PT	Cu	Hg	Mn	Se		As		Cd	Co	Cr			Li			Ni		Pb	Sr	V	Zn

Target (requested) LoQ has been set before analyses for every substance and TDS sample.

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2-3. WHAT FOOD GROUPS WILL BE ANALYZED BY ALL PARTNERS?

- 6 obligatory food groups (main exposure drivers)
- but all partners analyzed also 3 other food groups

FoodEx2 food groups	CZ	DE	FI	IS	PT
Grains and grain-based products	X	X	X	X	X
Meat and meat products	X	X	X	X	X
Fish, seafood, …	X	X	X	X	X
Fruit and fruit products	X	X	X	X	X
Legumes, nuts, oilseeds and spices	X	X	X	X	X
Milk and dairy products	X	X	X	X	X
Coffee, cocoa, tea and infusions		X	X		
Composite dishes	X	X	X	X	X
Eggs and egg products	X	X	X	X	X
Starchy roots or tubers and products	X	X	X	X	X
Vegetables and vegetable products		X	X		

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4. CULINARY TREATMENT PROCEDURES – RECIPES, PROCESSING FACTORS

1. Different food consumption data format is a challenge.
2. When we need to calculate „culinary factors“?

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1. DIFFERENT FOOD CONSUMPTION DATA FORMAT IS A CHALLENGE FOR HARMONIZATION

Food	Pork				
Reported amount	raw	Meat processing 	raw, edible part	Culinary treatment 	as consumed

Not only FCS method is important but also standard data formats and collected details!

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2. WHEN WE NEED TO CALCULATE „CULINARY FACTORS“?

- Food consumption data can be presented as:
  1. As consumed
  2. **Raw**
  3. **Raw, edible part** - specific case when we have format **„as purchased“**
- **Except for the first case, „culinary factor“ (yield) must be used for calculation of exposure doses.**
- Culinary factors are calculated for each TDS sample according to food consumption data format, as described in SOP4.

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5. PRE-LABORATORY SAMPLE PROCESSING – HOMOGENIZATION

1. What TDS samples should we test before analyzes?
2. How to test homogeneity of TDS samples?

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1. WHAT TDS SAMPLES WE SHOULD TEST BEFORE ANALYZES? *(mainly homogeneity of pooled samples)*

- Selection of TDS samples with expected challenges, from various food groups
- Number and type of selected TDS samples:

Pilot lab/country	No of samples	Type of tested TDS samples
SZU, CZ	10	Sandwich, pizza, fish fingers, table-grapes, multigrain bread, pasta, buns, tree nuts, salami, cow/ox/bull fresh meat
MATIS, IS	9	Bread, pumpernickel bread, muesli, popcorn, salted cod, deep fried chicken, liver sausage, dried vine fruits, table-grapes
BfR, DE	7	Pizza, egg based dishes, bread, candies, meat based dishes, pralines, muesli
EVIRA, FI	5	Freshwater fish, sweet orange, smoked cooked sausage, tomato, multigrain bread
INSA, PT	10	Beans, meat, and vegetables meal, meat based dishes, fish and rice meal, finger food, bivalve molluscs, table-grapes, flan tart, peanut, raw cured meat, dry and fermented sausages
Total	**41**	

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2. HOW TO TEST HOMOGENEITY OF TDS SAMPLES?

- Testing of homogenization tested according to the FAPAS protocol

Analyte and matrix analysed: **Mercury (Hg) in Table-grapes**

Target LOQ	Declared LOQ	Real Lab LOQ	Unit
0,011900	0,000100	0,000040	mg/kg

Table 1

Sample No.	Insert analytical results result a (mg/kg)	result b (mg/kg)	D (a-b)	S (a+b)	D^2
1	0,000132	0,000132	0,000000	0,000264	0,000000
2	0,000066	0,000106	-0,000040	0,000172	0,000000
3	0,000079	0,000092	-0,000013	0,000172	0,000000
4	0,000158	0,000172	-0,000013	0,000330	0,000000
5	0,000066	0,000079	-0,000013	0,000145	0,000000
6	0,000145	0,000079	0,000066	0,000224	0,000000
7	0,000092	0,000132	-0,000040	0,000224	0,000000
8	0,000106	0,000040	0,000066	0,000146	0,000000
9	0,000158	0,000092	0,000066	0,000251	0,000000
10	0,000079	0,000119	-0,000040	0,000198	0,000000
11	0,000185	0,000106	0,000079	0,000290	0,000000
12	0,000066	0,000106	-0,000040	0,000172	0,000000
Sum	0,001333	0,001254		0,002588	0,000000
Avg	**0,000108**		variance	0,000000	
			MSB	0,000000	

Table 2

Choose your Target Standard deviation (Target SD)	0,000024	mg/kg

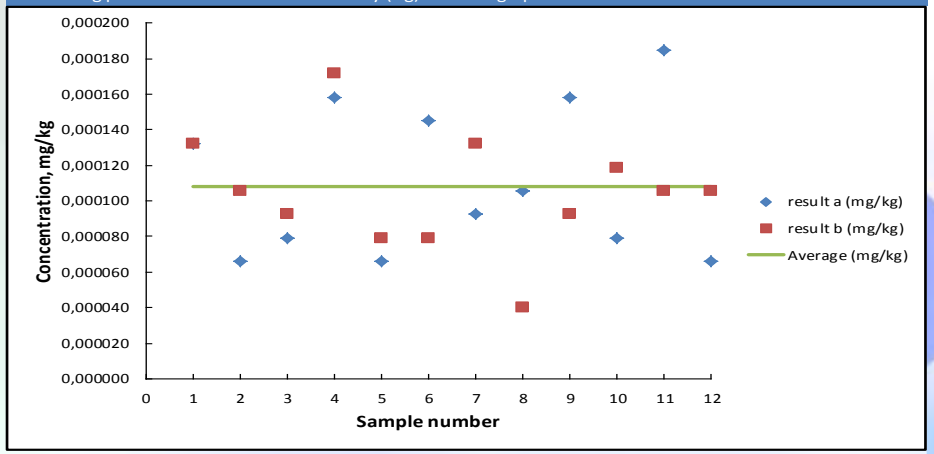
HORWITZ "SD" CALCULATOR

Average concentration of analyte in set of tested samples	0,000108	mg/kg
Calculated Target SD (σ_H)	0,000024	mg/kg

Additional calculations *see ref.1*

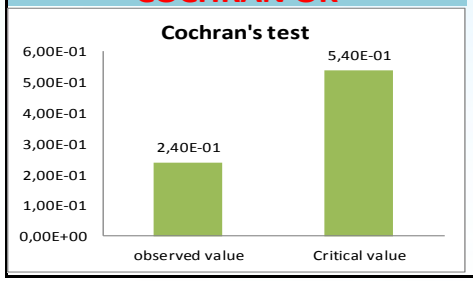
		Cochran´s test	
Cochran's test (ratio)	2,40E-01		
Estimate of analytical variance, s^2_{an}	1,09E-09	observed value	Critical value
Test for acceptable between-sample variance, (σ^2_{all})	5,06E-11	2,40E-01	5,40E-01
Est. of between-sample variance, (s^2_{sam})	3,29E-10		
Critical value	1,03E-09		

Testing procedure visualization: Mercury (Hg) in Table-grapes

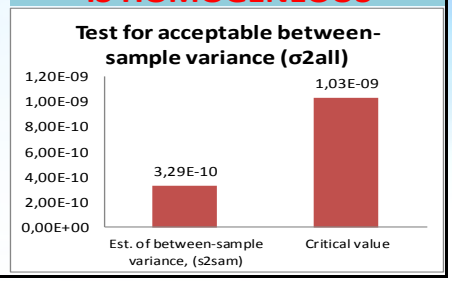


TDS sample homogeniety evaluation:

COCHRAN OK



IS HOMOGENEOUS



Remarks:

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6. QUALITY MANAGEMENT – SOPs

(FINALIZED BEFORE PILOT STUDIES)

1. What principles were used to create harmonized SOPs?
2. What SOPs were prepared before pilot studies?

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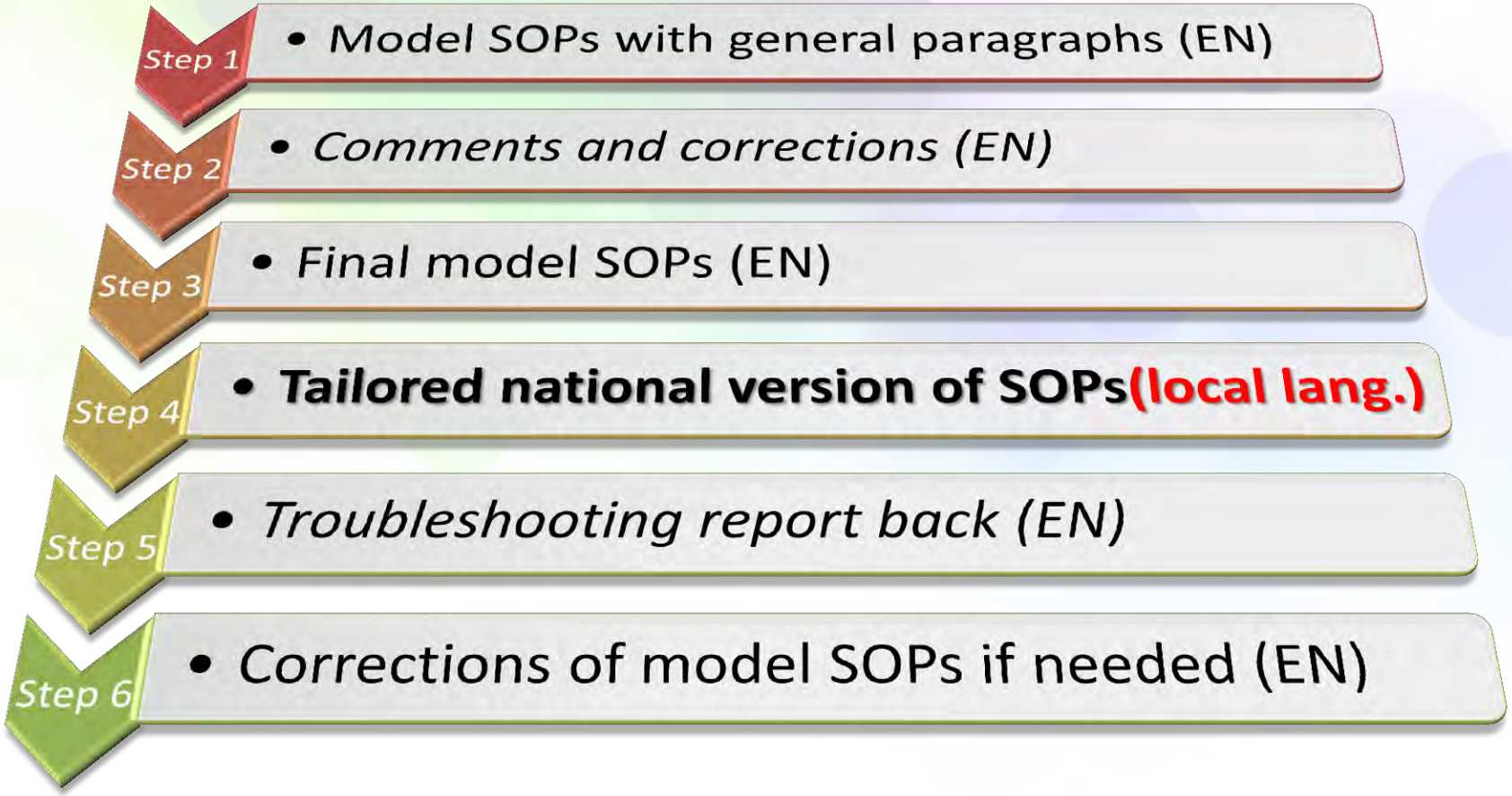
1. WHAT PRINCIPLES WERE USED TO CREATE HARMONIZED SOPs?



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2. WHAT SOPs WERE PREPARED BEFORE PILOT STUDIES?

Preparation for food collection, sample preparation and analysis	SOP 01
Food collection	SOP 02
Reception of individual samples (at kitchen laboratory)	SOP 03
Sample preparation (at kitchen / pre-analytical laboratory)	SOP 04
Chemical analysis of laboratory samples	SOP 05

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7. TDS PILOT STUDY – FEASIBILITY STUDY

1. How to transport food samples?
2. How to document collected foods?
3. Is kitchen ready for TDS tasks?
4. How to work with quantity/quality of food samples?

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1. HOW TO TRANSPORT FOOD SAMPLES?

- **Challenges**
  - Maintaining the low temperature for frozen and perishable foods during food collection
    - Currently using isothermal boxes
    - Thermoelectric cooling boxes could improve/facilitate the food collection
  - Reaching 8-10 shops during one day
    - In some cases foods collected in two consecutive days
  - Collecting 12 subsamples during one day
    - In some cases samples of the same batch (and expiry date) collected in several shops
    - More variation if collected in several days

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2. HOW TO DOCUMENT COLLECTED FOODS?

- Photographic documentation is carried out for each purchased food
- Device used: Ipevo Ziggi HD
- We took 1-4 photos of each food sample (front view, ingredients, nutritional value, best before date and other important information on the package

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3. IS KITCHEN READY FOR TDS?

- Pre-analytical treatment of food samples is performed in the kitchen laboratory of MATÍS
- Homogenisation is carried out in trace element laboratory (next floor)
- Two persons are involved into this work
- Various heat treatment - boiling, baking, frying, roasting and stewing are applied during sample preparation
- Tap water and vegetable oil are used for culinary treatment

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4. HOW TO WORK WITH QUANTITY AND QUALITY OF FOOD SAMPLES?

”No pain, no gain”

Pilot study – training is necessary before start of the national TDS

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Evira

8. EXPOSURE ASSESSMENT– CALCULATION OF DOSES

- Basic exposure scenario
- Calculations by TDS version of the MCRA software
- Example of results:
  1. Should we use OIM or LNN model for calculation of exposure doses to total Hg?
  2. What are the main contributors to total Hg exposure for Adults+Elderly?
  3. What is molar ration between Se/Hg from consumed Fish/sea food?
  4. What is the difference between intake of Cu for Adults and Elderly and main sources among piloting countries?
  5. Why is intake of Mn for upper tail (P99) of Elderly consumers in Finland higher than in other countries?

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BASIC EXPOSURE SCENARIO

Activity	Exposure route	Source	Target
Eating	Oral	Foods	Adults, Elderly

FoodEx2 food groups
Grains and grain-based products[1]
Meat and meat products
Fish, seafood, …
Fruit and fruit products
Legumes, nuts, oilseeds and spices
Milk and dairy products
Composite dishes[1]
Eggs and egg products
Starchy roots or tubers and products[1]

[1] not analyzed by PT

Age	Adults		Elderly		
Gender	M	F	M	F	
No. respondents:					Total
Cz	793	873	59	85	1810
DE	4592	5827	951	1055	12.425
IS	523	539	76	74	1212
FI	729	846	229	234	2038
PT	1363	1389	220	300	3272

[2]EVIRA: from 25 y

F: Females
M: Males

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Calculations by MCRA

Software MCRA8.1-TDS settings

- Exposure type: chronic
- Advanced setting: use total diet study
- Compounds: Hg/Mn/Se/Cu
- Population groups: **Adults + Elderly (age 18-74, M+F); Adults x Elderly; M x F**
- Food: **9 food groups /only fish, seafood,…**
- Conversion: read across
- Replacement of non-detects: by zero (LB) and factor 1 x LOR (UB) (remarks: LB usually needed when number of ND is higher than 20%)
- Exposure model type: **OIM and/or LNN**
- Uncertainty: perform uncertainty analysis; min number of iterations 1000, number of resample cycles 100, resample individuals only
- Output: show means and percentiles for 50 90 95 99; percentage for upper tail 97,5; show % of population below level: Automatic

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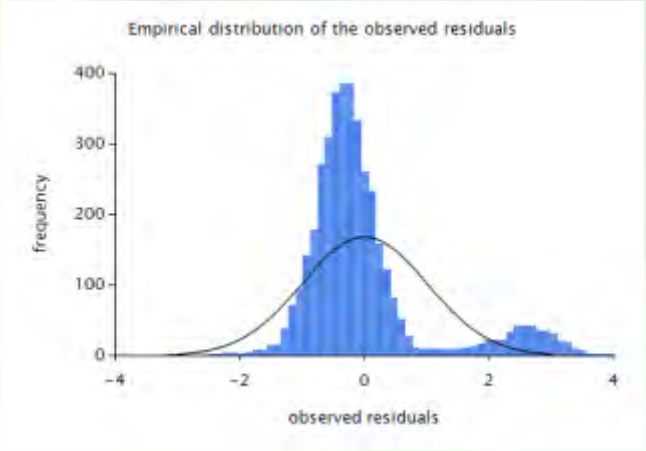
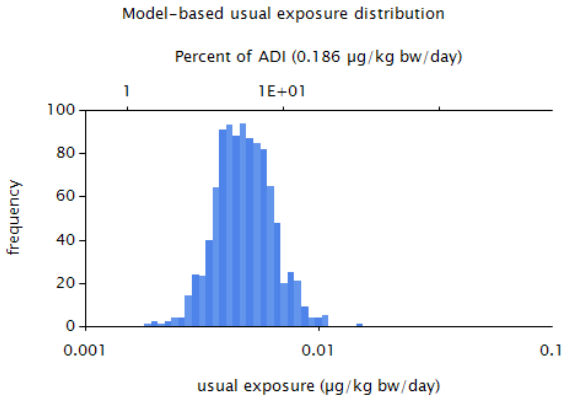
1. SHOULD WE USE OIM OR LNN MODEL FOR CALCULATION OF EXPOSURE DOSES TO TOTAL Hg? (CZ DATA)

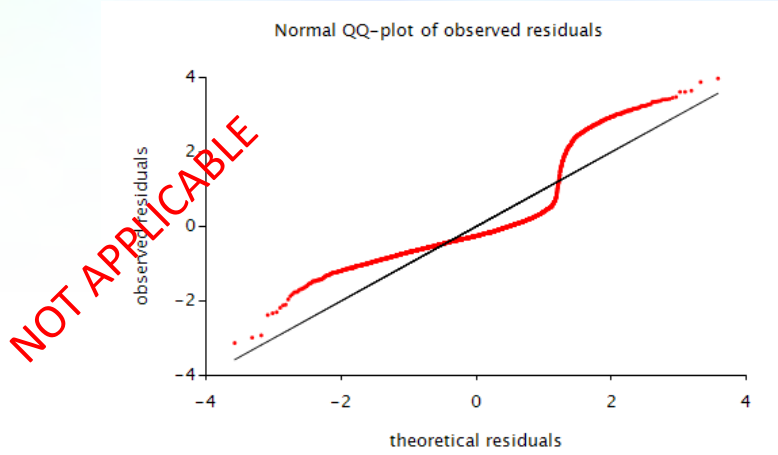
- **Population groups (18-74y, M+F), 9 food groups, LNN (UB)**



Percentage	Exposure (µg/kg bw/day)	Lower Bound (p2.5)	Upper Bound (p97.5)	Percentage of reference dose
50.00 %	0.004792	0.004405	0.005323	2.58 %
90.00 %	0.006793	0.005287	0.007929	3.65 %
95.00 %	0.007734	0.005363	0.009149	4.16 %
99.00 %	0.009537	0.00551	0.0117	5.13 %

Q/Q – plot evaluates usage of this model





NOT APPLICABLE

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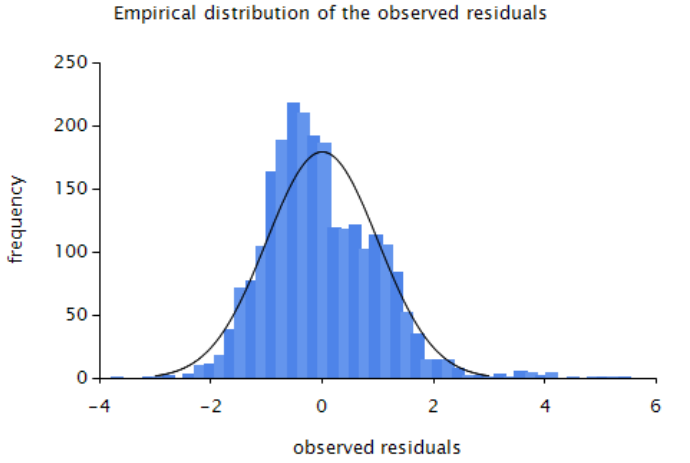
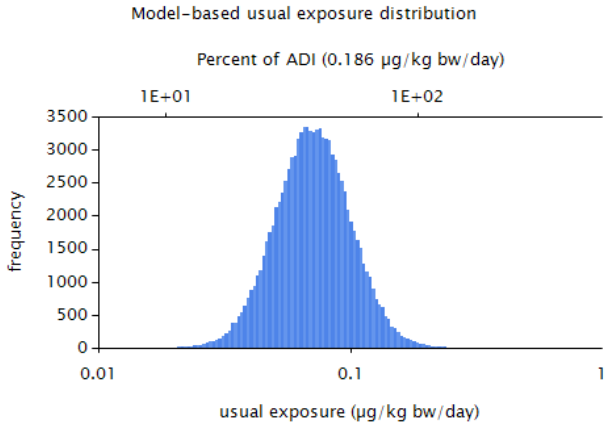
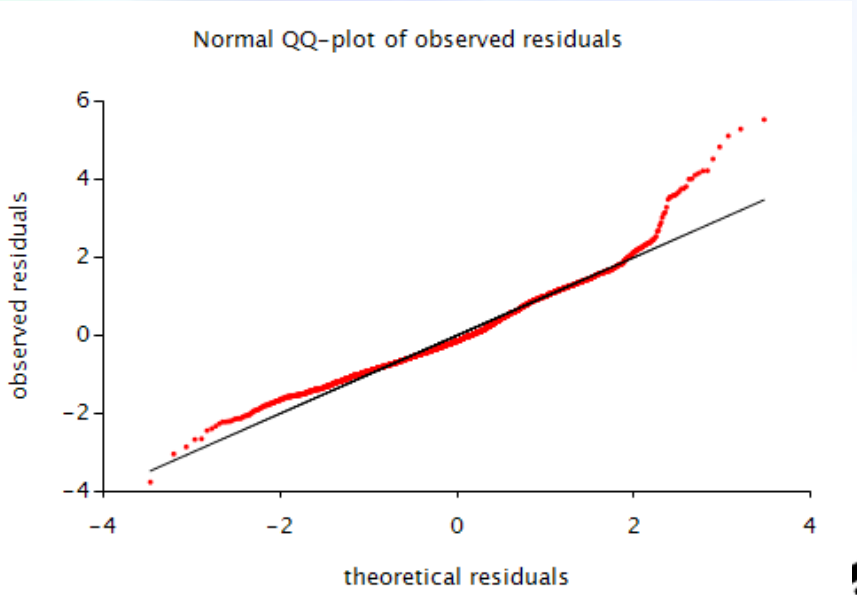
SHOULD WE USE OIM OR LNN MODEL FOR CALCULATION OF EXPOSURE DOSES TO TOTAL Hg? (IS DATA)

- **Population groups (18-74y, M+F), 9 food groups, LNN (UB)**





Percentage	Exposure (µg/kg bw/day)	Lower Bound (p2.5)	Upper Bound (p97.5)	Percentage of reference dose
50.00 %	0,07137	0,06732	0,07529	38,37%
90.00 %	0,1102	0,1018	0,1187	59,27%
95.00 %	0,1246	0,1136	0,1376	66,99%
99.00 %	0,1581	0,139	0,1778	85,00%



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tds exposure

2. WHAT ARE THE MAIN CONTRIBUTORS TO TOTAL Hg EXPOSURE FOR ADULTS+ELDERLY? - DOSES

- Population groups (18-74y, M+F), 9 food groups (PT-6 gr), OIM

Hg	ED in ug/kg bw/day LB				ED in ug/kg bw/day UB				Remarks (number of not detected / number of detected)
	mean	P90	P95	P99	mean	P90	P95	P99	TWI = 1,3 ug /kg bw/w = 186 ng/kg bw/d for MeHg (EFSA 2012)
CZ	0,008	0,029	0,043	0,070	0,008	0,030	0,044	0,070	42/67
DE	0,006	0,014	0,032	0,072	0,007	0,015	0,033	0,073	104/120
FI	0,031	0,088	0,180	0,383	0,044	0,103	0,192	0,395	**68**/13, above TDI
IS	0,058	0,107	0,15	0,676	0,089	0,141	0,187	0,722	65/34
PT*	0,110	0,391	0,607	1,189	0,120	0,393	0,609	1,190	48/120

*only 1 day consumption data

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tds exposure

2. WHAT ARE THE MAIN CONTRIBUTORS TO TOTAL Hg EXPOSURE FOR ADULTS+ELDERLY? - FOODS

- Population groups (18-74y, M+F), 9 food groups (PT-6 f gr), OIM

Hg	Main dietary sources (LB) in % of total exposure dose					Remarks
	1.	2.	3.	4.	5.	
CZ %	43	10	8	7	6	
food	Cod and cod-like fishes	Canned fish in oil	Processed fish products Herring marinated	Prepared fish salad	Other smoked fishes	
DE %	31	14	7	5	4	
food	Pollack, pollock	Processed fish products Herring canned	Ocean perch	Mixed vegetable salad	Dairy ice creams and similar	
FI %	64	12	7	6	3	
food	Freshwater fish	Rainbow trout	Canned fish in brine	Canned fish in oil	Other smoked fishes	High content of Hg in freshwater fish.
IS %	27	23	7,6	5,3	4,0	
food	Haddock	Processed fish products $ shark, fermented	Halibut, atlantic $ halibut, big, fillet	Other dried fishes, including freshwater and diadromous	Processed fish products $ salted cod, desalted	
PT %	28,5	26,2	13,5	11,2	3,7	
food	Cod, dried	Hakes	Pelagic marine fishes-2	Canned tuna in oil	Horse mackerel	

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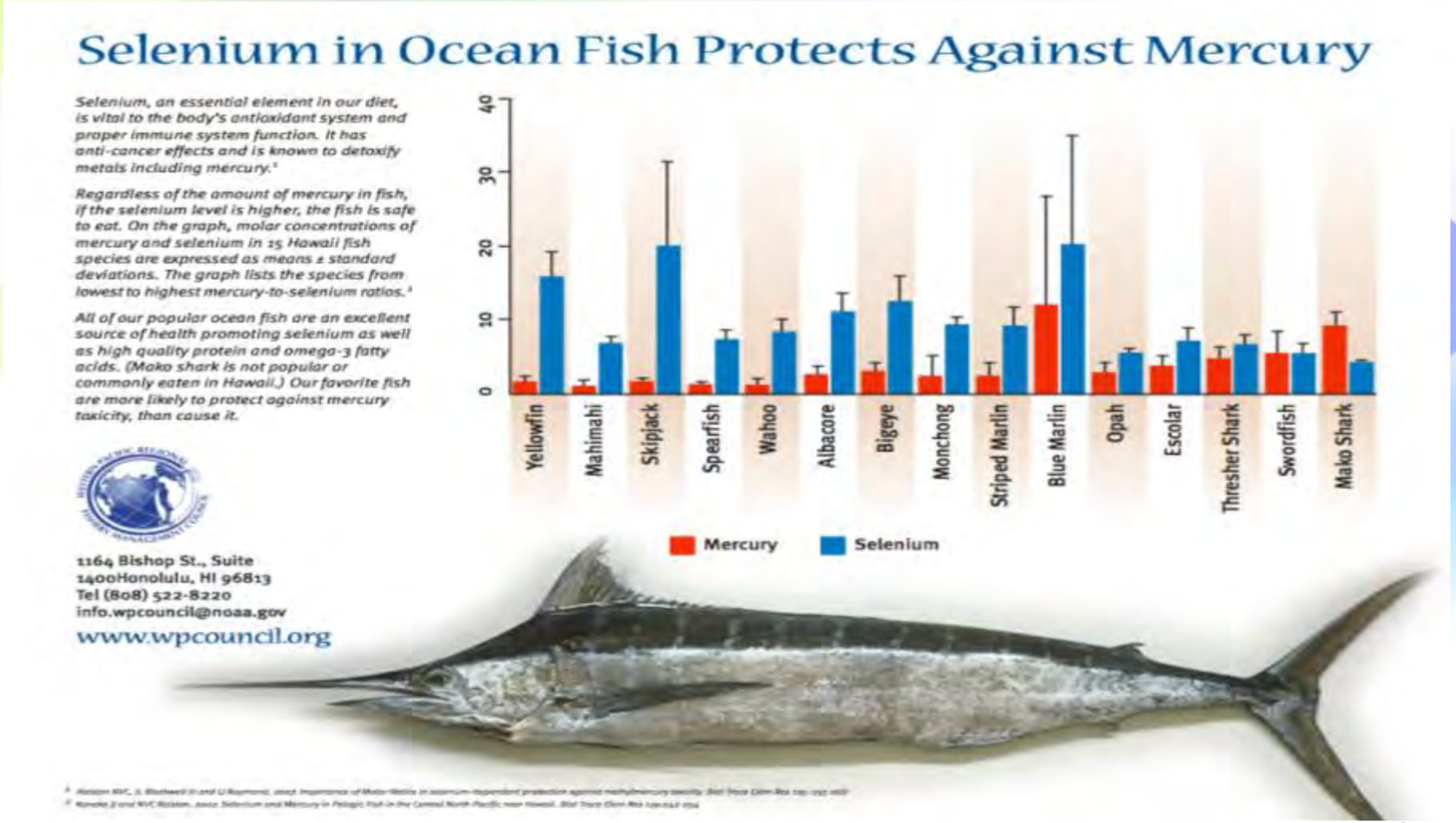
tds exposure

3. What is Se/total Hg molar ratio during intake?



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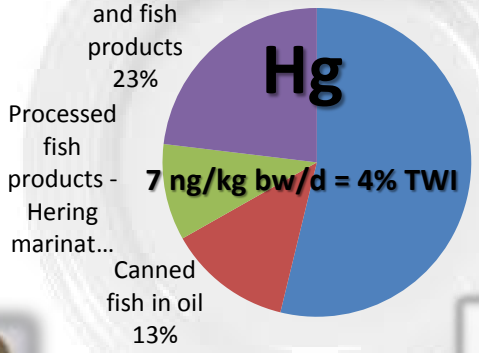
tds exposure

3 main „fish/seafood“ sources of total Hg exposure of consumers: simultaneous usual intake of Se and total Hg and Se

CZ

Se/Hg mol ratio = 15

3.



Se/Hg mol ratio = 40

2.

Se/Hg mol ratio = 20

1.

Se/Hg molar ratio e.g.„5“ means that per 1 nmol of total Hg intake we simultaneously consume 5 nmol of Se for consumption days only.

TWI = 1,3 ug Hg/kg bw/w = 186 ng Hg/kg bw/d for MeHg (EFSA 2012)

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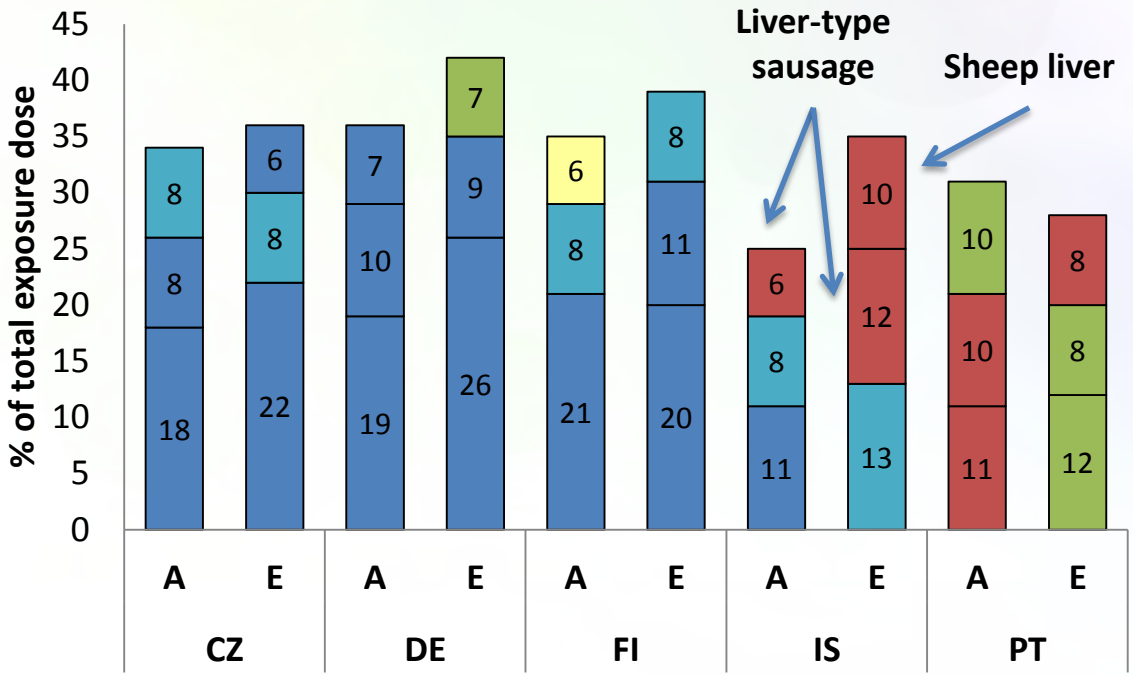
4. WHAT IS THE DIFFERENCE BETWEEN INTAKE OF Cu FOR ADULTS AND ELDERLY AND MAIN SOURCES AMONG PILOTING COUNTRIES?



	FoodEx2 food groups
	Grains /grain-based products
	Meat and meat products
	Fish, seafood, …
	Fruit and fruit products
	Legumes, nuts, …
	Milk and dairy products
	Composite dishes
	Eggs and egg products
	Starchy roots or tubers …

A: Adults
E: Elderly
UB: Upper bound

tds exposure

5. WHY IS INTAKE OF Mn FOR UPPER TAIL OF ELDERLY CONSUMERS IN FINLAND HIGHER IN OTHER COUNTRIES?

- Population groups (M + F), 9 food groups (PT: 6 groups), **OIM**

Mn	ED in µg/kg bw/day UB Adults				ED in µg/kg bw/day UB Elderly				Remarks (number of not detected / number of detected)
Partner	P50	P90	P95	P99	P50	P90	P95	P99	RfD = 140 µg/kg bw/d*
CZ	29,7	52,0	61,2	80,5	29,9	48,9	58,2	66,9	9/100 | 9/99
DE	23,2	44,3	52,6	72,5	24,8	43,3	50,1	69,9	11/310 | 11/301
FI	40,4	76,6	90,5	125,0	46,5	92,6	105,4	**145,6**	5/76 | 5/76 **> RfD**
IS	25,1	48,4	56,9	78,4	24,2	43,3	52,9	66,8	
PT	2,2	16,3	23,3	50,3	2,0	15,0	23,4	72,2	1/300 | 1/284

*U.S. EPA, IRIS 1996

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Evira

tds exposure

WHY IS INTAKE OF Mn FOR UPPER TAIL OF ELDERLY CONSUMERS IN FINLAND HIGHER IN OTHER COUNTRIES?

- Population groups (M + F), 9 food groups (PT: 6 groups), **OIM**

Mn	Main dietary sources (UB) in % of total exposure dose						Remarks
	Adults			Elderly			
	1.	2.	3.	1.	2.	3.	
CZ %	42	12	5	49	7	6	
food	Rye-wheat bread, refined flour	Wheat bread and rolls, white (refined flour)	Wheat flour white	Rye-wheat bread, refined flour	Wheat bread and rolls, white (refined flour)	Wheat flour white	
DE %	31	17	10	39	20	5	
food	Multigrain bread and rolls	Bread and similar products wholemeal	Wheat bread and rolls, white (refined flour)	Multigrain bread and rolls	Bread and similar products wholemeal	Wheat bread and rolls, white (refined flour)	
FI %	31	13	10	26	21	17	
food	Rye-wheat bread, wholemeal	Berries and small fruits	Processed and mixed breakfast cereals	Rye-wheat bread, wholemeal	Berries and small fruits	Processed and mixed breakfast cereals	Elderly, upper tail P97,5: berries 37 %
IS %	16	14	9	18	12	11	
food	Processed and mixed breakfast cereals	Wheat bread and rolls, white	Oat porridge	Oat porridge	Processed and mixed breakfast cereals	Wheat bread and rolls, white	
PT %	36	12	7	32	15	8	
food	Banana	Lupin	Fruit salad	Banana	Lupin	Pineapple	

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tds exposure

Key conclusions:

What was successfully tested/implemented

Methodology how to:

1. create specific (age/sex) TDS food and TDS sample lists
2. pool individual TDS samples
3. construct sampling and shopping plan for TDS study
4. apply standardized (national) culinary treatment
5. calculate culinary factors“ (3 possible scenarios)
6. test adequate homogeneity of TDS samples before laboratory analyses
7. predict target/requested LoQ for used analytical methods
8. create tailored national SOPs“, based on generic SOP’s- mandatory/recommended requirements, acceptance criteria, tolerance limits
9. practically perform pilot TDS studies (data collection)
10. calculate exposure doses by the advanced MCRA software and compare results

Now - M42-48 Publishing of results – expected two papers with comments on feasibility

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KEY CONCLUSIONS

1. **FoodEx2 = was the key element for harmonization of TDS food/sample lists.**
2. **Food consumption data format and complexity = limiting factor.**
3. **Resulting number of TDS samples representing at least 90% of average diet was not the same (128 – 243).**
4. **Descriptive and visual documentation of foods was recognized as very supportive even when relatively time-consuming.**
5. **MCRA 8.1 software was successfully used to calculate exposure doses and produce fully comparable numeric and graphical format.**

All partners signalized feasibility of suggested harmonized TDS work methods.

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