

Better Cities for Better Life, Prague 2014

Czech products for Smart Cities

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Partners company

- Immobiliser Central Europe, Ltd.
- MacTechCity, Ltd.
- Trilobyte Statistical Software, Ltd.
- PrenCare, Ltd.
- KBsoft

Commercial partner - CompuGroup Medical Czech Republic, Ltd.

Academic partner - Faculty of Electrical Engineering of Technical University Prague

Field of interest

- Telemedicine
- Disaster management
- Transport telematics

Telemedicine products

- BIOSCREEN - expert system for disease screening
- PrenCare - system for monitoring of risky pregnant women
- PlethyRo - Analysis of cardiovascular system

Idea of BIOSCREEN

- ① To develop new mathematical methods for data mining based on original cluster analysis
- ② To use standard approved biochemical parameters instead of expensive markers
- ③ To exclude interferences between parameters
- ④ To develop user friendly interactive graphics for visualization of results
- ⑤ To use gene analysis as for “calibration”

BIOSCREEN tools

- ① BioAnalyst III- proprietary cluster analysis
- ② IVR - Interactive 2D and 3D graphics
- ③ Neural network analysis
- ④ NGEP - New gene expression patterns analysis

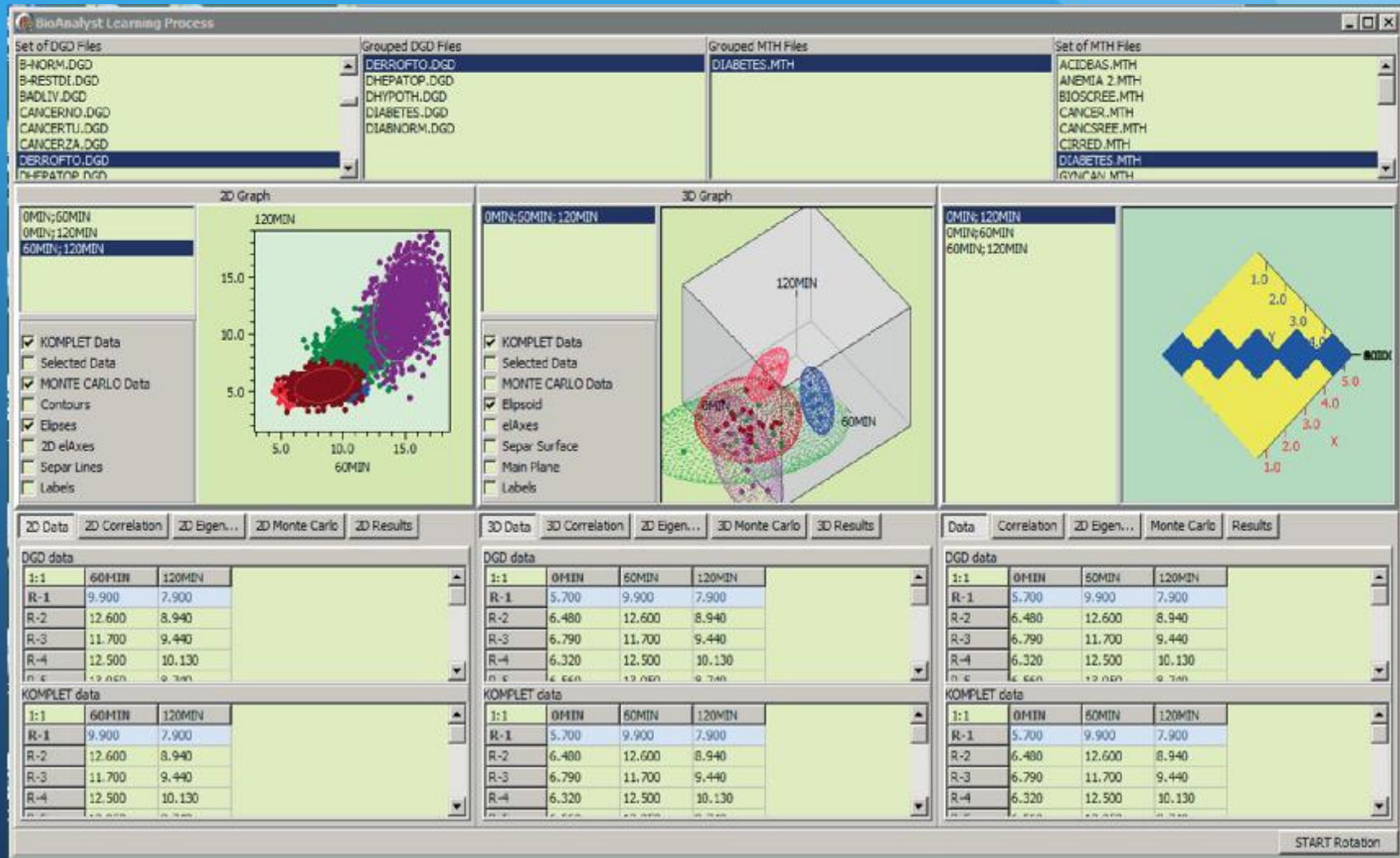
BIOSCREEN results for cancer screening

Clustex III - verze BioAnalyst

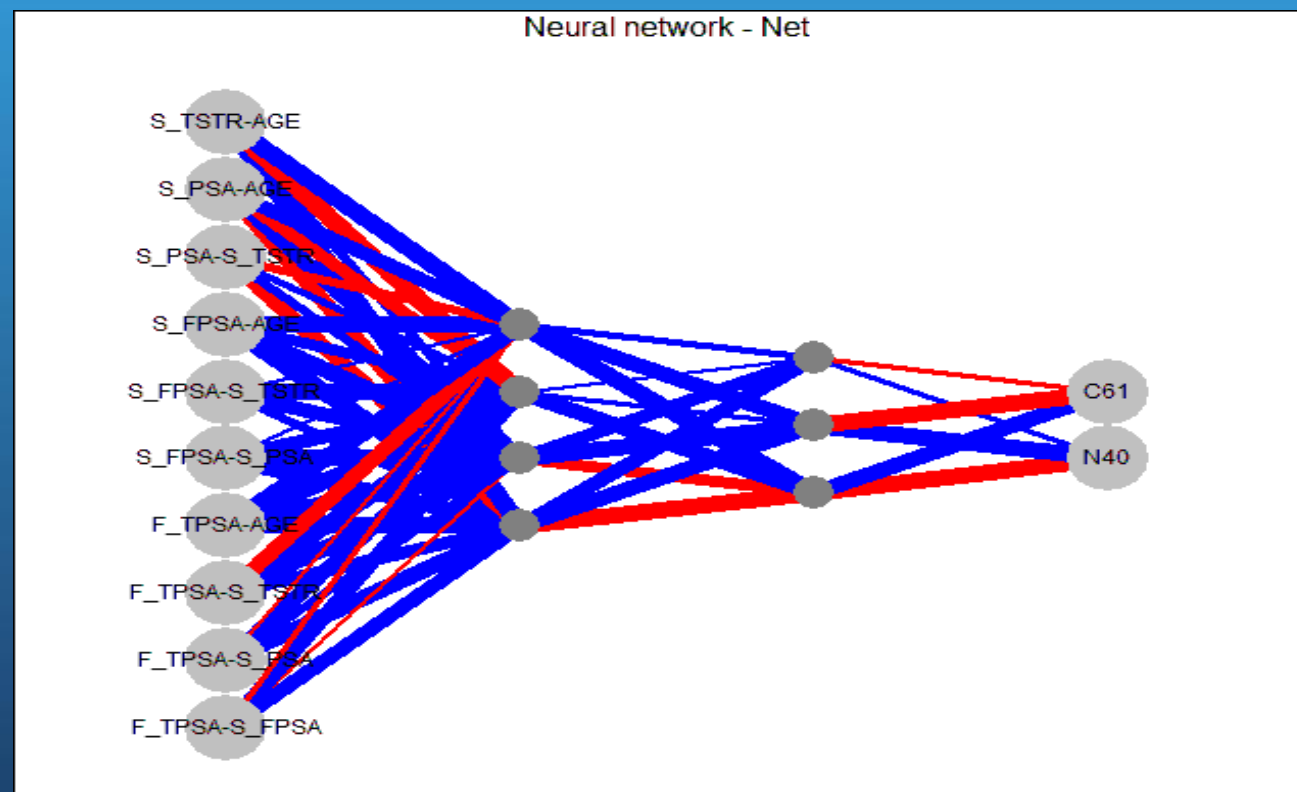
Pacienti	Pacient	Laboratorní výsledky	Doporučení, komentář	Metody																		
Pacient 1 Pacient 2 Pacient 3 Pacient 4 Pacient 5 Pacient 6 Pacient 7 Pacient 8 Pacient 9 Pacient 10 Pacient 11 Pacient 12 Pacient 13 Pacient 14 Pacient 15 Pacient 16 Pacient 17 Pacient 18 Pacient 19 Pacient 20 Pacient 21 Pacient 22	<table border="1"><tr><td>Jméno</td><td>Pacient 15</td></tr><tr><td>Ident</td><td></td></tr><tr><td>Dot.nar.</td><td></td></tr></table>	Jméno	Pacient 15	Ident		Dot.nar.		<table border="1"><thead><tr><th>Parametr</th><th>Hodnota</th></tr></thead><tbody><tr><td>A1AG</td><td>1.4</td></tr><tr><td>A1AT</td><td>3.5</td></tr><tr><td>HPG</td><td>5.0</td></tr><tr><td>TRF</td><td>3.0</td></tr><tr><td>GP</td><td>2.4</td></tr></tbody></table>	Parametr	Hodnota	A1AG	1.4	A1AT	3.5	HPG	5.0	TRF	3.0	GP	2.4	0.00 0.05 0.95	ACIDBAS.MTH ANEMIA 2.MTH BIOSCREEN.MTH CANCER.MTH CANCSCREEN.MTH CIRRED.MTH DIABETES.MTH GYNCAN.MTH HEART.MTH LEDDAD.MTH
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BioAnalyst III -diabetes analysis



Prostate cancer - application of neural network



New gene expression patterns analysis for breast cancer

Identified significant genes (GOI) may be used as predictors for regression or classification models like -

PCA-based data, 32 factors used.
10 misclass. Mayo Clinic

Shrink-regression-based data,
24 genes used. 0 misclass

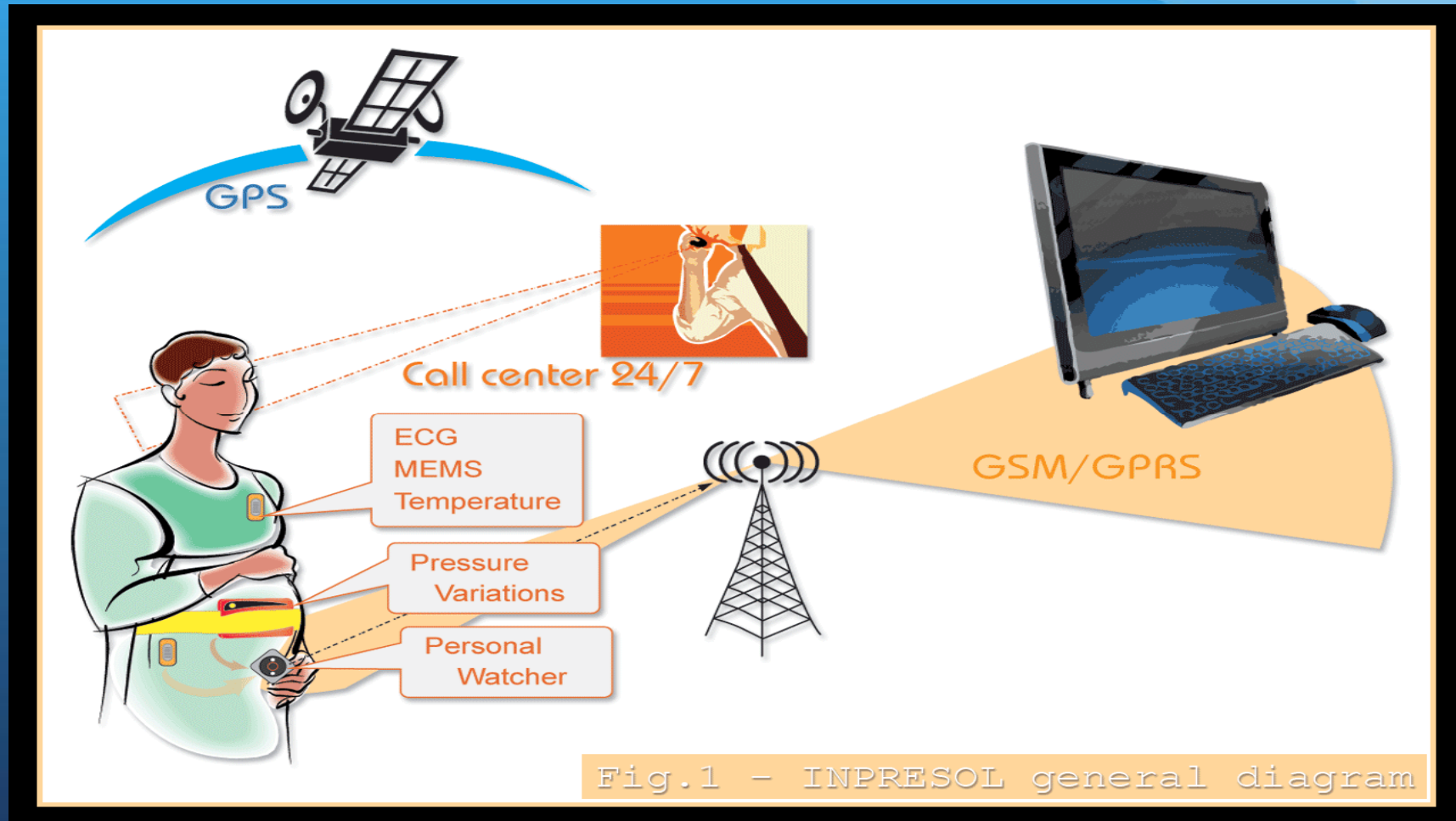
Index	Predicted	Data	Residual	Prob 1	Prob -1
93	1	1	0	0.8944	0.1056
94	1	1	0	0.8953	0.1047
95	1	1	0	0.894	0.106
96	1	1	0	0.8999	0.1001
97	1	1	0	0.8952	0.1048
98	1	1	0	0.8995	0.1005
99	1	1	0	0.8986	0.1014
100	1	1	0	0.9025	0.0975
101	1	1	1	0.8703	0.1297
102	1	1	1	0.8526	0.1474
103	1	1	1	0.8729	0.1271
104	1	1	1	0.8598	0.1402
105	1	-1	1	0.8579	0.1421
106	1	-1	1	0.8643	0.1357
107	1	-1	1	0.8729	0.1271
108	1	-1	1	0.8546	0.1454
109	1	-1	1	0.8729	0.1271
110	1	-1	1	0.8729	0.1271

	Predicted			
Data	1	-1	Total	
1	98	10	108	
-1	0	2	2	
Total	98	12	110	

Index	Predicted	Data	Residual	Prob 1	Prob -1
93	1	1	0	0.9959	0.0041
94	1	1	0	0.9975	0.0025
95	1	1	0	0.9983	0.0017
96	1	1	0	0.9984	0.0016
97	1	1	0	0.9845	0.0155
98	1	1	0	0.9971	0.0029
99	1	1	0	0.9958	0.0042
100	1	1	0	0.9988	0.0012
101	1	1	0	0.1752	0.8248
102	1	1	0	0.1752	0.8248
103	1	1	0	0.175	0.825
104	1	1	0	0.1751	0.8249
105	-1	-1	0	0.175	0.825
106	-1	-1	0	0.1741	0.8259
107	-1	-1	0	0.175	0.825
108	-1	-1	0	0.175	0.825
109	-1	-1	0	0.099	0.901
110	-1	-1	0	0.0667	0.9333

	Predicted			
Data	1	-1	Total	
1	98	0	98	
-1	0	12	12	
Total	98	12	110	

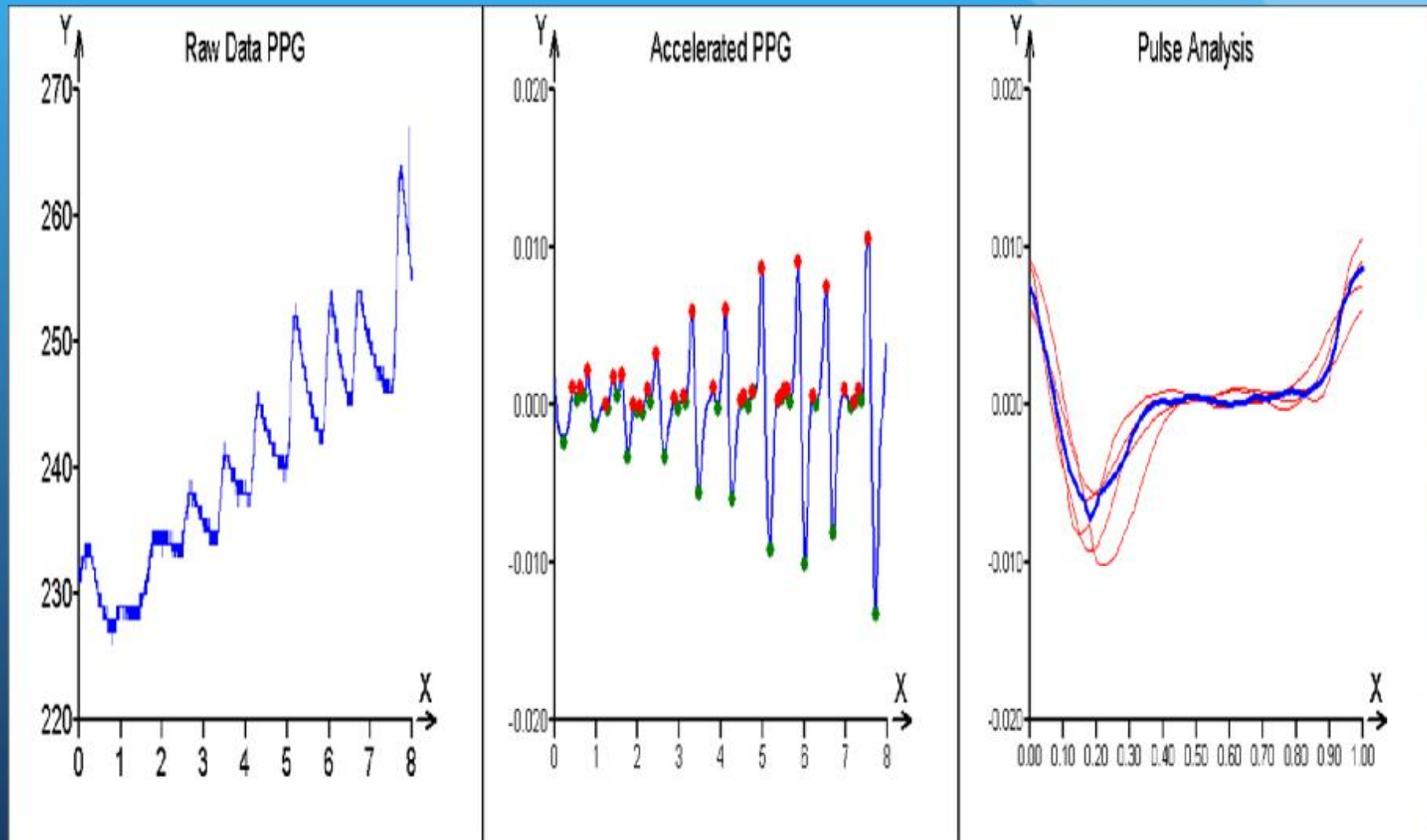
PrenCare - monitoring of risky pregnant women



PlethyRo - monitoring of cardiovascular system -cooperation FEE TU and NONIN, Inc.



PlethyRo - pulse, blood pressure, Fourier analysis of heart risk



Transport telematics

- GAS - Geographical Acoustic System based on RFID mesh network - TBD
- Container RFID logistics
- DSA - Transport administration agenda - project for Ministry of Transport

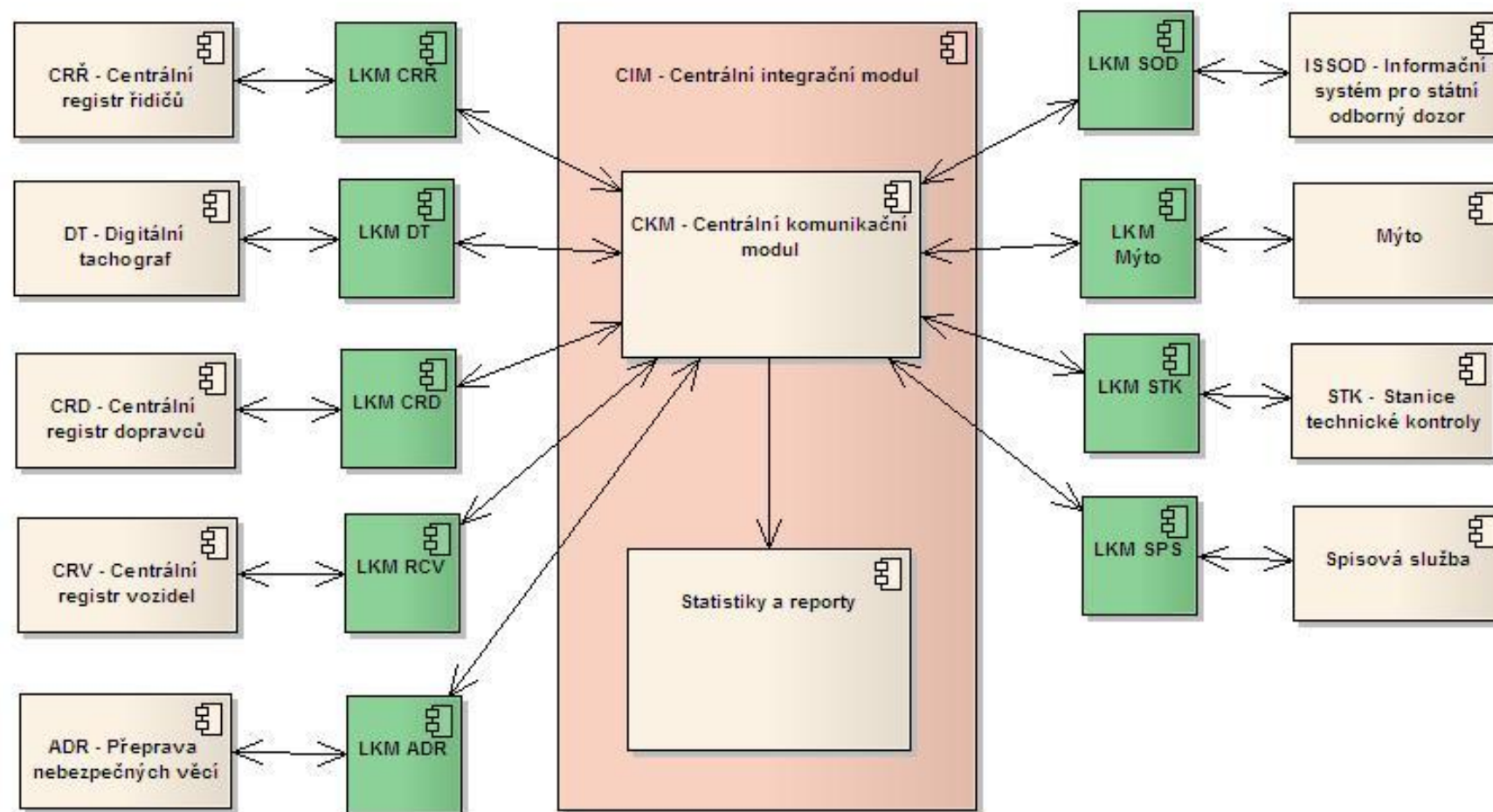
Container logistics



Transport Administration Agenda -

cmp Komponenty integrace DSA

Komponenty integrace DSA



Disaster management

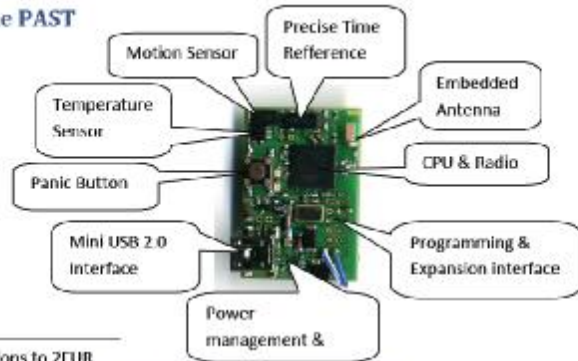
- Personal RFID unit for policeman and firemen allowing indoor localization and communication
- IP net - autonomous system for communication during disaster situations, when standard networks are damaged or jammed
- Events oriented GIS - based on MapLog II server of HSRS, Ltd.

RFID personal units for policemen and firemen



- Small size
- Very low power consumption (embedded paper thin rechargeable battery)
- IEEE 802.15.4 Wireless network compatible
- Radio range Up---to 1km expandable via MESH network Up---to 60km
- 16 MIPS CPU with 128kB Flash
- Temperature monitoring
- Motion monitoring (3 axes, 0.002g resolution, up---to 8g)
- Fall detect, impact detect
- Unique identification with 64bit code

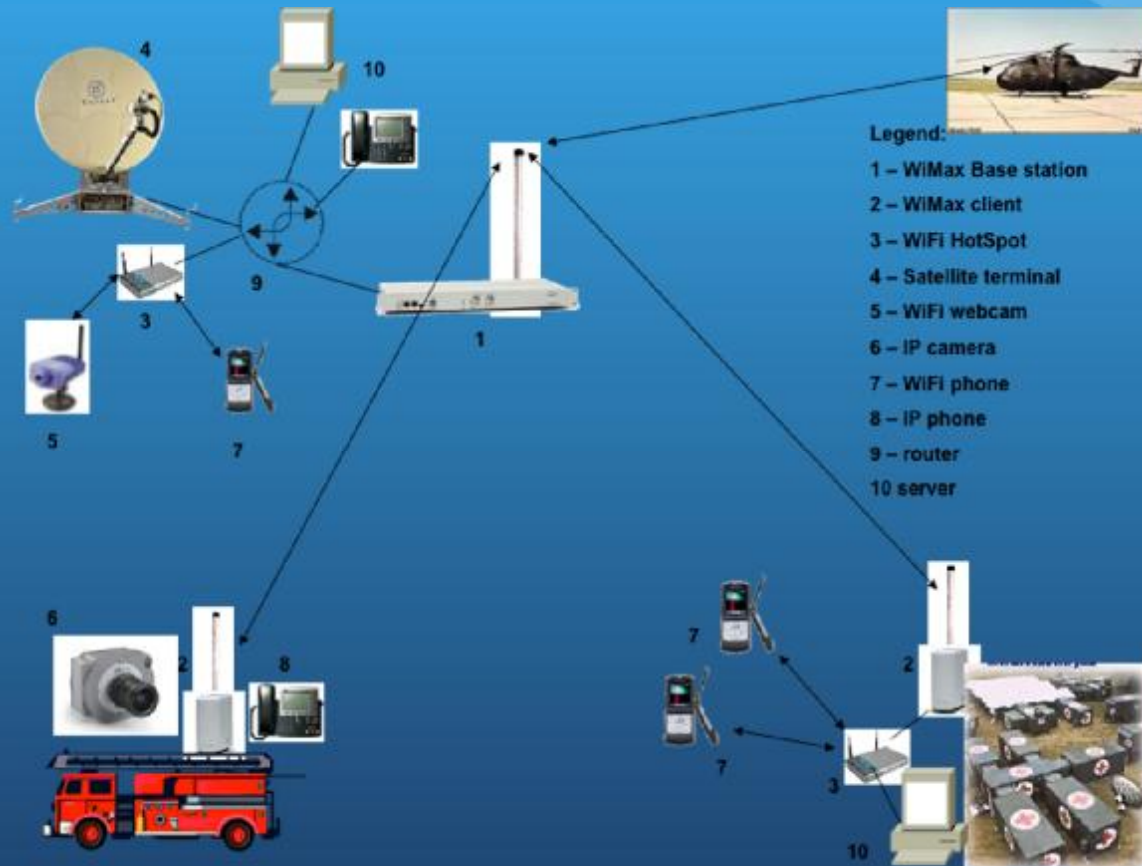
Inside PAST



Size comparisons to 2EUR coin and Credit Card



IP net - WiFi+WiMax+RFID



Events initiated GIS MapLog II

moniWhere | Logged in as: admin Logout

Intro | Map | Map - Europe | Administration | Traveling Book | Contact

Map | Detail

John Patient_01
20. 5. 2012 11:20:40
Temperature: 36,6° C
pO2: 90%
Diastolic pressure: 95 mm Hg
Systolic pressure: 180 mm Hg
Glucose: 7.6 7.6 mM
Motion status: laying
ECG:
aVL

John Patient_02 20. 5. 2012 11:20:40

John Patient_04 20. 5. 2012 11:20:40

John Hoffi_05 20. 5. 2012 11:20:40

MPRO_01 20. 5. 2012 11:20:40

14.51777, 50.01558
Last update: 11:20:45 OK

Units | History settings

Select:

- admin
 - Demo
 - John Patient_01
 - John Patient_02
 - John Hoffi_05
 - John Patient_04
 - Test
 - test_01
 - RTX2
 - Kulhanek_14_H
 - SG_Simona
 - New units
 - automatically added unit
 - automatically added unit
 - automatically added unit
 - automatically added unit
 - Android JJ
 - automatically added unit
 - automatically added unit
 - automatically added unit
 - Android2J
 - automatically added unit
 - automatically added unit
 - HSRS
 - HSRS_01
 - HSRS_02
 - KPZ
 - KPZ_K
 - KPZ_02
 - MPRO
 - MPRO_01
 - MPRO_02
 - MPRO_54
 - Group 2
 - Pla_01

Thank you!