



Review SMEs Continuous Open Call

PreCoMInd

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Virtuona

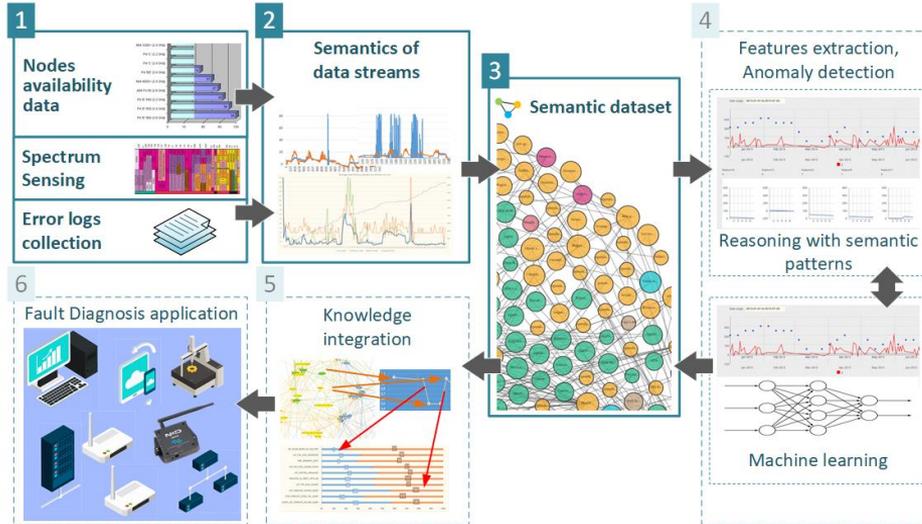
FEC8

Held Online, calling from Nis, Serbia

Outline

- **Experiment description (max. 4 slides)**
 - Concept and objectives
 - Background and motivation
 - Experiment set-up
- **Project results (max. 3 slides)**
 - Measurements
 - Lessons learned
- **Business impact (min. 4 slides)**
 - Impact on your business, .. how did Fed4FIRE helped you ?
 - Value perceived, .. why did you come to Fed4FIRE ?
- **Feedback (min. 4 slides)**
 - Used resources and tools
 - Added value of Fed4FIRE

Concept and objectives



(1) Heterogeneous data sources:

- spectrum sensing data,
- nodes availability data, and
- log files from computational nodes

(2) Algorithms for standardized semantic description of multi-modal data representations

(3) Semantic dataset as a new unified source of knowledge about operation of complex large-scale Industry 4.0 systems

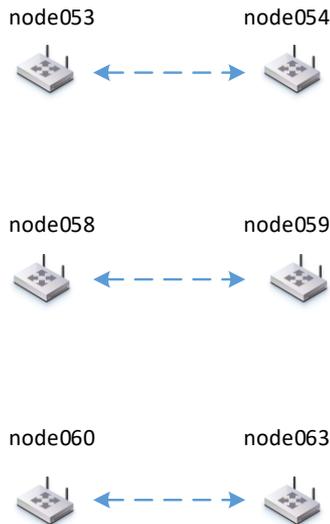
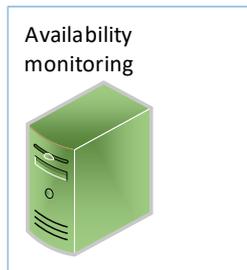
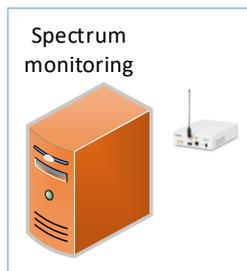
Background and motivation

- The goal is to integrate data collected on the Edge from:
 - testbed experiment, as well as
 - outside of the experiment.
- Run advanced AI algorithms on the Cloud
- If proven by the experiment, the PreCoMInd platform would be used for:
 - predictive maintenance,
 - spectrum and power usage,
 - automated security threat detection, etc.
- It would facilitate advanced analytics AI applications such that:
 - reporting,
 - optimization,
 - fault detection, and
 - cognitive predictive maintenance

Experiment set-up

imec

NITOS



- The goal is to integrate data collected from:
 - inside testbed experiment, and
 - outside of the experiment.
- Run advanced cloud AI algorithms
- If correlation is detected, the approach might be used for:
 - predictive maintenance,
 - spectrum and power usage,
 - automated security threat detection, etc.

TasorSCAS Project Edit View Help preclaimAppKB Language en preclaimd

Statement creator: search/drop subject x search/drop predicate x search/drop object x New

Home Browse SPARQL

Classes Properties

ActionLOG
http://87.117.203.34/virtdev_scas/resources/TemplateEditorAppType/RID6395ae90-ba64-11e8-b32a-00219879297

Testbed
 Software
 SysLogTag

Frequency
 TestbedDomain

Project Layers

Search for dataplace... Deselect all Select All

- rdfs
- http://193.190.127.248/preclaimd_scas/resources/preclaimAppKB_nameQueries
- http://www.w3.org/1999/02/22-rdf-syntax-ns
- http://87.117.203.34/virtdev_scas/resources/preclaimAppType
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- http://87.117.203.34/virtdev_scas/resources/preclaimd

Save as default Save Cancel

current resource: http://193.190.127.248/preclaimd_scas/resources/eded499e531_dataSeries

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<https://193.190.127.248/preclaimd/>

Semantic dataset integrates data about:
 Spectrum occupancy,
 Nodes turned on-off, and
 Testbed server log entries

Knowledge graph based reporting cloud application

FILTERS

Testbed

Spectrum frequency

Frequency 2.418
 Frequency 2.414
 Frequency 2.415
 Frequency 2.416
 Frequency 2.417
 Frequency 2.418
 Frequency 2.419
 Frequency 2.420
 Frequency 2.421
 Frequency 2.422
 Frequency 2.423
 Frequency 2.424

Node availability

Log entry type

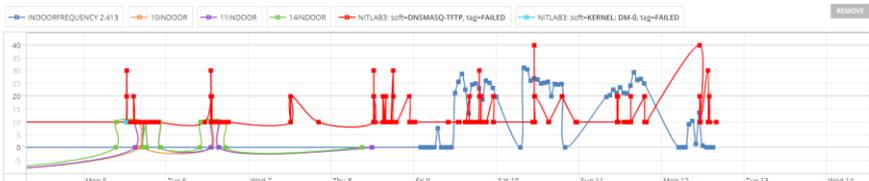
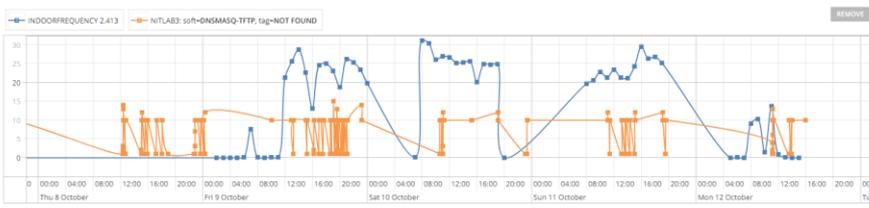
Search

(root)
 CMD
 log
 cannot
 dhcp
 epimd
 error
 failed
 file
 not found
 sens

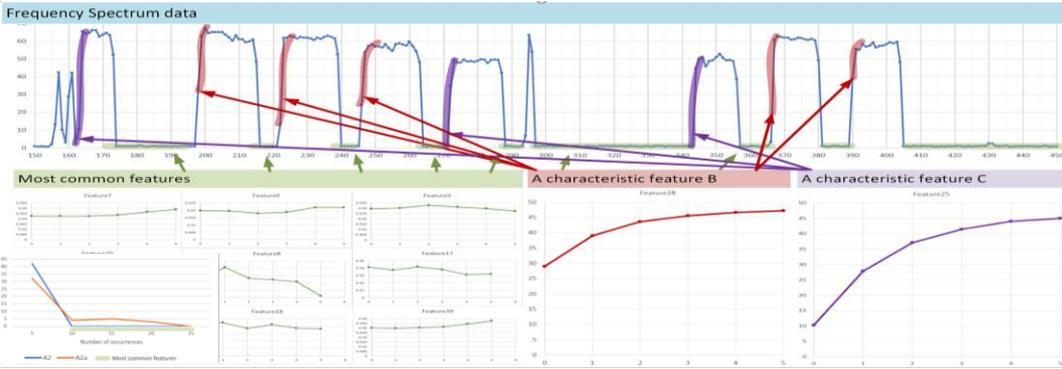
Log entry source

Search

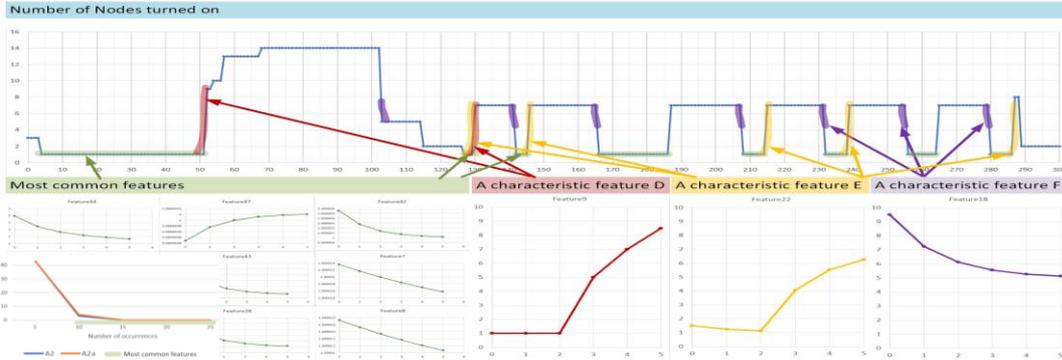
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 dnsmasq@dhcp
 dnsmasq@ltp
 EP001



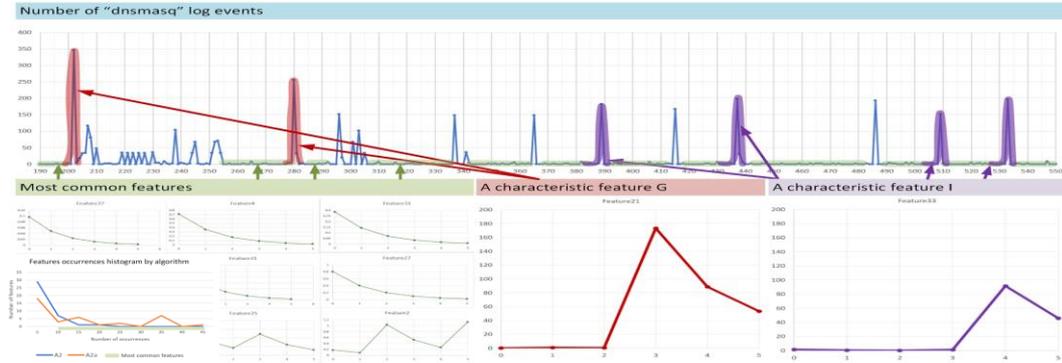
RESULTS: SEMANTIC DATASET & APP



Spectrum occupancy:
A data stream per channel

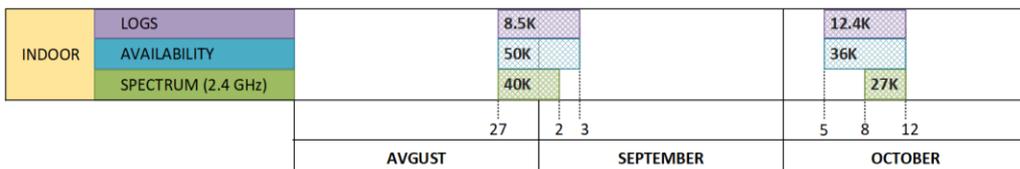


Features are detected in all data sources:
spectrum occupancy,
number of nodes turned on,
testbed server log entries

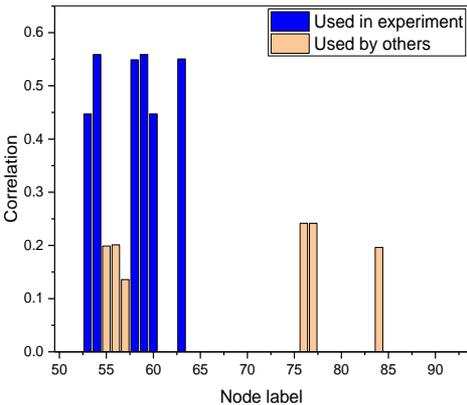


Characteristic vs. common features:
10 occurrences - a threshold

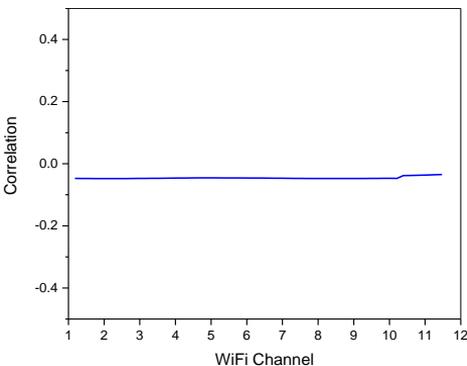
RESULTS: FEATURES DETECTION



Number of triplets in dataset imported from NITOS indoor testbed



High correlation coefficient between node status and spectrum occupancy



Low correlation between spectrum occupancy and tags and programs in testbed server log

Features detected in all data sources: the concept is proven

Additional data sources should be included to facilitate commercially more valuable results: power consumption, logs of individual devices

RESULTS: LESSONS LEARNED

Business impact - motivation



- Application to FED4FIRE+ due to:
 - Needs:
 - Prove the concept in a production-like environment
 - Verify the data interpretation and integration algorithms on heterogeneous data sources typical for Industry 4.0 systems
 - Opportunity:
 - Easy access to testbeds and help in experimentation
 - Unified and user-friendly testbed environment usage, including wireless networks together with cloud infrastructure.
 - Funding
 - Received funding significantly reduces development risks

Business impact – market position



- The FED4FIRE+ experiment enables us to:
 - Approach new markets:
 - Proven solution within 5G and Industry 4.0 markets opens doors for implementations in other markets such as:
 1. advertisement,
 2. media,
 3. financials, etc.
 - Straighten up our position on exiting markets:
 - Our current target market is manufacturing. This project opens adoption for our products for new customers.

Business impact – vertical integration

- The FED4FIRE+ provides infrastructure that matches target customer infrastructure:
 - in this way, our solution is proven in the target environment
- Vertical industry integration:
 - different technologies supported by testbeds in the FED4FIRE+ federation can be used in an integrated experiment as required by different verticals
 - shared process models could be helpful



Business impact – strengthening current position



- A large EU-funded project like FED4FIRE+ represents a reference point for other EU-based businesses
- Even though Industry 4.0 is not directly connected to 5G networks and FED4FIRE+ infrastructure, conceptually they all require cognitive solutions for management in the corresponding systems.
- Semantic approach to the complex infrastructure management, as proven in the networking FED4FIRE+ environment, represents the attractive solution in other industries as well, such as advertisement, manufacturing, marketing, etc.

- **Virtual Wall (imec):** Virtual Wall 2, 1x pcgen3 node
- **NITOS (UTH) Wireless/5G/IoT testbeds :** 6x ICARUS nodes with WiFi cards, 2x ICARUS nodes with USRP B210

FED4FIRE+
Used resources

FEEDBACK

- **Jfed** We were using Windows JFed client without any problems for Virtual Wall 2 experiments.
- **OMF tool** OMF was used to run experiments in NITOS. It was working correctly, as expected, except for one minor problem with user rights. However, the problem was solved quickly by NITOS staff.

FED4FIRE+
Used tools

FEEDBACK

Feedback: based on design/set-up/running your experiment on Fed4FIRE+



- Documentation for both testbeds was very detailed and clear.
- Setup of the experiment was easy and straightforward.
- The support of the Patron (NITOS) was valuable for the smooth execution of the experiment.

FEEDBACK

“We proved our concept in a production-like environment, proof-of-concept **reporting app** is developed, and **characteristic features** are successfully detected.

Additional data sources will be needed to facilitate commercially more valuable results.

The proposed solution represents **very attractive solution** in industries other than manufacturing, such as advertisement and marketing.”

Thanks to the
FED4FIRE+
experiment



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WWW.FED4FIRE.EU