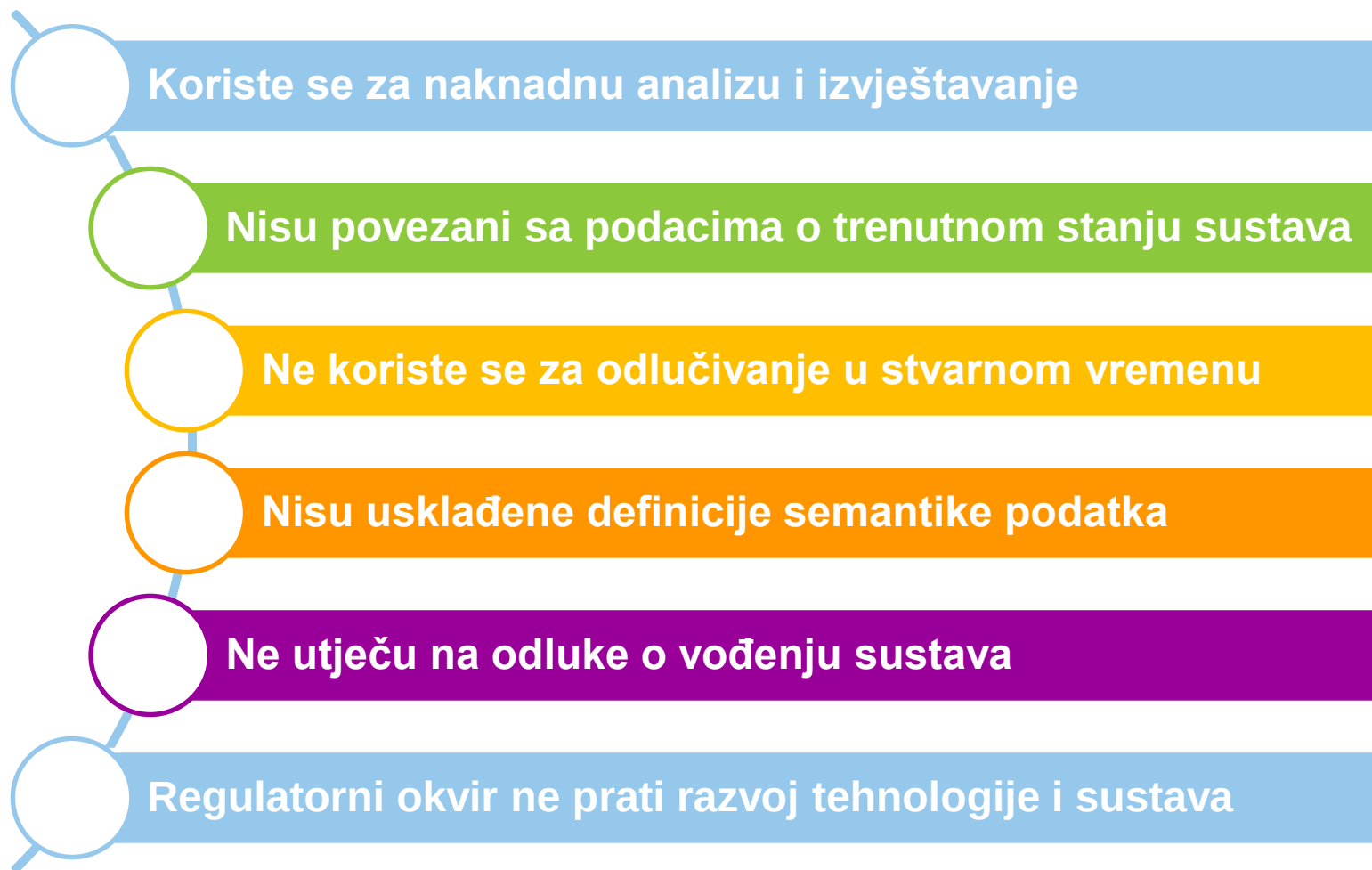


Sustav za upravljanje kvalitetom električne energije u stvarnom vremenu

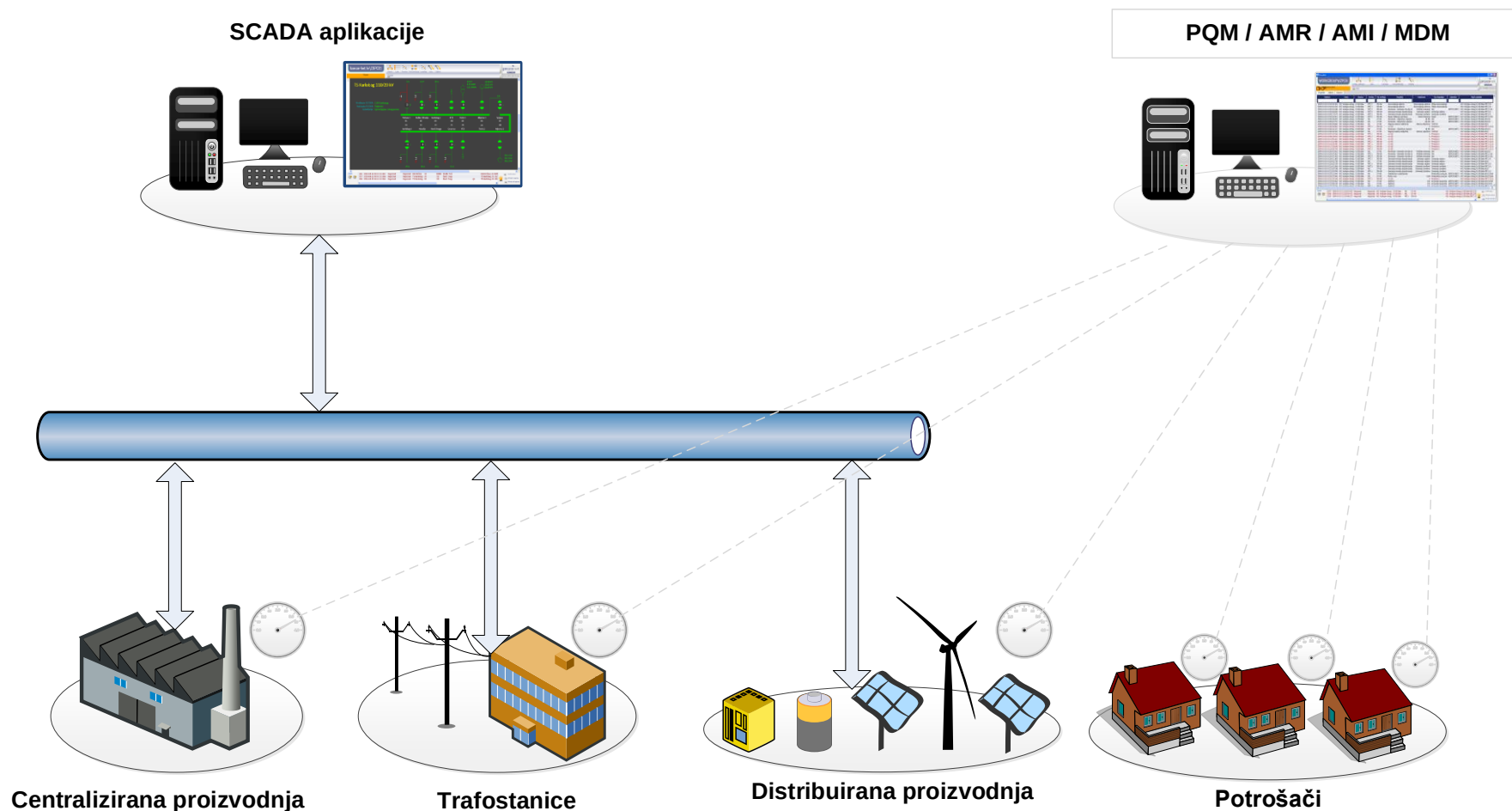
dr.sc. Stjepan Sučić
Ana Tomasović Teklić, dipl.ing.
Andrej Volčjak, dipl.ing.

Končar – KET d.d.
Končar – Institut za elektrotehniku d.d.
ISKRA d.o.o.

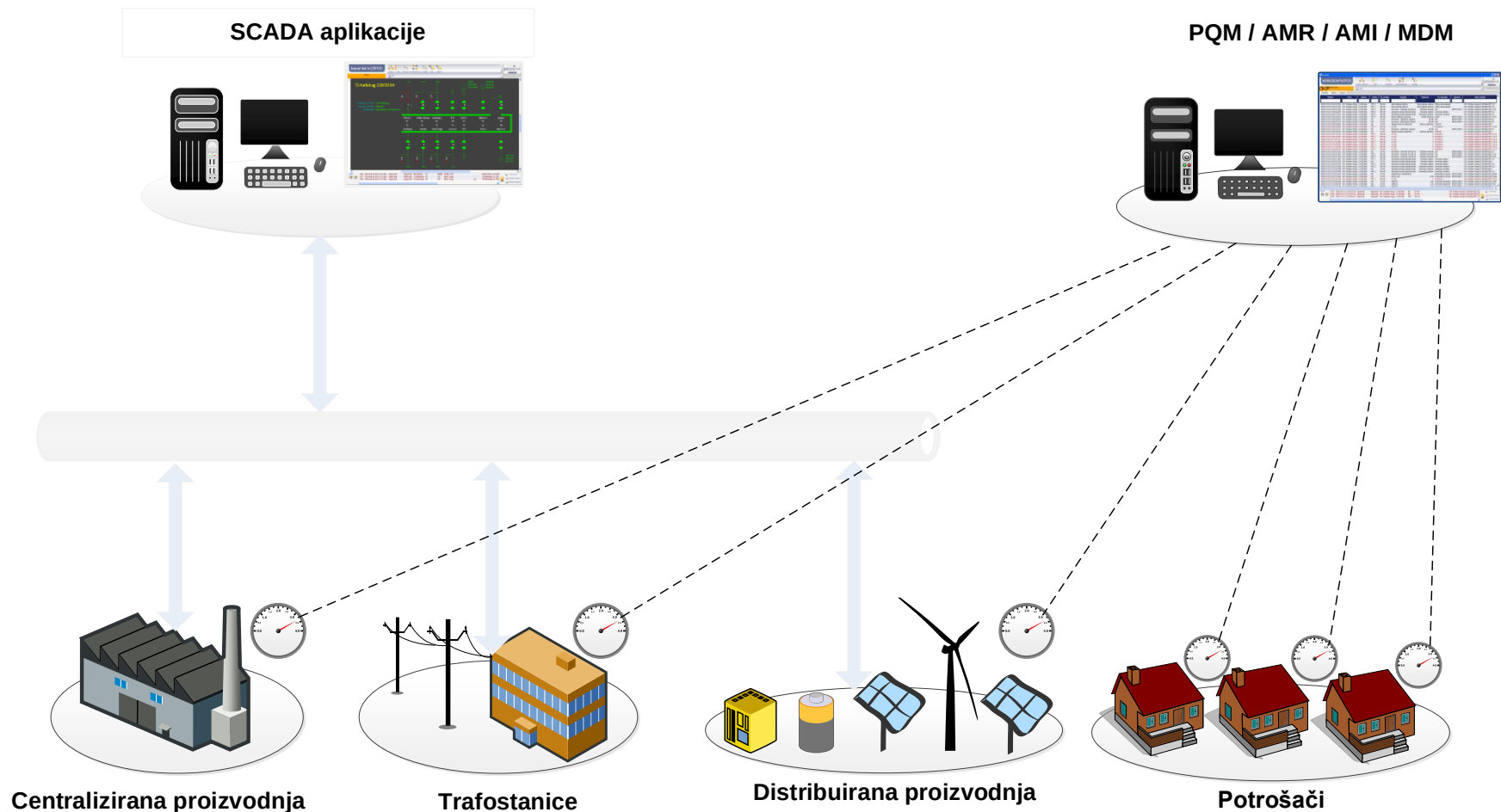
Izazovi podataka o kvaliteti električne energije



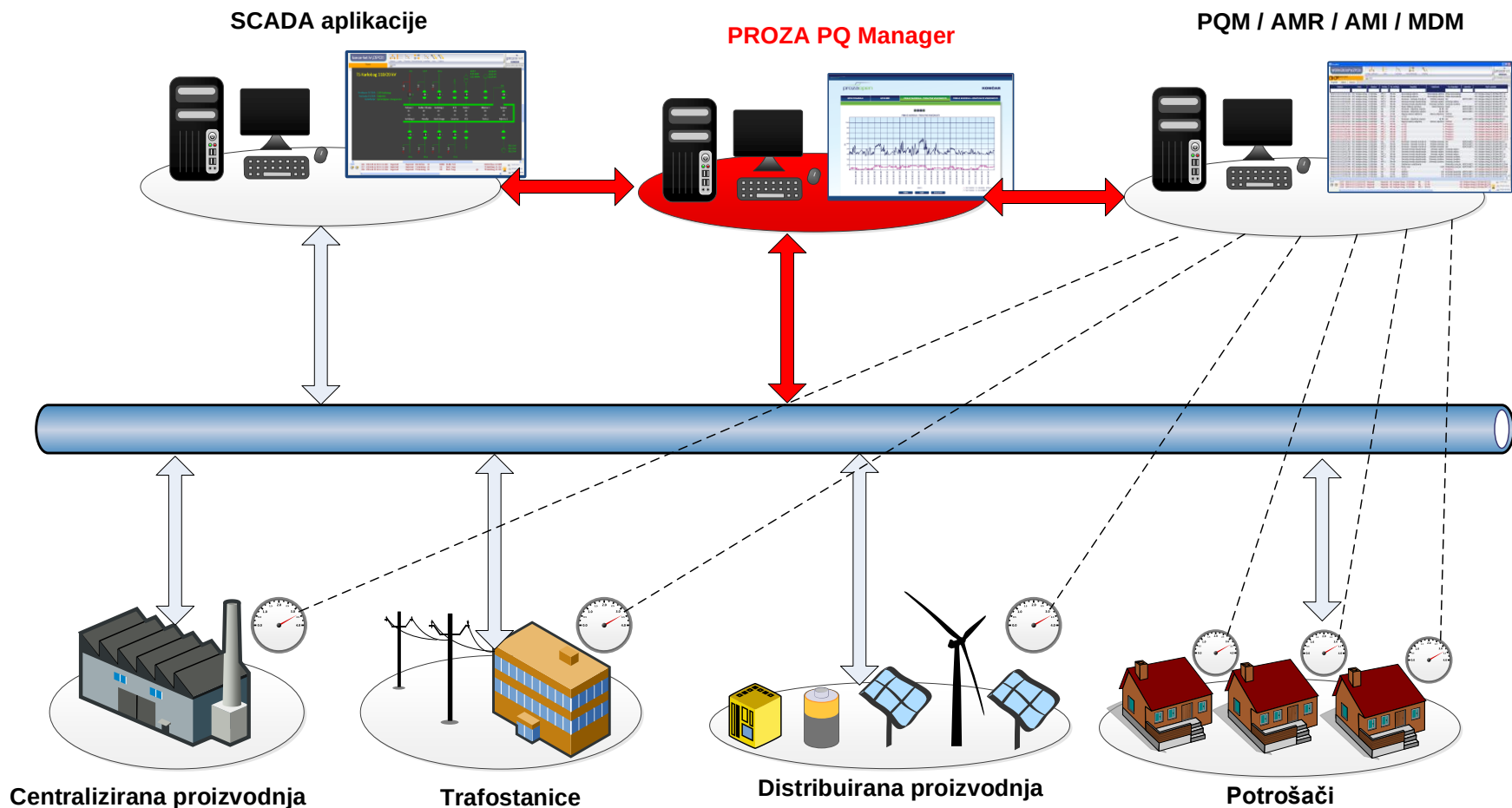
1. Podatkovni otok – Procesni podaci - SCADA



2. Podatkovni otok– Mjerni podaci – PQM i billing



PROZA PQ Manager – povezivanje podatkovnih otoka



PROZA PQ Manager vs. uobičajene PQ aplikacije

PROZA PQ Manager

Analiza u stvarnom vremenu

Prikupljanje na min rezoluciji

Veza sa SCADA podacima

Integritet podataka

Pomoć u odlučivanju

Utjecaj na vođenje procesa

Neovisnost o proizvođačima

Uobičajene PQ aplikacije

Cikličko prikupljanje

Nije povezano sa SCADA-om

Nije vezano uz vođenje sustava

Naknadna analiza

Naknadno izvještavanje

Nije povezano sa billingom

Vezano uz proizvođača

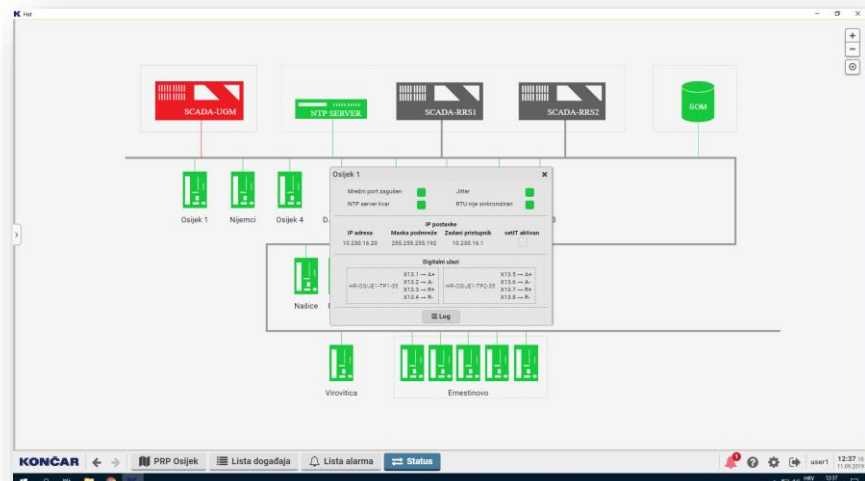


PROZA PQ Manager – Prikupljanje i analiza



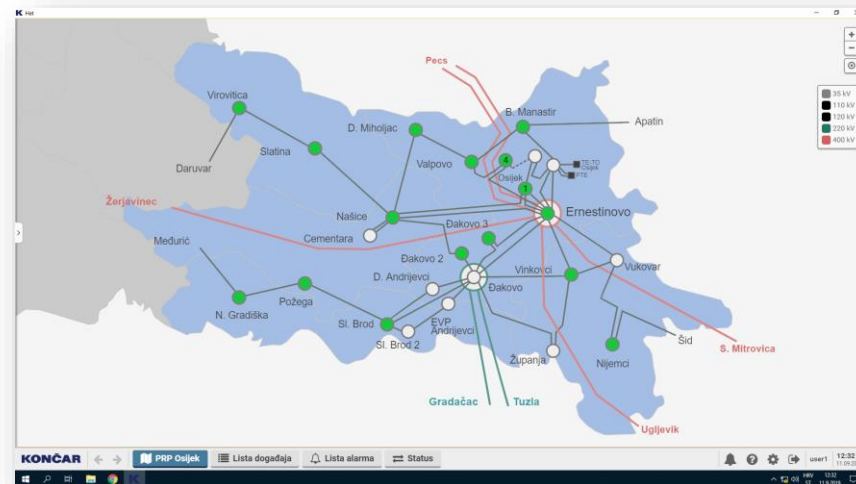
PROZA PQ Manager – Online konfiguriranje

- Online konfiguracija
 - Mreža
 - Uređaji
 - Vizualizacija
- Upravljanje sustavom
- Uređivanje vizualizacije



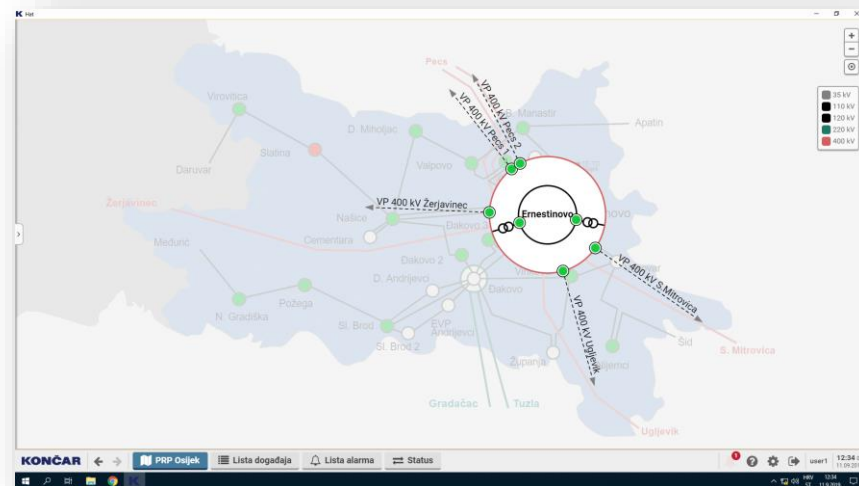
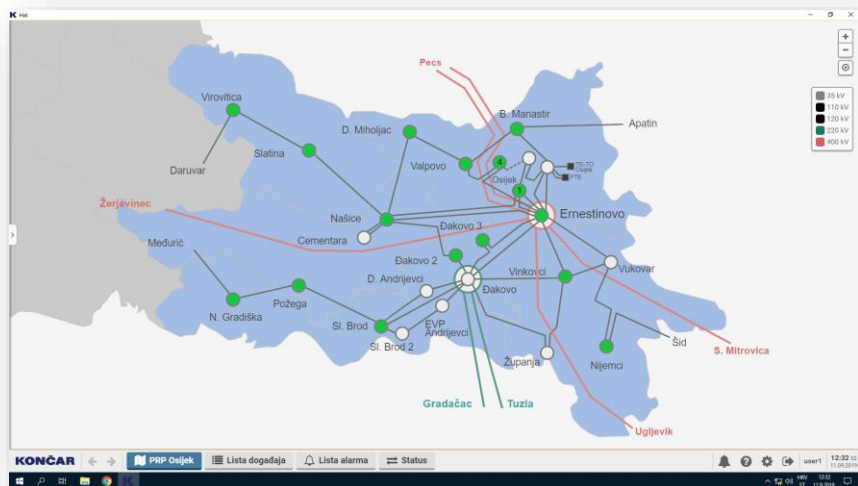
The screenshot displays the PROZA PQ Manager online configuration interface showing a table of events and alarms. The table has columns for 'Izorno vrijeme', 'Vrijeme', 'Stanica', 'Razl.', 'Ur.', 'Polje', 'Ime', 'Interval', 'Kategorija', 'Vrijednost', 'Status', and 'Display name'. The data rows show various events and alarms, including 'PREKORAČEN APR', 'NORMAL', and 'ALARM'.

Izorno vrijeme	Vrijeme	Stanica	Razl.	Ur.	Polje	Ime	Interval	Kategorija	Vrijednost	Status	Display name
2019-09-11 12:31:56.367						POTVRDA	5s	confirmed			
2019-09-11 11:15:00.000	2019-09-11 12:10:57.902	B. Manastr	35 kV	RTU01	TP1	A+ PREKORAČEN APR	15min	APR	2.1000000000000000	ALARM	HR-B-MANASTR-TP1
2019-09-11 11:30:00.000	2019-09-11 12:10:57.902	B. Manastr	35 kV	RTU01	TP1	A+ PREKORAČEN APR	15min	APR	1.0499999999999999	NORMAL	HR-B-MANASTR-TP1
2019-09-11 12:00:00.000	2019-09-11 12:02:57.783	Virovitica	110 kV	RTU01	Darugar	A- PREKORAČEN APR	15min	APR	0	NORMAL	HR-VIRODARUG-1
2019-09-11 12:00:00.000	2019-09-11 12:02:57.783	Slatina	35 kV	RTU01	TP1	A- PREKORAČEN APR	15min	APR	2.0999999999999999	NORMAL	HR-SLATIN-TP1-3
2019-09-11 11:45:00.000	2019-09-11 11:47:57.667	Valpovo	35 kV	RTU01	TP1	A+ PREKORAČEN APR	15min	APR	0	NORMAL	HR-VALPOV-TP1
2019-09-11 11:45:00.000	2019-09-11 11:47:57.667	Slatina	35 kV	RTU01	TP1	B+ PREKORAČEN APR	15min	APR	2.1000000000000000	NORMAL	HR-SLATIN-TP1-3
2019-09-11 11:45:00.000	2019-09-11 11:47:57.667	Virovitica	110 kV	RTU01	Darugar	A- PREKORAČEN APR	15min	APR	66	ALARM	HR-VIRODARUG-1
2019-09-11 11:30:00.000	2019-09-11 11:32:57.815	Slatina	35 kV	RTU01	TP1	A- PREKORAČEN APR	15min	APR	4.2	ALARM	HR-SLATIN-TP1-3
2019-09-11 11:30:00.000	2019-09-11 11:32:57.815	Valpovo	35 kV	RTU01	TP1	A+ PREKORAČEN APR	15min	APR	2.1000000000000000	ALARM	HR-VALPOV-TP1
2019-09-11 11:30:00.000	2019-09-11 11:32:57.815	Slatina	35 kV	RTU01	TP1	B+ PREKORAČEN APR	15min	APR	4.2	ALARM	HR-SLATIN-TP1-3
2019-09-11 11:30:00.000	2019-09-11 11:10:57.742	Ernestinovo	110 kV	RTU05	TP1	A+ PREKORAČEN APR	15min	APR	165	ALARM	HR-ERNES-TP1-1
2019-09-11 10:45:00.000	2019-09-11 11:10:57.742	Ernestinovo	110 kV	RTU05	TP1	A+ PREKORAČEN APR	15min	APR	16.5	NORMAL	HR-ERNES-TP1-1
2019-09-11 10:45:00.000	2019-09-11 11:10:57.742	Dakovo 3	110 kV	RTU01	TP2	A- PREKORAČEN APR	15min	APR	16.5	ALARM	HR-DJAK3-TP2-1
2019-09-11 11:00:00.000	2019-09-11 11:10:57.742	Dakovo 3	110 kV	RTU01	TP2	A- PREKORAČEN APR	15min	APR	9.8999999999999999	NORMAL	HR-DJAK3-TP2-1
2019-09-11 11:00:00.000	2019-09-11 11:02:57.662	Slatina	35 kV	RTU01	TP1	B+ PREKORAČEN APR	15min	APR	2.1	NORMAL	HR-SLATIN-TP1-3
2019-09-11 10:45:00.000	2019-09-11 10:47:57.576	Nijmci	35 kV	RTU01	TP1	B- PREKORAČEN APR	15min	APR	1.0499999999999999	NORMAL	HR-NIJMAC-TP1-C
2019-09-11 10:45:00.000	2019-09-11 10:47:57.576	Slatina	35 kV	RTU01	TP1	B+ PREKORAČEN APR	15min	APR	4.2	ALARM	HR-SLATIN-TP1-3
2019-09-11 10:45:00.000	2019-09-11 10:47:57.576	Slatina	35 kV	RTU01	TP1	A- PREKORAČEN APR	15min	APR	2.1	NORMAL	HR-SLATIN-TP1-3
2019-09-11 10:30:00.000	2019-09-11 10:32:57.601	Nijmci	35 kV	RTU01	TP1	B- PREKORAČEN APR	15min	APR	2.1000000000000000	ALARM	HR-NIJMAC-TP1-C
2019-09-11 10:30:00.000	2019-09-11 10:32:57.601	Slatina	35 kV	RTU01	TP1	A- PREKORAČEN APR	15min	APR	4.2000000000000000	ALARM	HR-SLATIN-TP1-3
2019-09-11 06:45:00.000	2019-09-11 10:10:57.658	Dakovo 2	35 kV	RTU01	TP1	B+ PREKORAČEN APR	15min	APR	4.2000000000000000	ALARM	HR-DJAK2-TP1



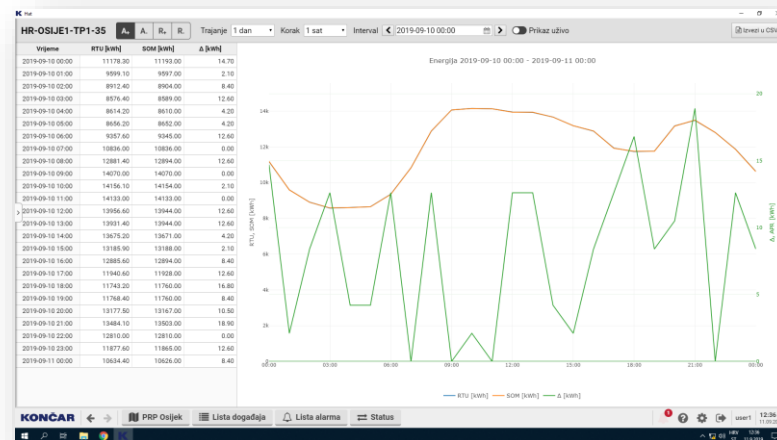
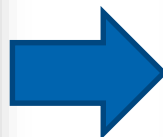
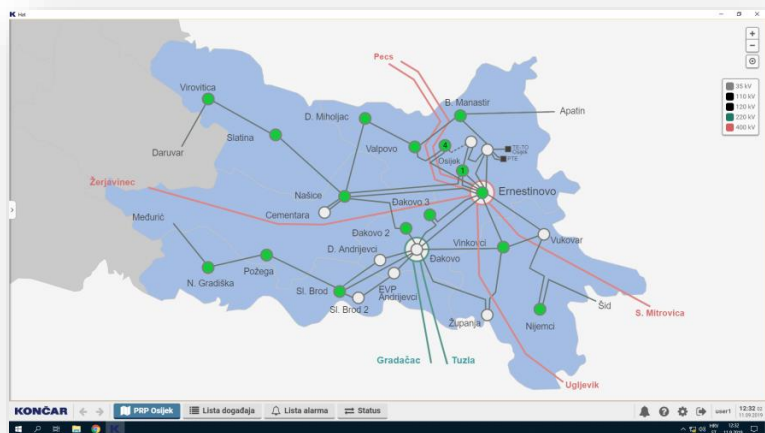
PROZA PQ Manager – Vizualizacija

- Web sučelje
- Prilagodba i personalizacija
- RBAC integracija
- IEC 62443 Cyber Security
- Podrška za GIS



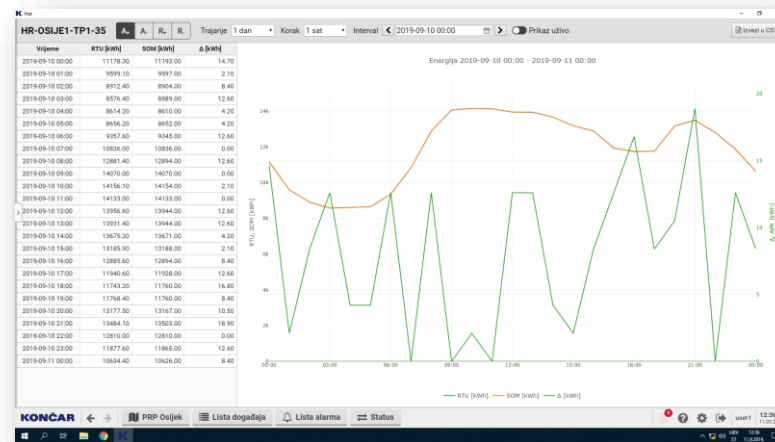
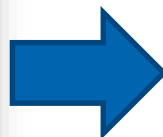
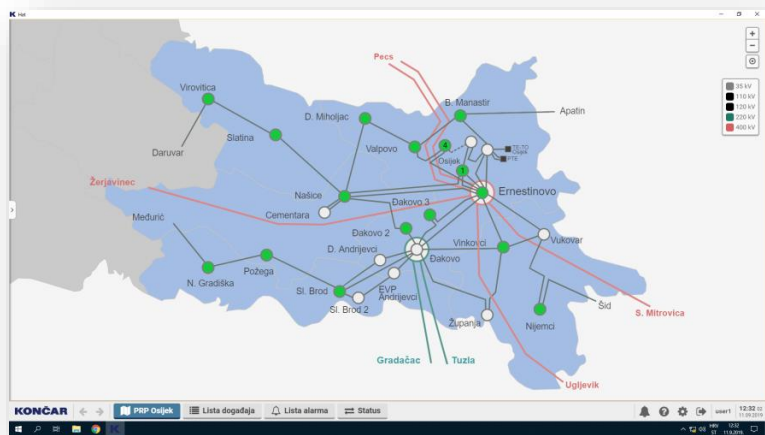
PROZA PQ Manager – Analiza i izračun

- Analiza kvalitete u stvarnom vremenu
- Jednostavno prototipiranje algoritma
- Skriptiranje u Python programskom jeziku
- Podrška za više platformi (Windows i Linux)



PROZA PQ Manager – Povezivost

- Prikupljanje podataka: IEC 61850, IEC 104, DLMS, Modbus, etc.
- CIM-compliant: IEC 61970, IEC 61968, CGMES
- Obrada velikih skupina podataka (Big Data Analytics)
- Napredne analize: IBM Cognos, Gurobi Solver, etc.



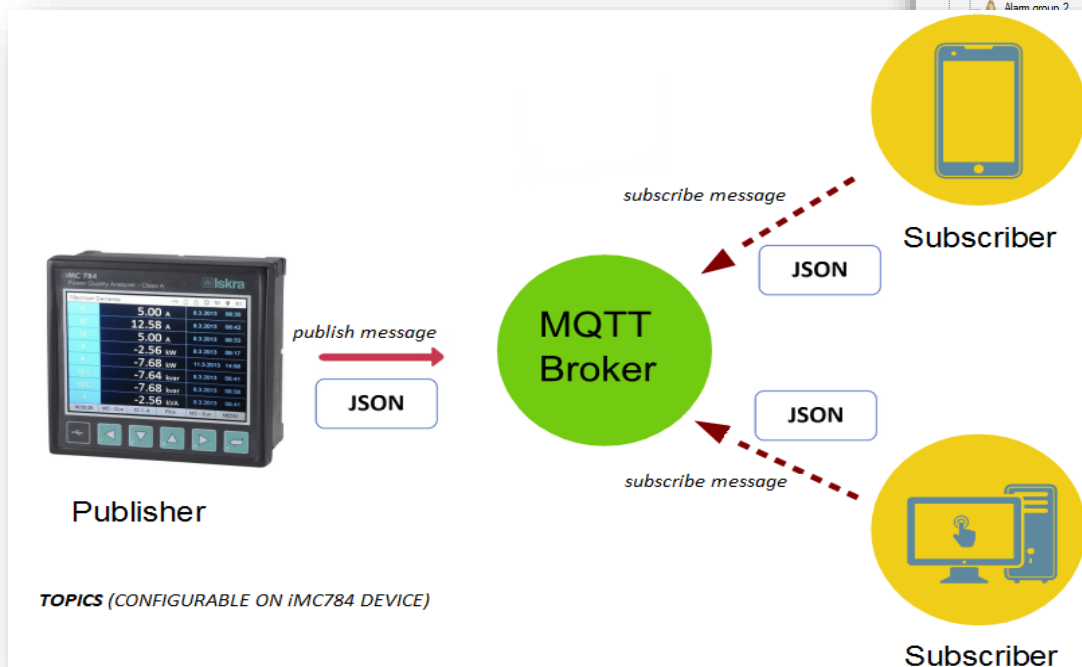
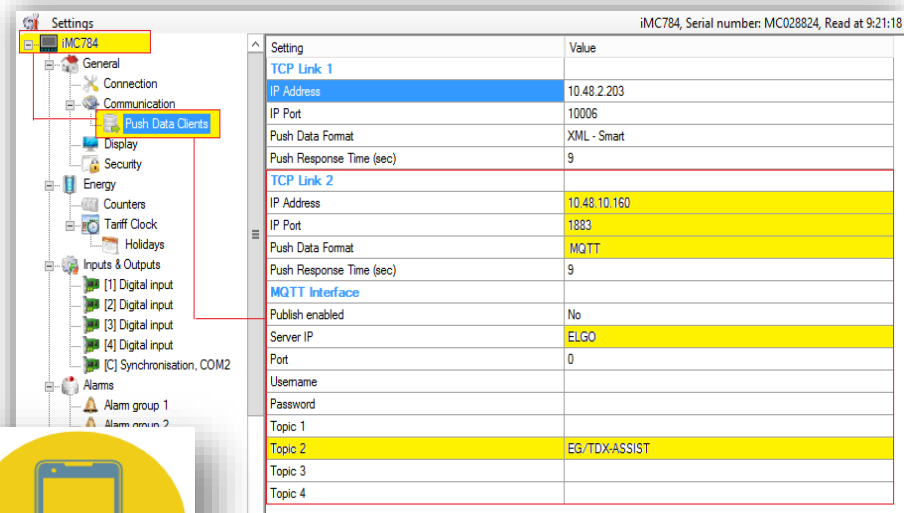
Praktična primjena – TDX-ASSIST (H2020)

- 3 godine, 4M€, RIA
- Međudjelovanje i povezivanje TSO i DSO
 - CGMES i CIM (IEC 61970 / IEC 61968)
 - Cyber Security: IEC 62443 i IEC 62351
 - Tržište električne energije (IEC 62325)
 - IEC 61850-90-17 (kvaliteta električne energije)
 - Skalabilnost SCADA aplikacija



Praktična primjena – TDX-ASSIST (H2020)

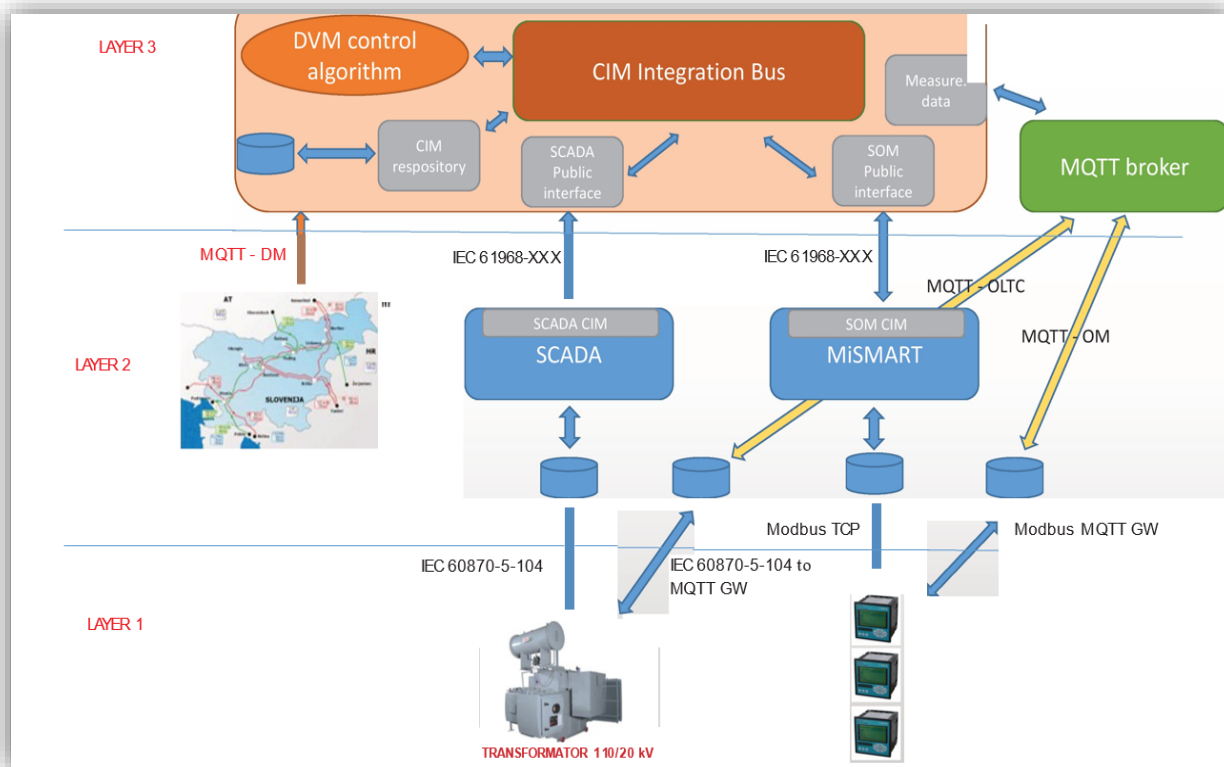
- iMC784 PQ uređaj
- PQ u stvarnom vremenu
- M2M protokol - MQTT



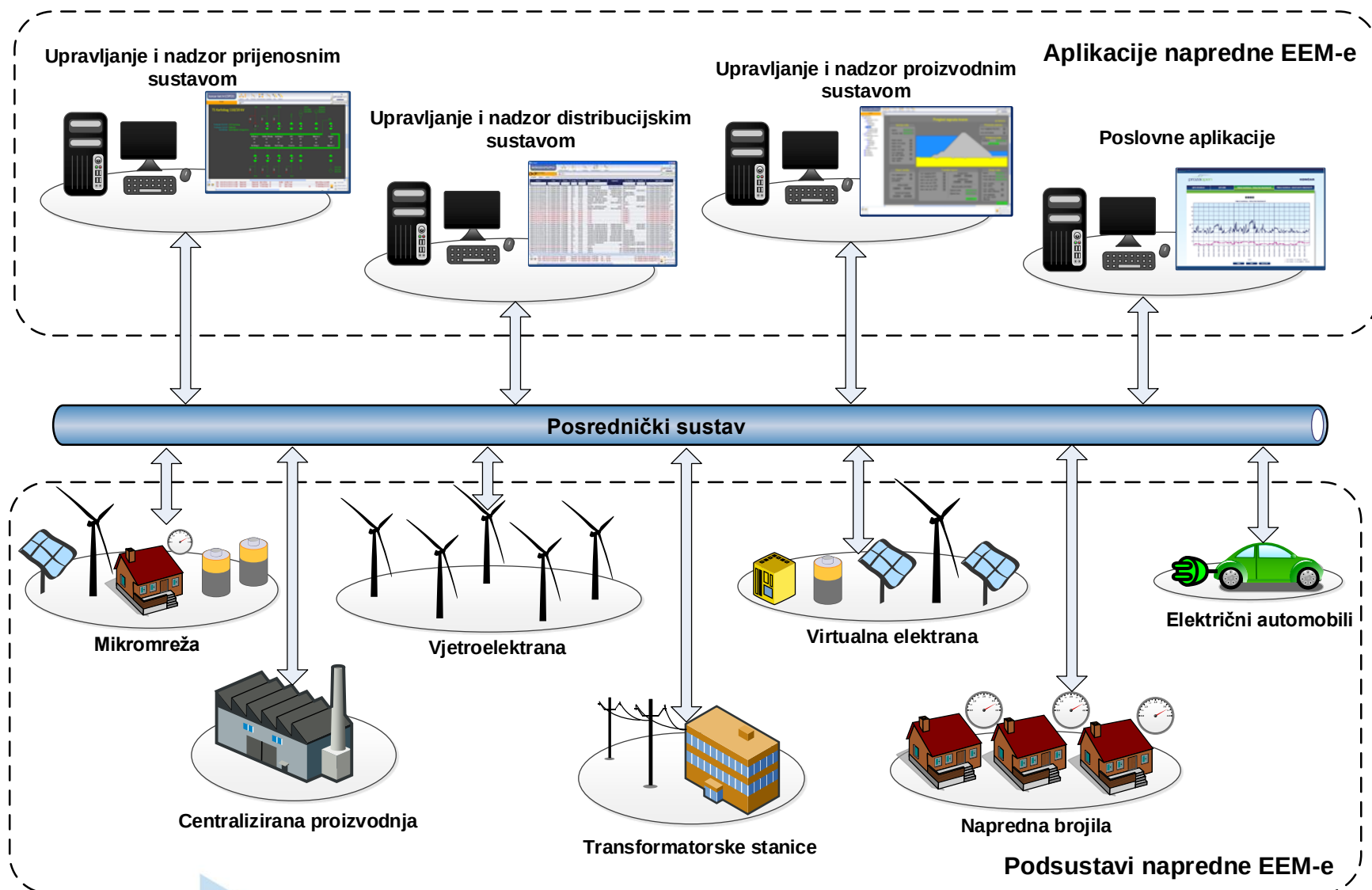
KONČAR

Praktična primjena – TDX-ASSIST (H2020)

- ISKRA - ELES - Elektro Gorenjska d.d. (pilot projekt)
- Control Voltage Regulation (CVR)
- MiSmart – MQTT – izbjegnuta problem sa Firewall-om



Digitalna transformacija EES-a



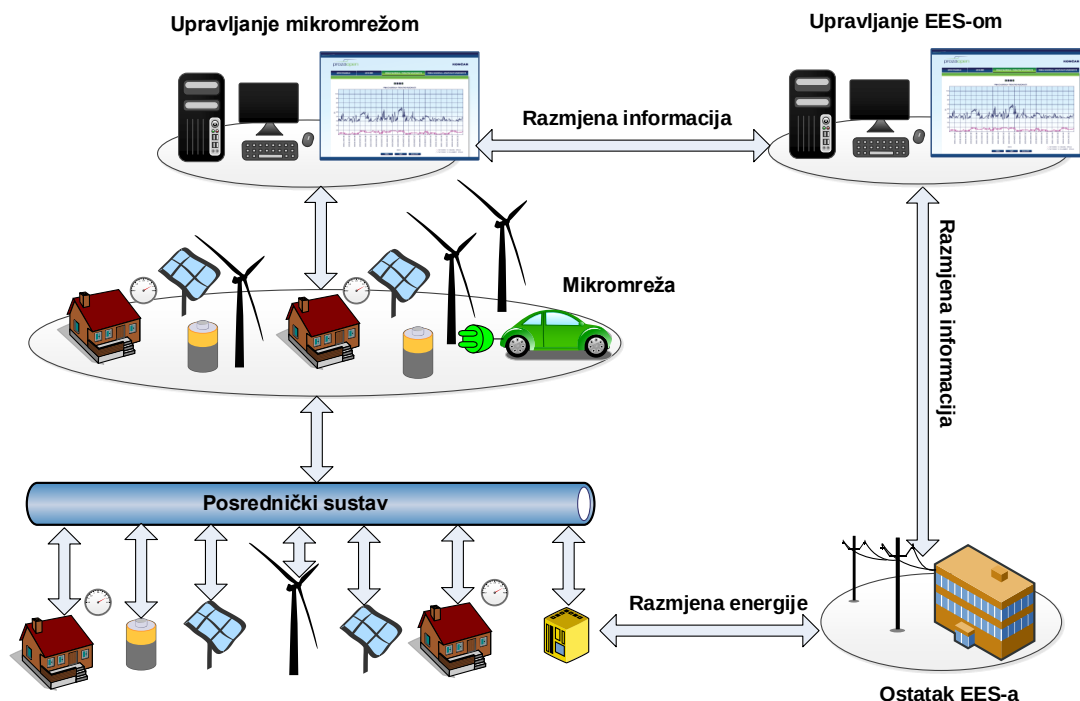
PROZA PQ Manager nije SCADA nego SCADA !

- **SCADA** - Supervisory Control and Data **Analysis**
- Pametni SCADA sustavi
- PQ i mjerenja postaju dio **procesnih podataka**
- **Kontinuirano** praćenje svih aspekata sustava
- **Napredne analize** velikih skupina podataka
- Dodatna vrijednost i **transparentnost** za kupca
- **Neovisnost** o proizvođaču PQ uređaja
- Podrška za normu **IEC 61850-90-17**

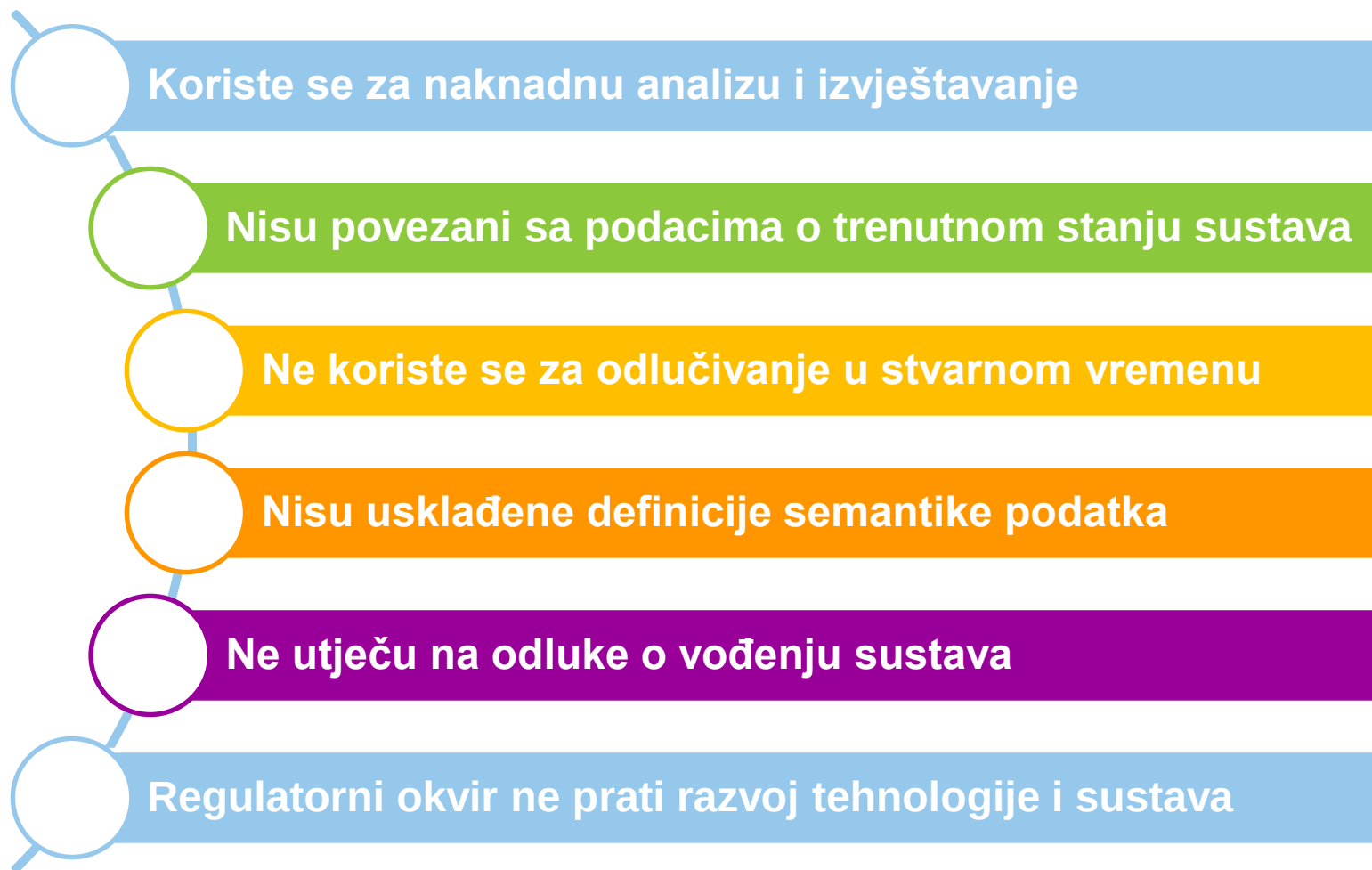


PROZA PQ Manager - Spremni za nove izazove EES-a

- **Decentralizacija** proizvodnje u DSO razini
- **Kibernetička sigurnost** (IEC 62443-2-4)
- DSO i TSO **suradnja** na SCADA razini
- CIM za DSO
- CGMES za TSO
- Automatsko izvještavanje o kvaliteti električne energije
 - Mail, SMS, App
- **Vezivanje s pogonskim događajima**



Izazovi podataka o kvaliteti električne energije



Kako PROZA PQ Manager pomaže?



KONČAR



KONČAR