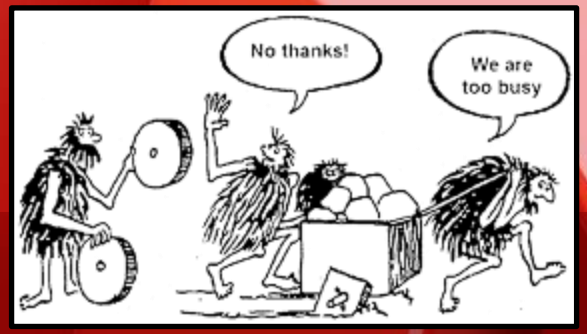


Efficiency trough automation

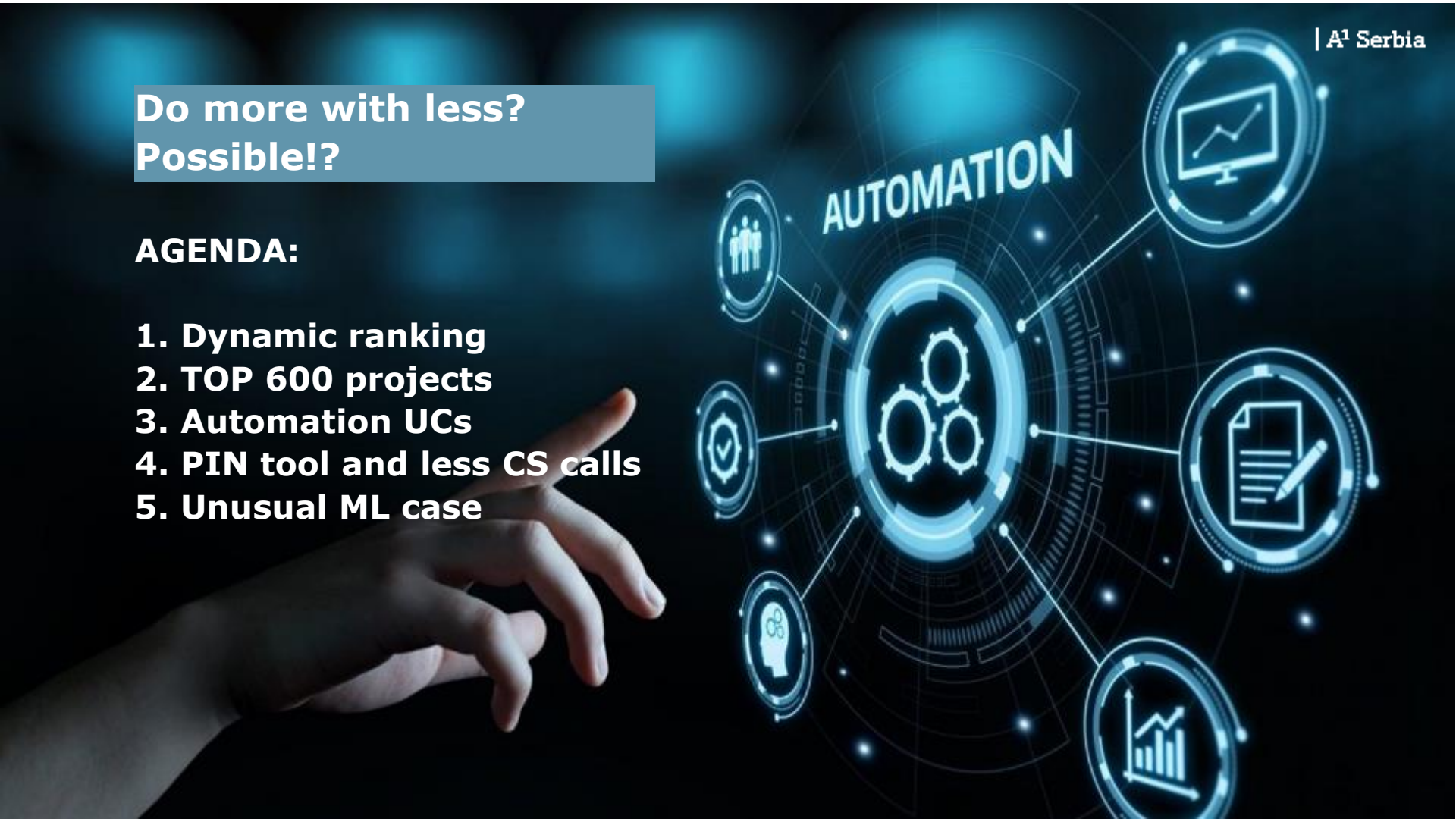
27.11.2024.
Đorđe Dubaić
Head of NSOC and OSS team

| A1 Serbia

Do more with less? Possible!?

AGENDA:

1. Dynamic ranking
2. TOP 600 projects
3. Automation UCs
4. PIN tool and less CS calls
5. Unusual ML case

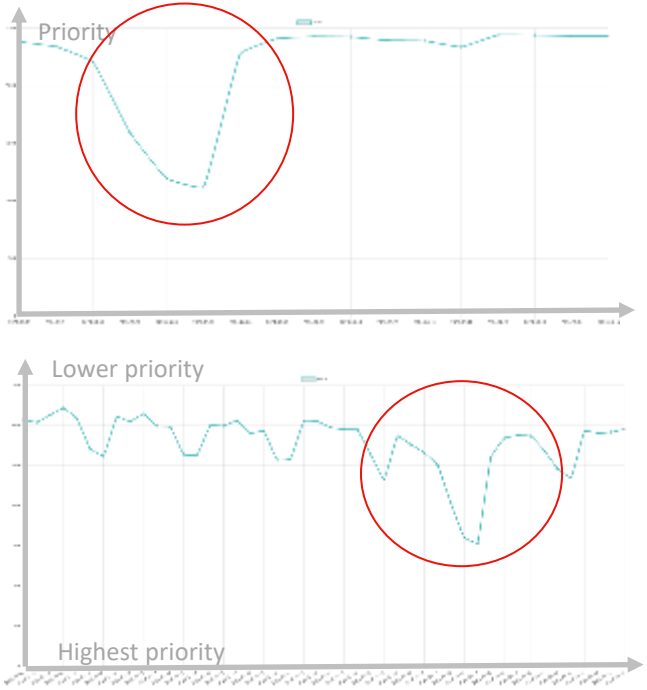


Dynamic ranking

Dynamic Ranking: Key Elements

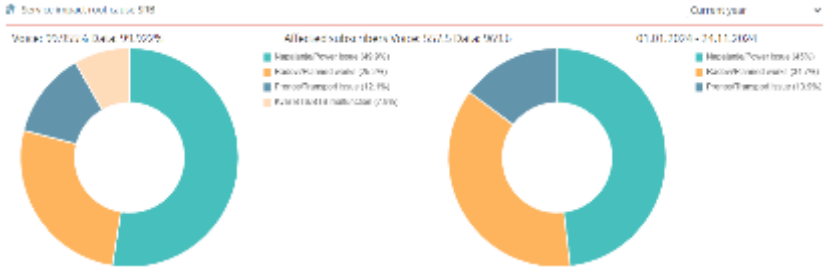
- **Traditional base station ranking:** manual, periodical, fix value of site rank
- **What is Dynamic Ranking?**
  A methodology that combines **service availability** as a core parameter with additional metrics to dynamically rank base stations.
- **How is it created?**
  The initial score, based on service availability, is blended with parameters such as user count, voice and data traffic, road impact (road IA/IB), and dependent sites to form the final rank.
- **How does it work?**
  Parameters are weighted with specific scores, averaged to determine the station's rank, enabling precise prioritization and resource allocation.
- **Why is it important?**
  It enables better SLA definition and optimizes field service dispatch, directly enhancing service availability and customer satisfaction.
- **Outcome:**
  More efficient network management, reduced downtime, and improved user experience.

Example: event site
Guča Trumpet Festival 2-4 Aug

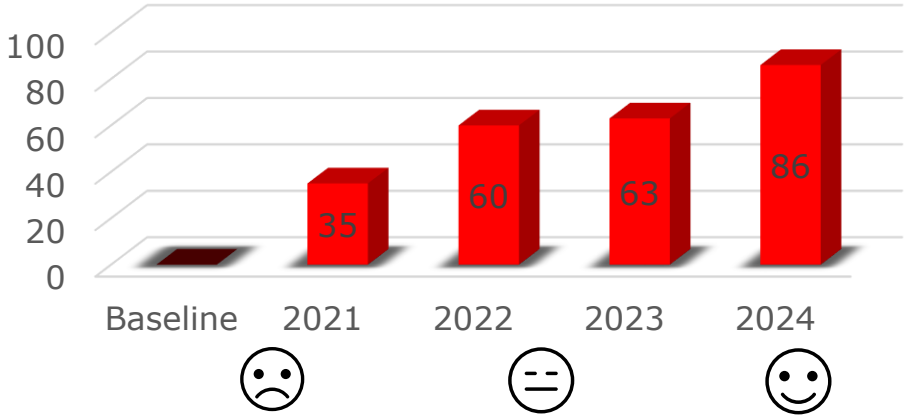


Draft for internal discussion

What is Top 600 project?



Growth in Battery Backup Time(%)



- All base stations in our network were ranked based on negative impact to user experience
- The **Top 600** project is about 600 most critical base stations based on **service availability**.
- The goal is to ensure that these stations are fully optimized and prepared for all scenarios
- It's an innovative method for analyzing and improving service availability for end users.

This includes:

- **24/7 accessibility** for maintenance teams,
- Adequate **battery backups** to sustain longer outages,
- **Standby diesel generators** and **solar panels** for additional energy resilience.

- Once the Top 600 stations are fully optimized, the focus will shift to the next set of 600 ranked stations.

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Draft for internal discussion

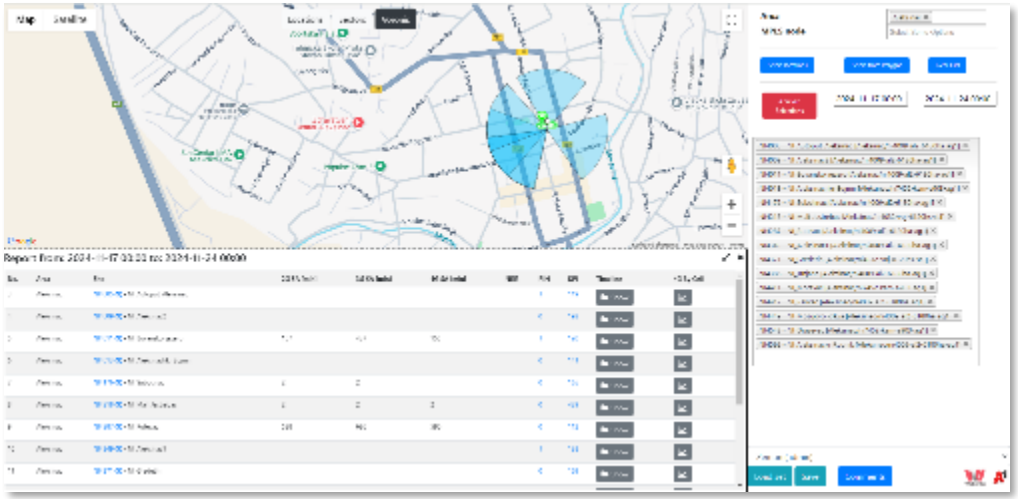
From data to reactive and preemptive plans

- **Analysis of Historical Data:**
  The platform identifies base stations with frequent outages.
  By combining this data with network topology and battery system parameters, priority lists of locations for intervention are generated.

- **Defining Action Plans:**
  Task force teams (planning and operations) utilize data from the platform to create targeted action plans, for example:

  - Modifying transmission paths to improve reliability
  - Adding additional power supplies and expanding battery backups.

- **Rapid Problem Resolution:**
  Frequent issues are detected much faster than was previously possible.



The focus is on resolving problems in areas with the most affected users, thereby improving overall network reliability.

Automated algorithms as facilitator for SMART CAPEX

The platform automatically suggests priorities and potential candidates for investment, facilitating a **smart CAPEX approach** investing where it will have the greatest impact on user experience.

For example, battery backups are enhanced or replaced in areas with frequent power outages, with specific attention on base stations that affects service availability and thus consumer experience.

Draft for internal discussion

Automation use cases

Automation Complexity

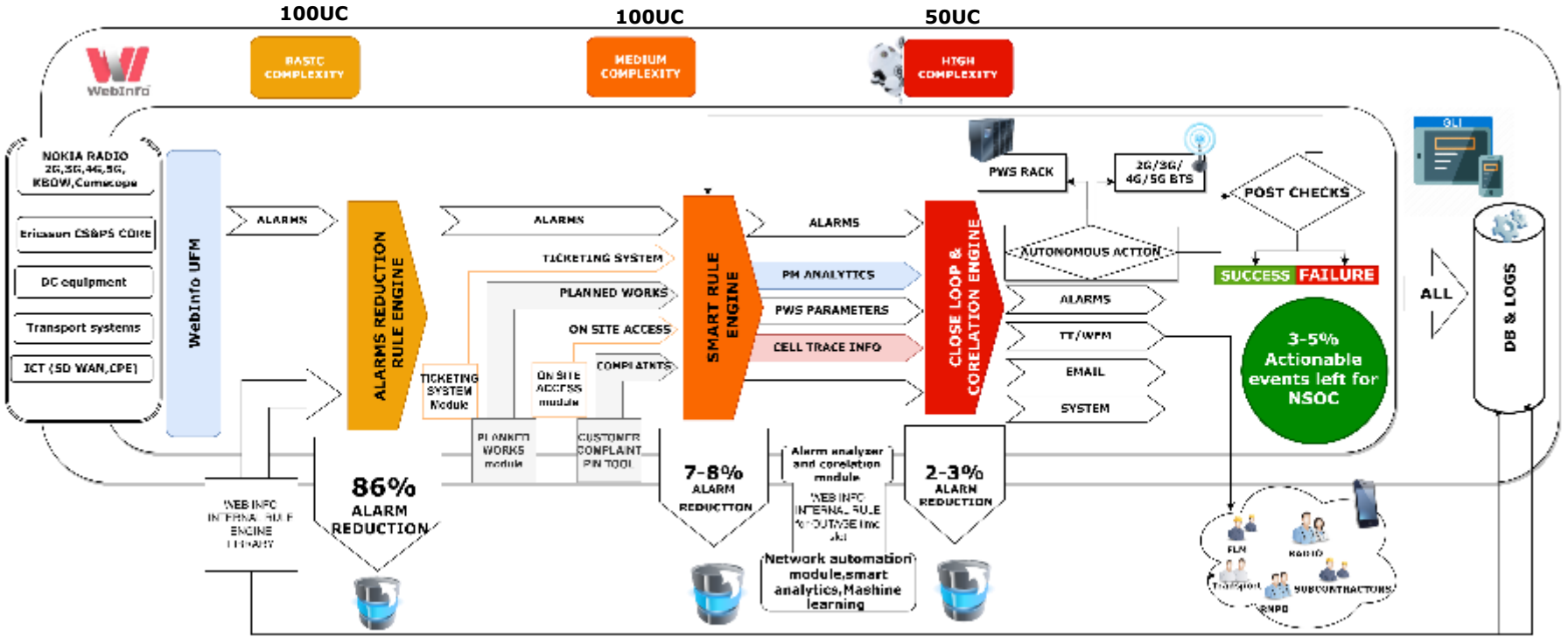
Draft for internal discussion

- **Basic complexity – Alarm Reduction:** The basic level of automation uses rules that automatically recognize and temporarily ignore less critical alarms. This makes the alarm list more manageable and allows specialists to focus on more critical issues. These basic rules can reduce over 80% of alarms, making them essential for efficient alarm management tasks.

- **Medium complexity – Auto Ticket Creation and Assignment:** The medium level of automation - more advanced rules that not only filter alarms but also automatically create and assign tickets for tracking. These rules correlate with planned network activities as well as reduce the need for manual checks by NSOC specialists.

- **High complexity – Auto Resolution, Closed Loop:** The highest level of automation includes tools that independently take or suggest actions after checking with other systems. These tools can autonomously communicate to base stations based on alarms, suboptimal KPIs, or customer complaint, ensuring comprehensive network management.

Automation model



Draft for internal discussion

Top 3 UCs:

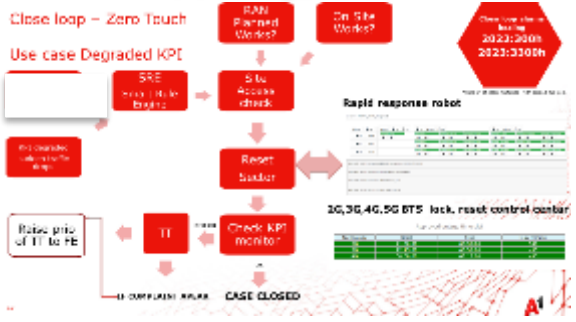
VSWR Alarm Handling and Escalation:

- Automated resets address VSWR alarms efficiently, reducing unnecessary field service dispatches, and if self-healing does not resolve the issue—often due to persistent physical antenna problems—the system automatically generates a ticket, ensuring the alarm is escalated to the appropriate maintenance team for further action.

Smart Temperature Management

- In telecom infrastructure, particularly during summer, managing temperature alarms with precision is key. Sensors often trigger at 35°C, yet equipment can tolerate up to 45°C. A smart rule engine, updating every 10 minutes, is crucial not just for equipment safety, but also to ensure field teams receive accurate, meaningful alerts, avoiding overload with false alarms.

KPI management



- We intend to showcase a self-healing system that addresses not only alarms but also autonomously corrects degraded KPIs, enhancing network resilience and operational efficiency.
- **KPI Monitoring & Degradation Detection**: The system continuously monitors (KPIs) for anomalies such as zero voice/data traffic periods and sudden decreases in voice traffic or call duration.
- **Automated Precheck & Action Initiation**: Upon detecting three consecutive raw samples indicating KPI degradation, Rapid Robot initiates prechecks and automatically performs corrective actions such as module resets, site resets, or power resets between 7 AM and 10 PM.

Draft for internal discussion

PIN tool and less CS calls

WebInfo PIN tool

- "Pin" the complaint to the map: Geocoding complaints concerning network coverage and quality in real time
- Integration with CRM, Atoll, GIS – thus providing to CS agent info about coverage, current issues on his location and so on
- Improving first call resolution and decreasing number of calls to CS

RAPID RESPONSE ROBOT:

- Raising alarms based on geo-proximity of complaints
- Raising alarms based on same type of complaints

Decreased number of calls to CS for NTW issues with proactive alerting

2023: 50%

Increased First call resolution for customer complaints in CS

2021: 22%

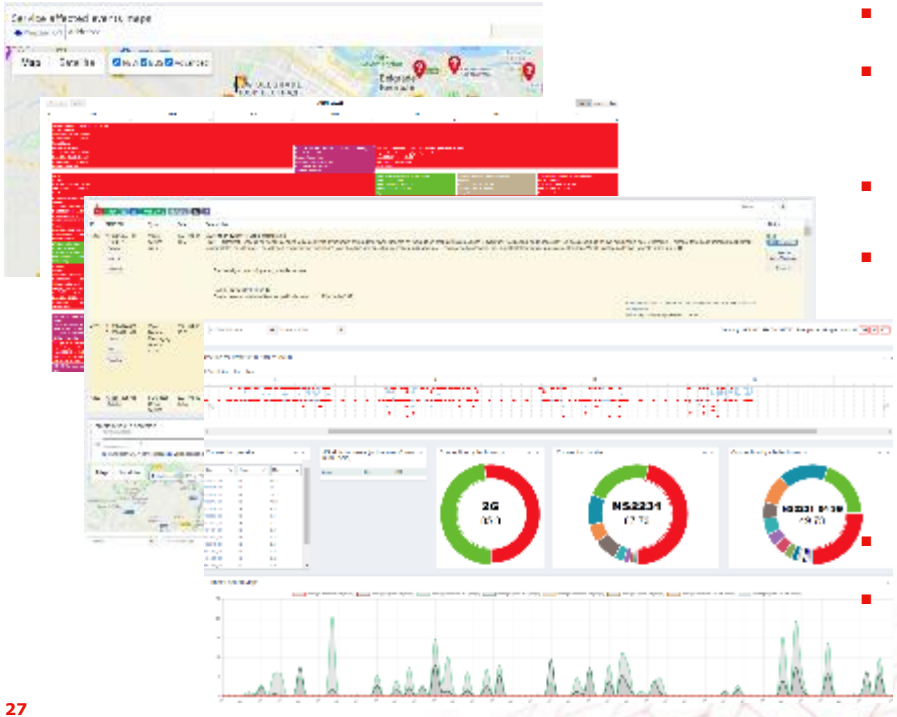
2022: 35%

2023: 40%

Draft for internal discussion

PIN module as joint cross domain effort for better AHT

CS New PIN | Planned work cross comparison | R³ Process | Technical dept. | Customer feedback



- CS receive complaint for NTW
- Check dashboard! No outage? PIN the complaint to the map!
- Regulate process with question templates
- CS motivated to use because of good technical feedback
  - Correlation with all current work in NTW
  - Coverage predictions
  - All technical data about customer in one placeless tickets to second level.
- R3 trace MSISDN, locate Base station with bad KPI
- Reset station, first give auto feedback

Draft for internal discussion

Unusual ML case

Planned power outages detection (machine learning project)

55% of all outages related to power !

40% power failures due to planned works ED !

- What we have: 30 power company web sites with no structure and difficult to search
- The only curently available method is reading all the websites and comparing info with our sites locations
- What we need: structured geolocation data of planned power outages from different sources

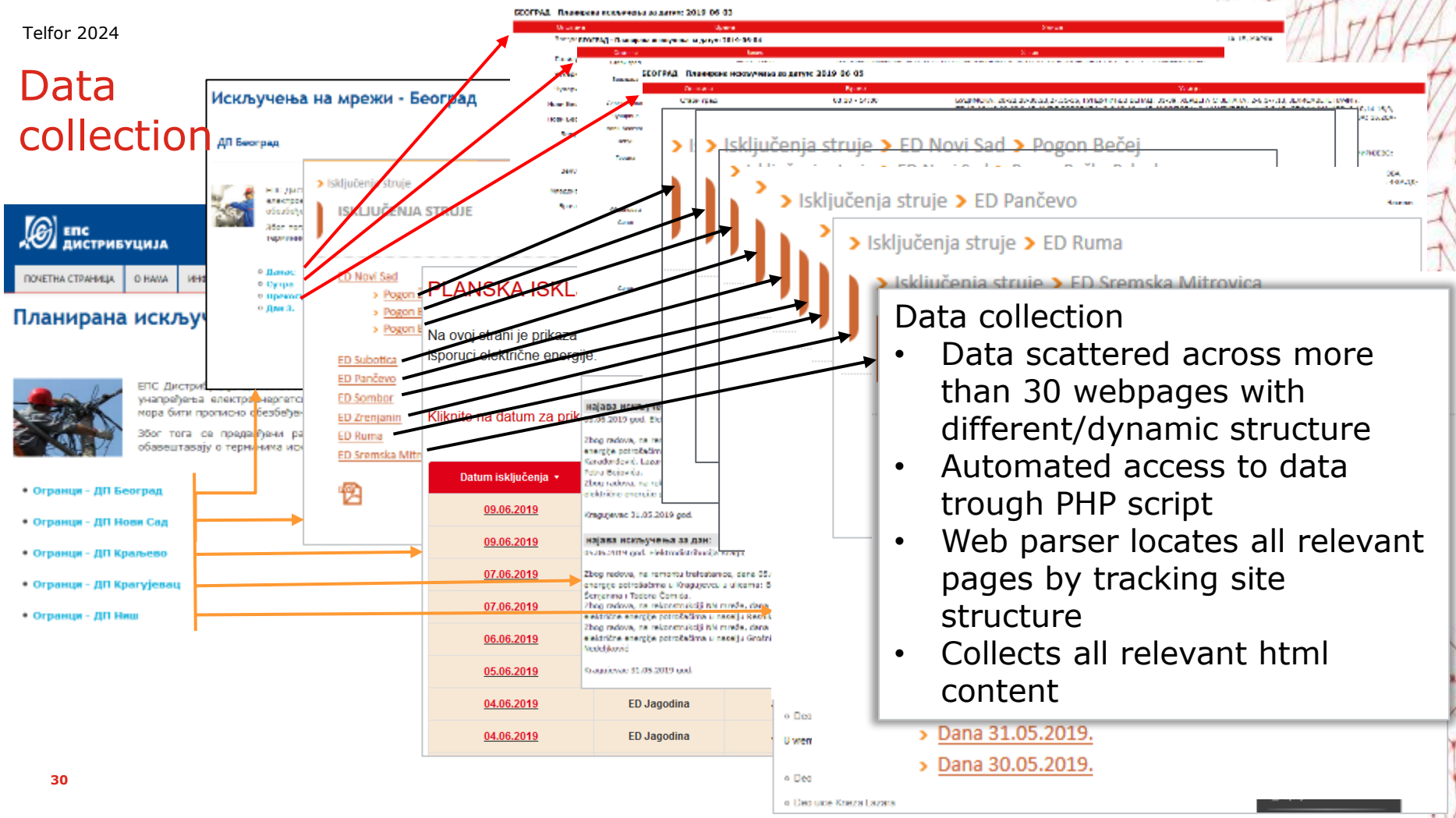
- **Initial idea**: automation through machine learning algorithm

- **Goal**: to be proactive and well prepared for planned power outages in advance

- **Ultimate goal**: automatic scheduled dispatch of trouble tickets for Diesel generator

Draft for internal discussion

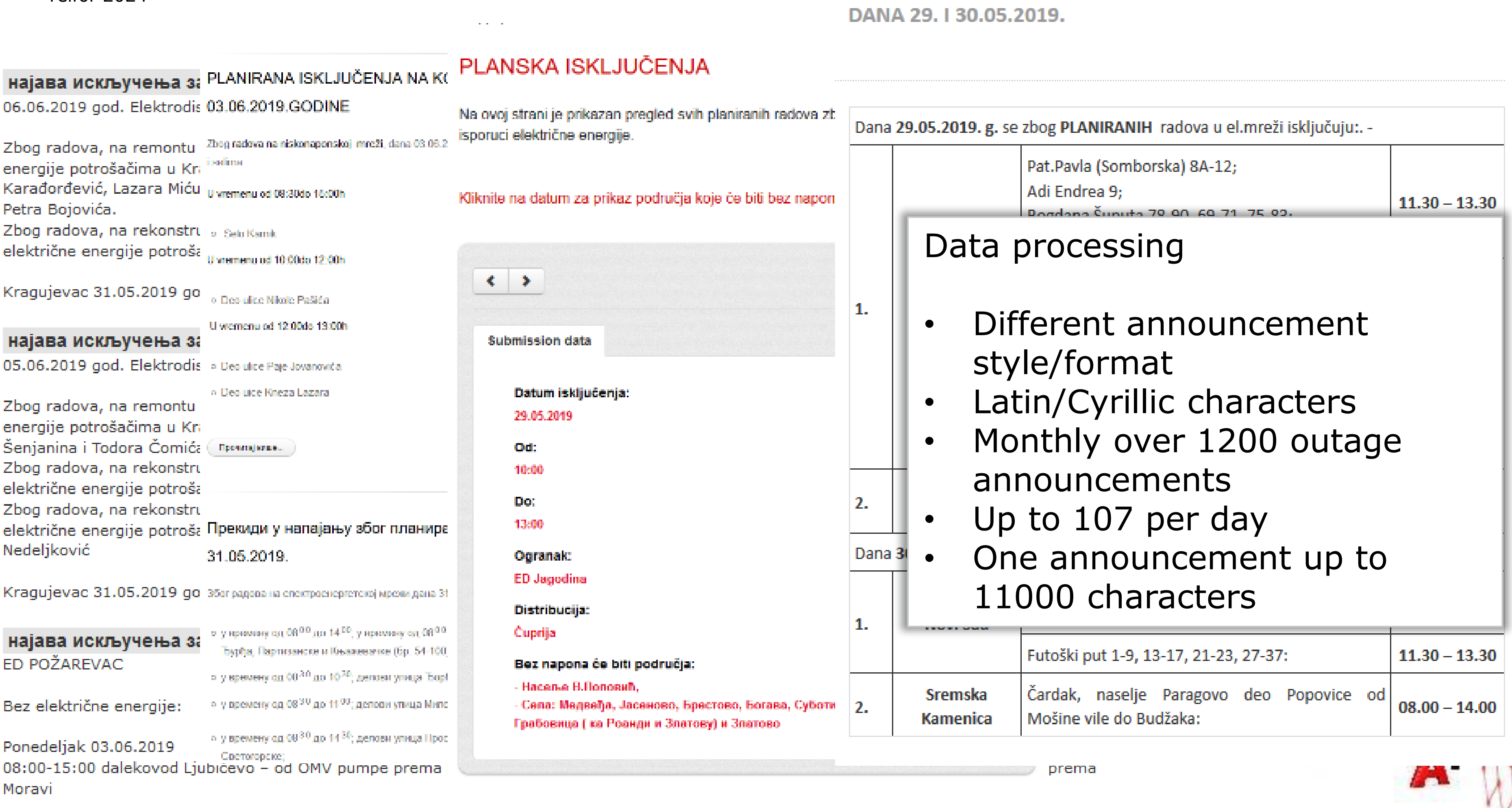
Data collection



Data collection

- Data scattered across more than 30 webpages with different/dynamic structure
- Automated access to data trough PHP script
- Web parser locates all relevant pages by tracking site structure
- Collects all relevant html content

Draft for internal discussion



Data processing

- Different announcement style/format
- Latin/Cyrillic characters
- Monthly over 1200 outage announcements
- Up to 107 per day
- One announcement up to 11000 characters

Data processing

19318	ED Nis	2019-05-30 00:00:00	08:30 - 14:30	/	делови улица Руђера Бошковића, Др Михајла Мике Марковића, Драгоми
19319	ED Nis	2019-05-30 00:00:00	09:00 - 11:00	/	део Тасковића, Лазаревог села, Миљковца, Велепоља, Топила, Кравља,
19320	ED Nis	2019-05-30 00:00:00	08:30 - 14:00	/	део Шарлинца
19321	ED Nis	2019-05-30 00:00:00	10:30 - 12:30	/	део улице Патриса Лумумбе (бр. 51)
19322	ED Nis	2019-05-30 00:00:00	12:30 - 14:30	/	део улице Патриса Лумумбе (бр. 49)
19323	ED Pirot	2019-05-30 00:00:00	08:00	/	Deo ulica: Čoka Jove Zmaja, Milivoja Manića, Senjska, Srpskih vladara.
19324	ED Pirot	2019-05-30 00:00:00	08:00 - 17:00	/	Deo sela: Bela, Pakleštica, Rudina, Gostuša.
19325	ED Pirot	2019-05-30 00:00:00	08:30 - 15:00	/	Deo sela: Kamik, Petrovac.
19326	ED Prokuplje	2019-05-30 00:00:00	09:00 - 14:00	Kursumlija	селу Доње Точане 30.05.2019.год.
19327	ED Prokuplje	2019-05-30 00:00:00	10:00 - 13:00	Kursumlija	насеље Кастрат , улице:Косовке Девојке, Миодрага Марковића, Радета
19335	ED Jagodina	2019-05-30 00:00:00	09:00 - 14:00	Ćuprija	Дана 30.05.2019. због планир нергије ће би
19338	ED Šabac	2019-05-30 00:00:00	08:00 - 14:30	Šabac	Brdarica prema Jazovni
19340	ED Kruševac	2019-05-30 00:00:00	08:00 - 15:00	Kruševac	1. U vremenu od08.30 Kobilje,Ribare a Lukavac dva sata2. U vremenu od08.00
19341	ED Kruševac	2019-05-30 00:00:00	08:30 - 14:30	Trstenik	Grabovac. Od 8,30 do 3).

Data processing
Results:

- Processed data in DB
- All available history plus daily collection
- Data turns into information

Draft for internal discussion

ML with support of geo spatial analysis

Use two steps in classification:

- **Step 1**:Use ML to decide if announcement has impact on our network based on historical data
- **Step 2**: Use geospatial proximity analysis to decide what base station is in potential risk

Benefits:

- We created usable module that is already in use – saving time
- We use solution to collect valid data for ML verification and re-training

- Future: with enough training data we will replace GIS proximity analysis with ML in finding exact site location

Draft for internal discussion

EPS Distribucija

Korisnički Servis

Mediji

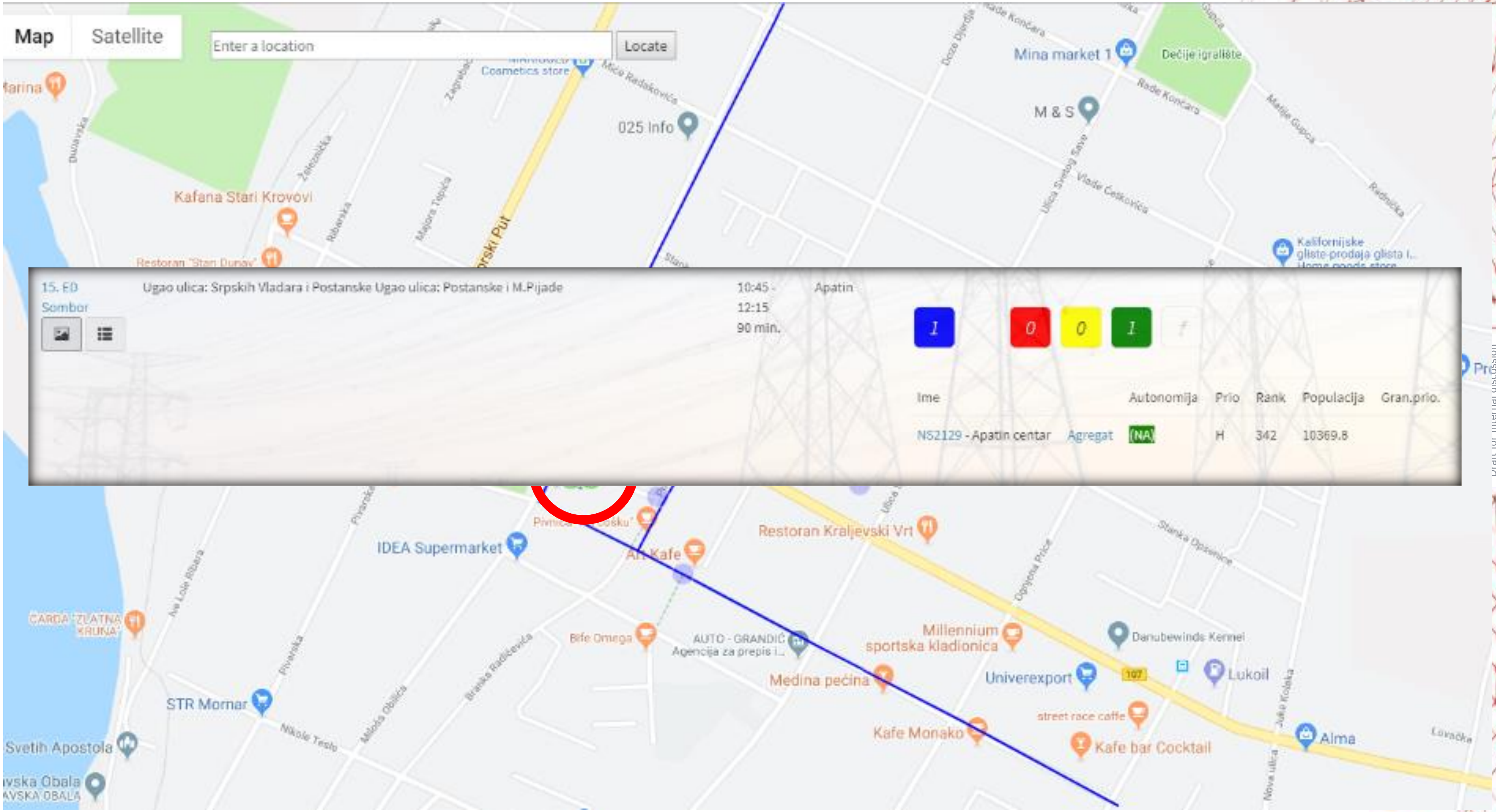
› Isključenja struje › ED Sombor

ED SOMBOR

Zbog PLANIRANIH radova na električn

- Dana 28.06.2019.
- Dana 27.06.2019.
- Dana 26.06.2019.
- Dana 25.06.2019.
- Dana 24.06.2019.

1.	*Апатин*	Подручје ТС „Дом омладине Подручје ТС „Станка Опсенице“ Подручје ТС „Парк“ Подручје ТС „Код Чарапаре“	Повремено 08:00-14:00
2.	*Ријица*	УЛ. Буковачка од бр.1-15 и бр.2-30 УЛ.В.Карађића бр. 34,36 и бр.45,49	08:30-14:00
3.	*Апатин*	Угао улица: Српских Владара и Поштанске Угао улица: Поштанске и М.Пијаде	10:45-12:15
4.	*Апатин*	**Ромско Насеље:** **Подручје ТС „Пик Машинска“** **Подручје ТС „Ромско Насеље 2“** **Подручје ТС „Ромско Насеље 1“** **Подручје ТС „Кружни Насип“** **Подручје ТС „Кружни Насип 2“**	09:00-13:00
5.	*Апатин*	Према Буђаку из ТС Пчела	08:00-09:00
6.	*Чонопља*	Због радова на НН мрежи: УЛ. Огњена Прице (од трафостанице у ул. О. Прице до ул. М.Орешковића) УЛ. М.Орешковића УЛ. Божидара Аџије УЛ. Степе Степановића	09:00-13:00
7.	*Куцура*	Партизанска 1-131 и 4-68 Гавра Костелника 62-82 и 75-99 Нови шор 84-88 и 117-145 Владимира Назора 1-61 и 4-42 Маршала Тита 126-130	08:30-13:00


Map
Satellite
Enter a location
Locate
15. ED Sombor
Ugao ulica: Srpskih Vladara i Postanske Ugao ulica: Postanske i M.Pijade
10:45 - 12:15
90 min.
Apatin
1
0
0
1
Ime
Autonomija
Prio
Rank
Populacija
Gran.prio.
NS2129 - Apatin centar
Agregat
(NA)
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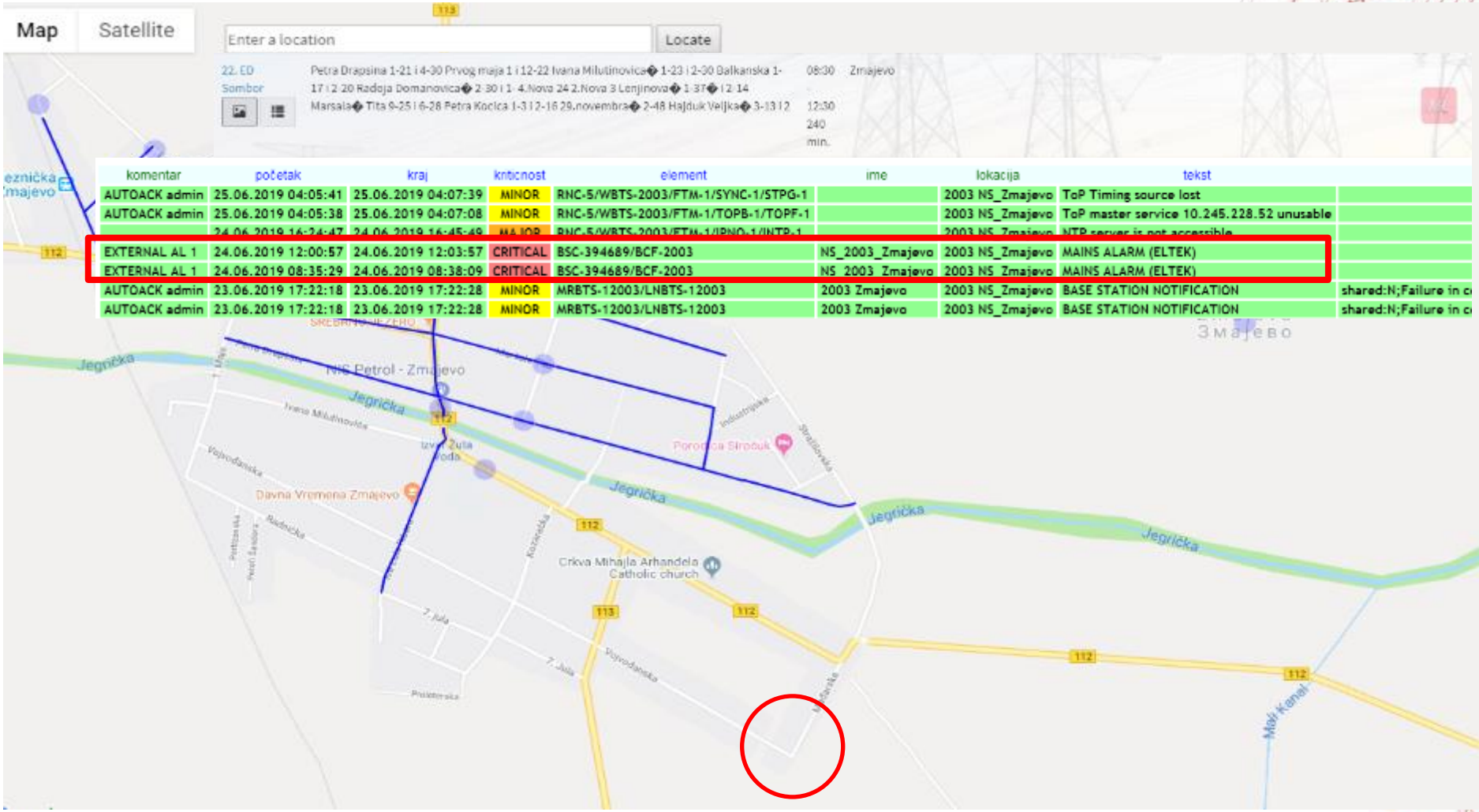
342
10369.8
Mina market 1
Dečije igralište
M & S
025 Info
Kafana Stari Krovovi
IDEA Supermarket
Restoran Kraljevski Vrt
Art Kafe
Bife Omega
Millennium sportska kladionica
Medina pećina
Univerexport
Lukoil
Danubewinds Kennel
Kafe Monako
street race caffe
Kafe bar Cocktail
Alma
STR Mornar
Svetih Apostola



Draft for internal discussion

Long story short ☺

Service availability - service

Servis availability:

2024

VOICE: 99,95%

Target: 99,90%

DATA: 99,92%

Ticket Automation:

Auto created+ Auto assigned + Auto resolved

AUTO: 71%

TARGET: 70%

MANUAL: 29%

Rapid response robot "Roberto"

- 4500 autonomous actions on BTS
- 900 man/hour saved
- 265 close loop use cases

SMART alarm reduction:

- CORE 56%
- MW 24%
- RAN: 94%

Draft for internal discussion

Telfor 2024

Time savings

RAN Alarms Handled by tool: zero touch by NSOC

2021: 44%
2022: 90%
2023: 96%

Fully automated RAN tickets:
2023: 62%
2024: **71%**

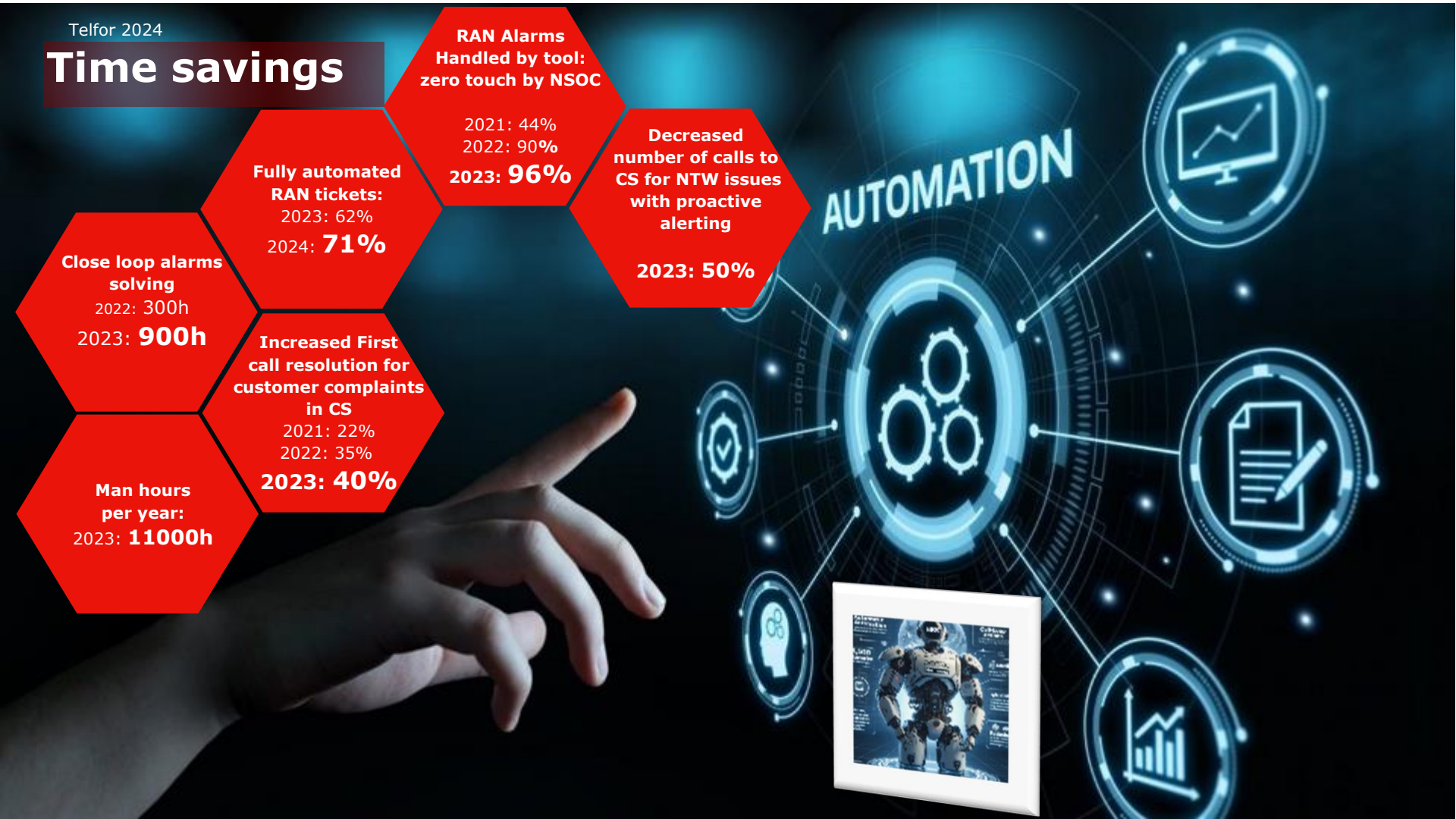
Decreased number of calls to CS for NTW issues with proactive alerting

2023: 50%

Close loop alarms solving
2022: 300h
2023: **900h**

Increased First call resolution for customer complaints in CS
2021: 22%
2022: 35%
2023: 40%

Man hours per year:
2023: **11000h**



Thank you

Bojan Kovačević
Head of Radio Access Network
Đorđe Dubaić
Head of NSOC and OSS team