



ASSET RENEWAL IN ČEZ DISTRIBUTION USING TECHNICAL CONDITION EVALUATION TOOLS ČEZ DISTRIBUCE, A.S.



20. 9. 2018, Adam Teringl, Ondřej Tupý
CIIRC Prague

ČEZ DISTRIBUCE AT GLANCE

OVERVIEW OF KEY DATA



POWER SYSTEM IN THE CZECH REPUBLIC

Production	ČEZ, producers
Transmission	ČEPS
Distribution	ČEZ Distribuce E.ON Distribuce PRE Distribuce

GENERAL DATA

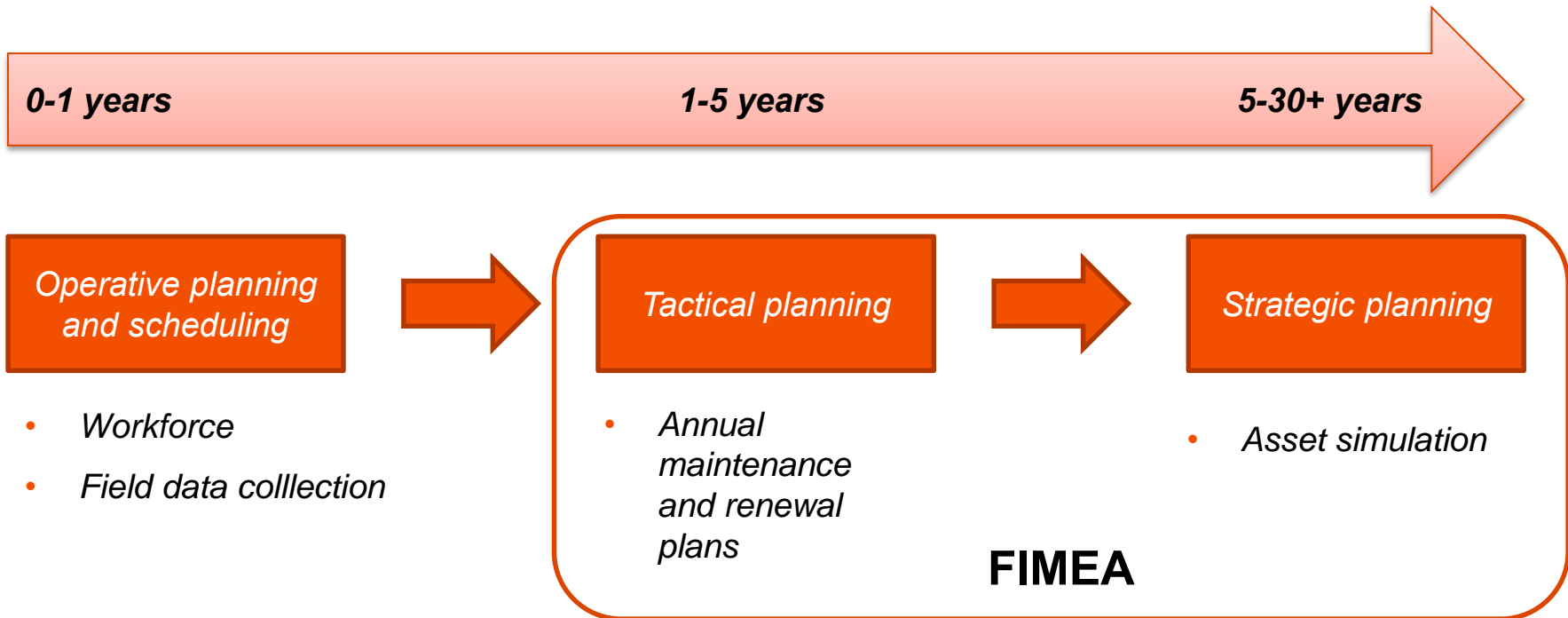
Area of supply	52 001 km ²
Number of supply points	3 589 039
Distributed energy	43 331 TWh
Total length of lines	162 583 km
Number of substations	58 157

ASSET MANAGEMENT OF PHYSICAL ASSETS



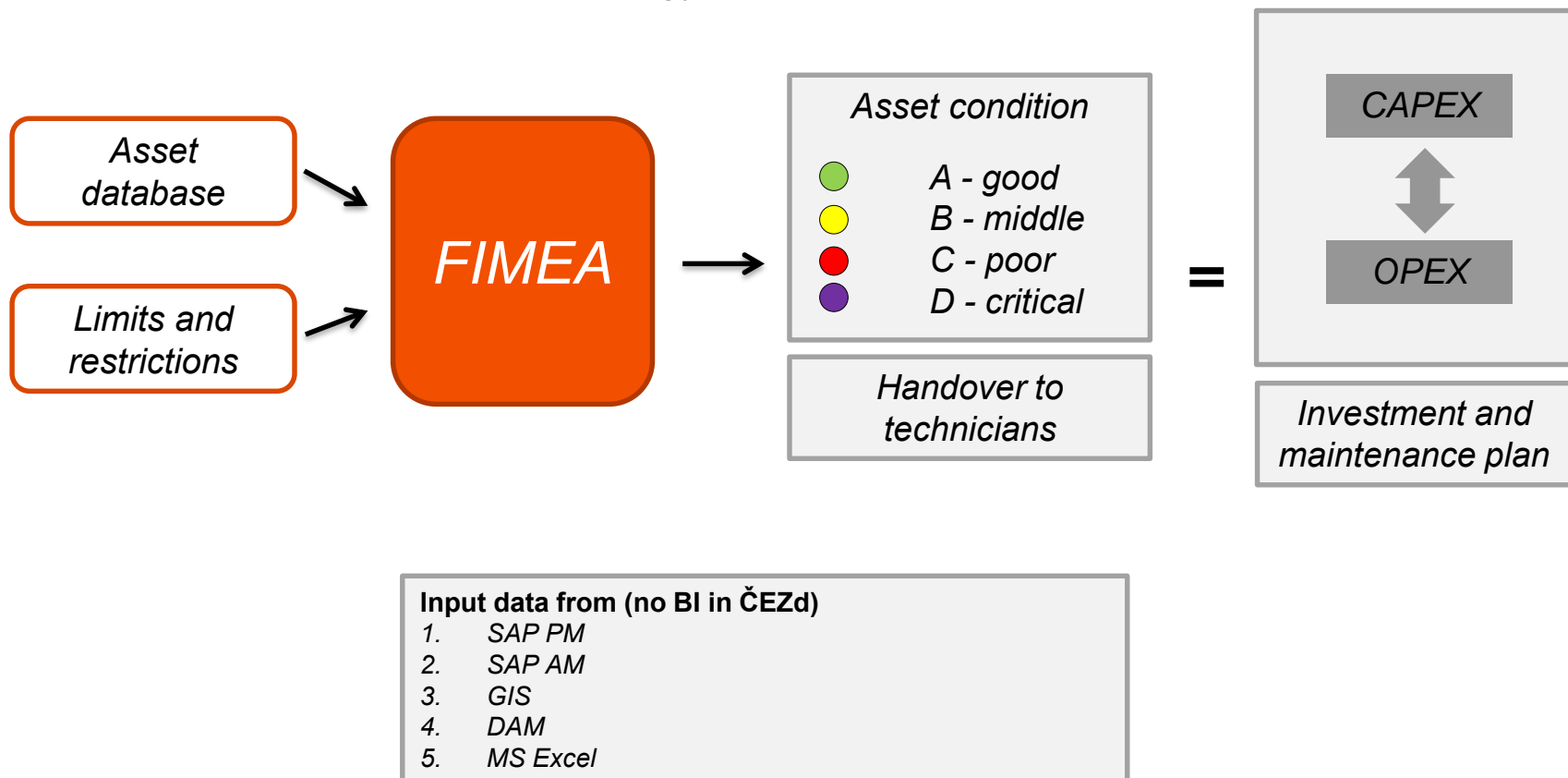
STRATEGIC ASSET MANAGEMENT

ISO 55000 defines Asset management as the
"coordinated activity of an organization to realize value from assets"

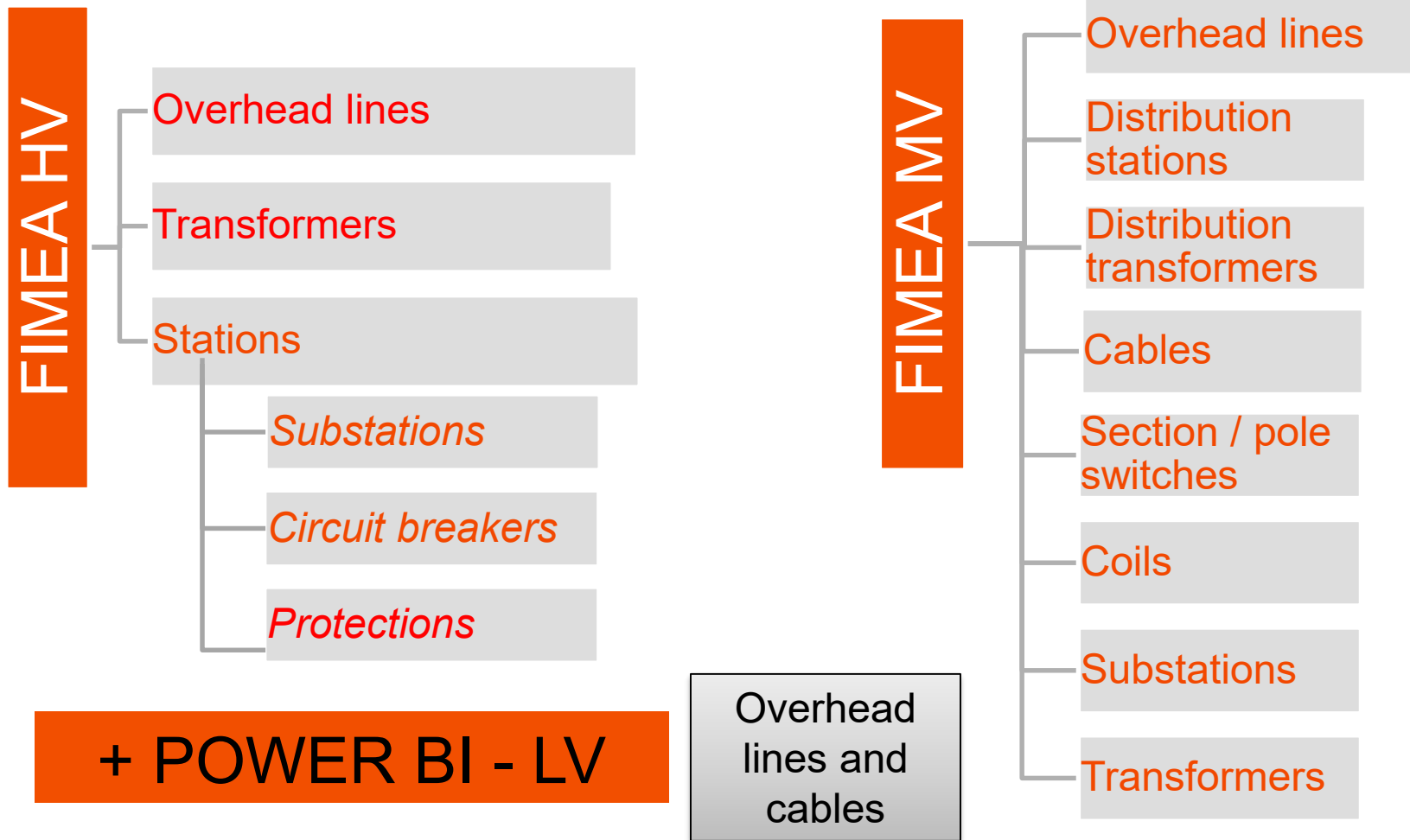


TOOL FOR EVALUATION OF TECHNICAL CONDITION

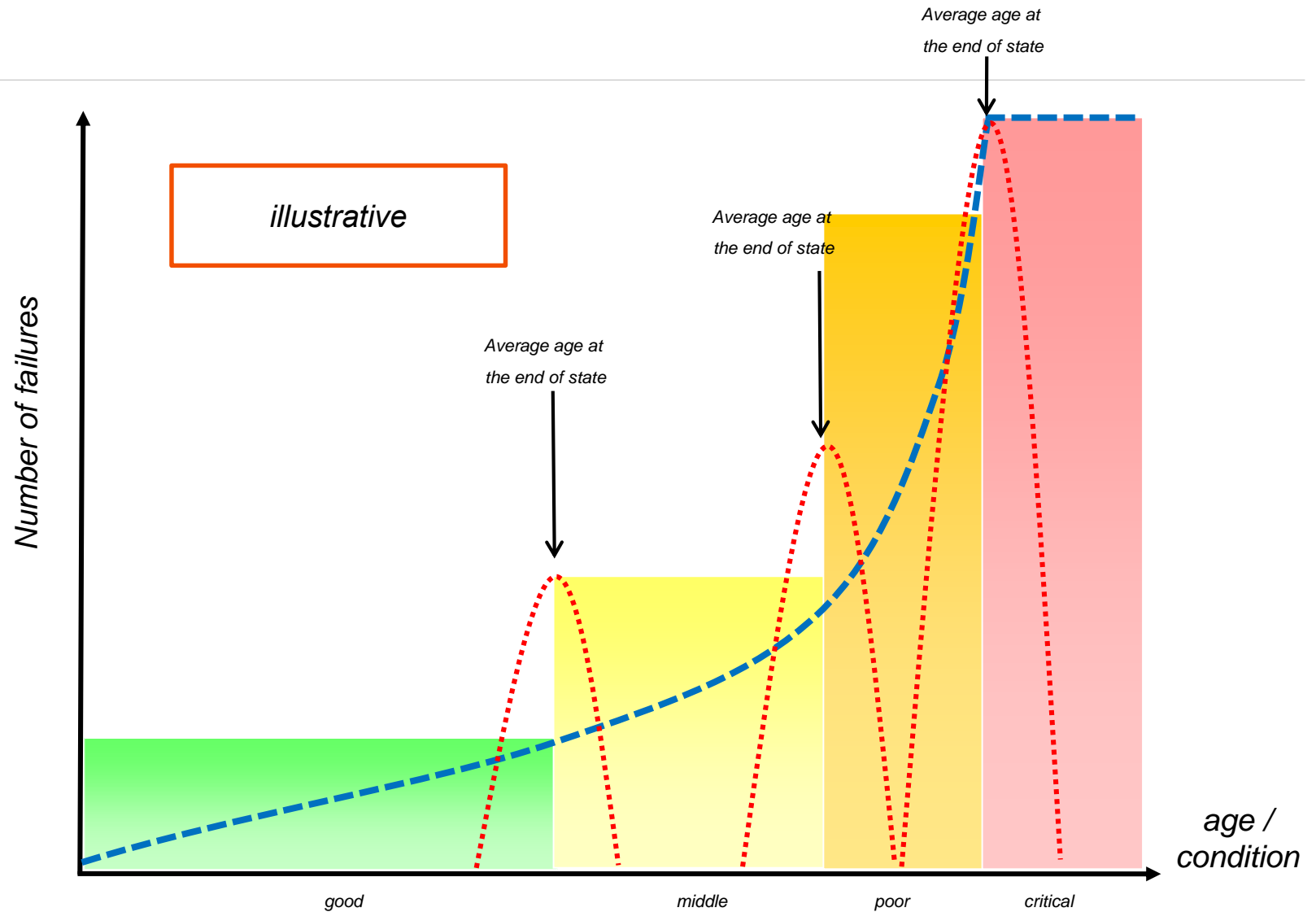
- **FIMEA** = **F**inancial **M**odel of **E**nergy **A**ssets



SEGMENTATION FOR LONG-TERM ASSET SIMULATION

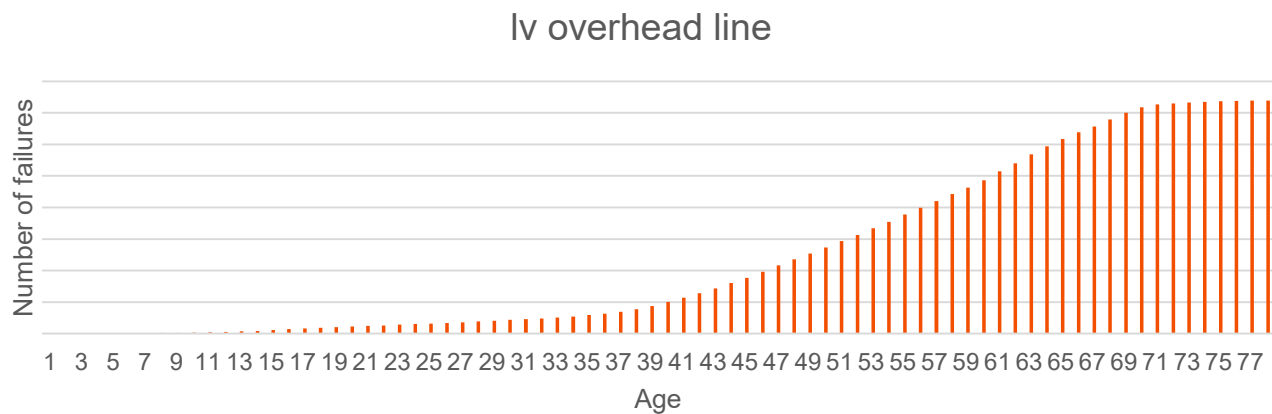
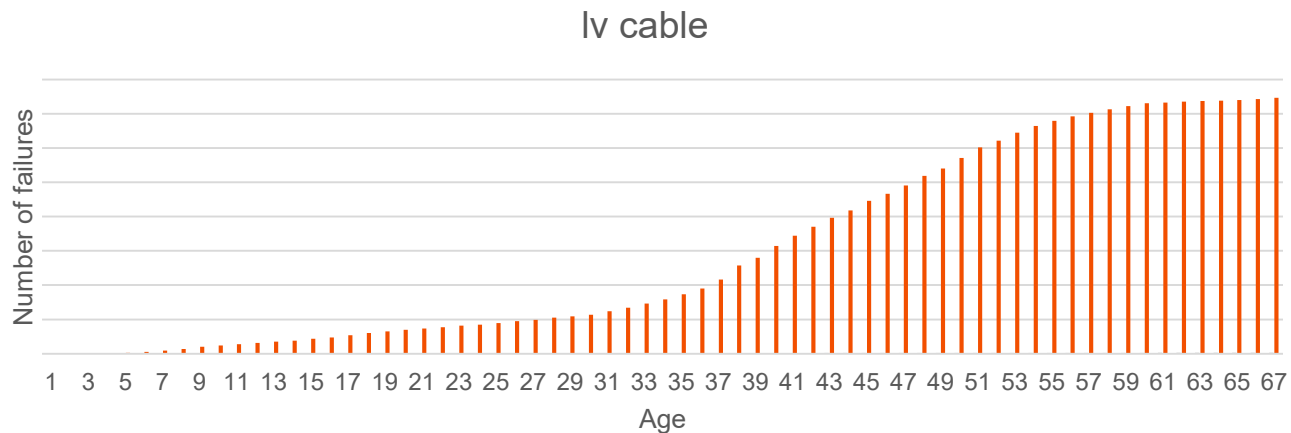


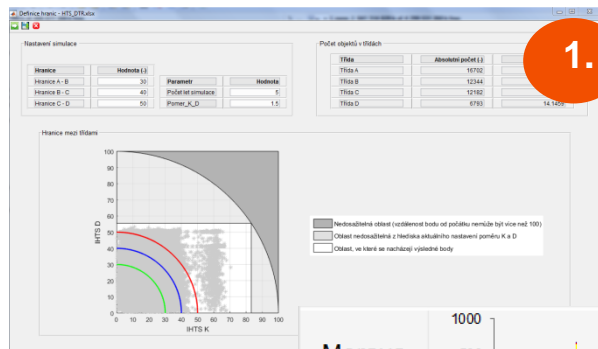
AGING CHAIN



FAILURE PROBABILITY CURVES

EXAMPLES





1.

Annual data update

2.

Strategic asset simulation, regional deviations

List of assets in worst condition handled to technicians

3.



Feedback from the field

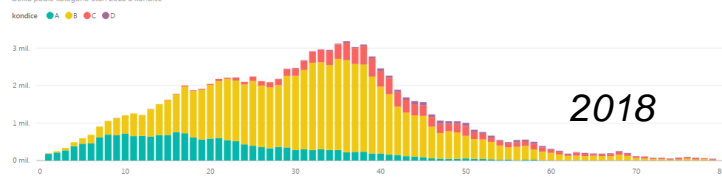
C	D	E	F	G	H	I	J
střanice	532	střanice	532	střanice	532	střanice	532
2	IC_0089	59595	683478	16004000953	4048097744	28,56076333	45,5420381 D
2	IC_0089	57255	683477	16004000953	4048097743	28,56076333	45,5420381 D
6	IC_0089	38424	683478	16004000953	4048097743	28,56076333	45,5420381 D
7	Sever	17333	15702	16002007230	74,3444832	22,28675265	77,45376587 D
7	Sever	4065	7105	16002007230	43,57055664	20,23857689	40,0435802 D
8	Východ	56702	55985	16004000953	69,53888254	22,80722427	70,59777325 D
9	Východ	39426	57772	16004000953	66,64007239	21,18725967	69,547229 D
10	Střed	36785	129010	16002007230	40,65051246	26,61056709	48,59215546 D
11	Východ	56838	57772	16004000953	40,65051246	26,61056709	48,59215546 D
12	Střed	36789	37670	16002007230	28,57875960	20,57875960	48,59215546 D
13	Sever	3290	6320	16002007230	67,02044044	15,65327654	69,67668393 D
14	Střed	29953	85620	16002007230	47,36478385	19,08620071	51,5668669 D
15	Východ	59185	61732	16004000953	44,34687299	20,54502678	51,5420381 D

LOW VOLTAGE SIMULATIONS AND PARAMETERS (POWER BI DESKTOP)

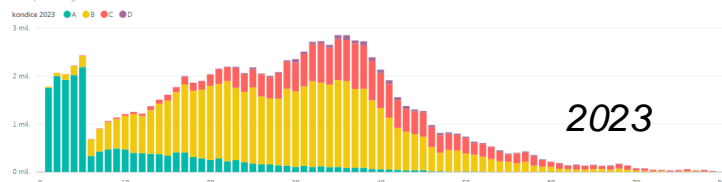
Parameters	
Average age	weighted average age for maintenance unit
Condition from preventive inspection	last preventive inspection result
Number of customers	to distinguish between rural, urban and city areas
Cost OPEX – CAPEX	cost of repairs (plan minus realized)
Number of failures	
Type of cable, number of joints	for lv cables
% cabelisation	for lv overhead lines

Condition is aggregated for one maintenance unit = regular inspection would be done in one day by one technician

Délka podle kategorie Stáří 2018 a kondice



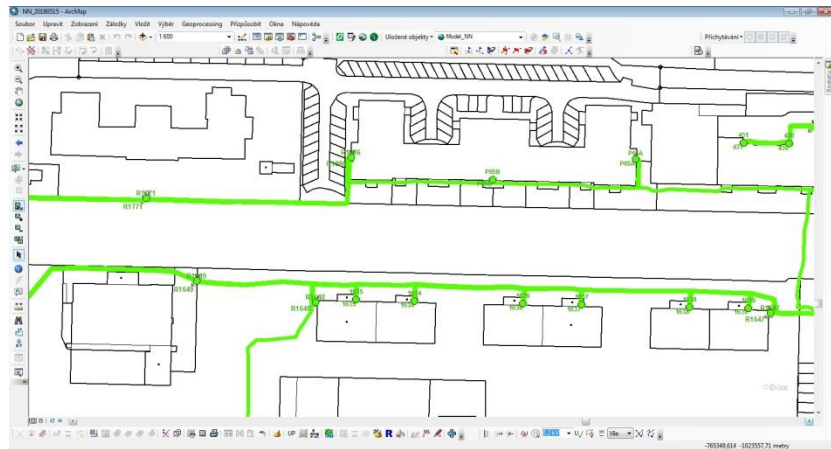
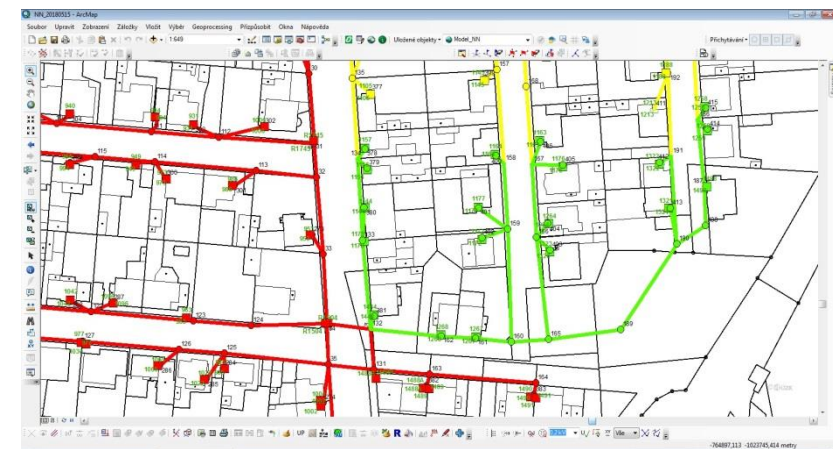
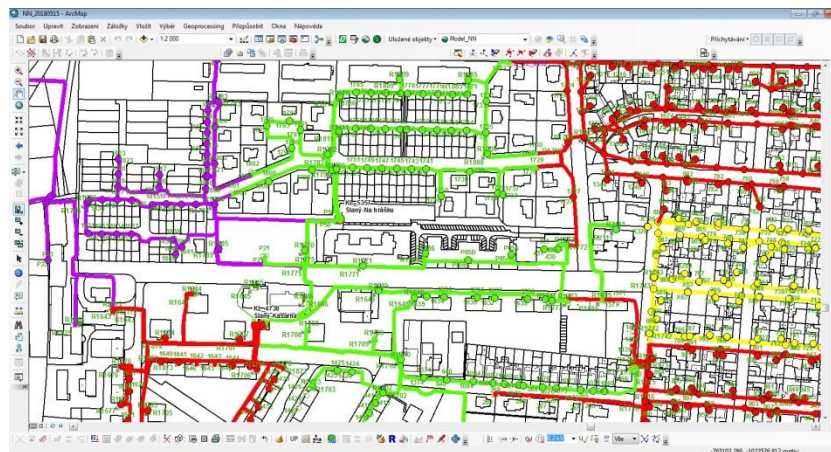
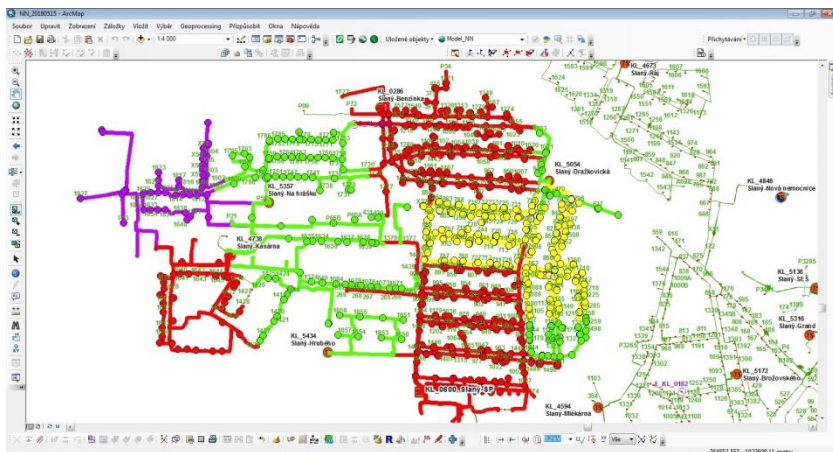
Délka podle kategorie 2023 a kondice 2023



Technická mláďa	Číslo	kondice	Délka	Okraj	Stáří	Avg. katalóg D6	Uprádky	Banking final	UP	Ranking D1	Redukce
DS-AN-302385-U0000	Motornový-G-RE_2107-Obec	D	1 514.85	PB	1 945.77	8.81	0.03	64.24	53	0.25	320
DS-AN-301727-U0009	Přívod-V-RE_2196-U Hřibů	D	560.10	PB	1 953.09	5.35	0.03	64.06	19	0.5	320
DS-AN-302389-U0003	Zavřecí-V-RE_8036 - Obec	D	1 140.31	PB	1 941.50	7.02	0.03	63.24	36	0.25	320
DS-AN-302462-U0007	Nápravný-RE_2161-Obec	D	1 552.34	PB	1 948.18	5.68	0.03	62.40	39	0.5	320
DS-AN-301873-U0005	Přívod-V-RE_2109-Obec	D	675.65	PB	1 955.07	6.77	0.06	62.39	39	0.5	320
DS-AN-301873-U00074	Přívod-V-RE_3124-TS 10 U malého kotle	D	3 059.13	PB	1 964.51	6.81	0.23	62.04	690	0.25	320
DS-AN-302775-U00018	Jinca-V-RE_3134-U malého kotle	D	1 993.89	PB	1 960.08	7.52	0.12	61.74	235	0.25	320
DS-AN-302346-U00014	Milov-V-RE_3189-U malého kotle	D	1 200.38	PB	1 970.73	7.93	0.03	61.61	37	0.5	320
DS-AN-301339-U00013	Milov-V-RE_4196-Bezdovka	D	1 171.31	PB	1 953.60	6.68	0.04	61.28	58	0.25	320
DS-AN-301873-U00022	Přívod-V-RE_7174-Sukhoroska aj.	D	950.04	PB	1 958.98	6.29	0.07	61.11	66	0.25	320
DS-AN-301873-U00005	Vilavice-V-RE_4027-Vilavice Kamenná H	D	56.92	PB	1 953.94	6.65	0.09	61.03	5	0.25	320
DS-AN-302386-U0007	Kodrník pod Těmínem-V-RE_2089-Radimka	D	39.46	PB	1 969.00	6.65	0.21	60.71	7	0.25	320
DS-AN-301856-U00005	Občid-V-RE_2008-U Hřibů	D	353.58	PB	1 959.38	6.03	0.07	60.20	23	0.25	320
DS-AN-301873-U00079	Přívod-V-RE_3135-TS 31 Buda	D	611.03	PB	1 965.30	6.47	0.08	59.87	46	0.25	320
DS-AN-301229-U0002	Luňka-V-RE_0079-Obec	D	291.81	PB	1 970.02	9.49	0.05	59.50	18	0.25	320
DS-AN-302389-U0004	Kondrovy-V-RE_8718-Hřibů	D	382.12	PB	1 940.30	5.11	0.03	59.48	13	0.25	320
DS-AN-301873-U00061	Přívod-V-RE_3139-TS 38 XXXX enapa za Dr	D	2 168.99	PB	1 976.09	7.68	0.23	59.48	491	0.25	320
DS-AN-301873-U00027	Milov pod Brdy-V-RE_2122-Dřetěže pod s	D	3 292.21	PB	1 960.08	5.64	0.09	59.40	285	0.25	320
DS-AN-301873-U00005	Liňav-V-RE_7081-U bytovak	D	1 217.69	PB	1 942.47	4.93	0.04	59.04	7	0.25	320
DS-AN-301873-U00005	Přívod-V-RE_3138-Vinohrady	D	1 217.69	PB	1 966.46	6.34	0.07	59.01	86	0.25	320
DS-AN-301873-U00090	Přívod-V-RE_3135-TS 35 XXX enapa ASD	D	1 688.12	PB	1 977.70	7.68	0.17	58.55	328	0.25	320
DS-AN-302462-U00014	Dřetěže-V-RE_4138-Obec 2	D	1 788.68	PB	1 968.57	4.69	0.04	58.51	74	0.5	320
Celkem			26 295.91					2659			

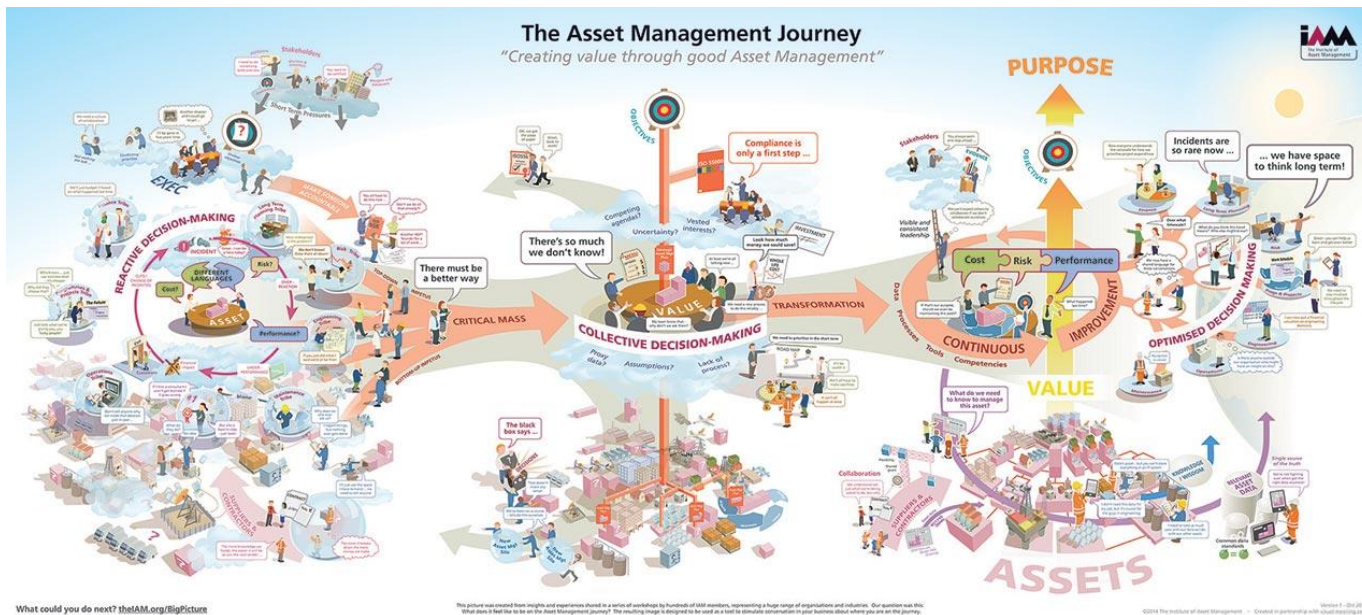
70 % success of feedback

GIS CONDITION VISUALISATION



CONCLUSION

- Continuous annual improvement of simulations
- Using statistical tools as R Studio or Python in the future to improve weights of parameters for technical condition evaluation
- Asset management is a journey
a journey from reactive decisions to optimized decisions





DISTRIBUCE

THANK YOU FOR YOUR ATTENTION

TIME FOR YOUR QUESTIONS

Adam Teringl, Ondřej Tupý