

Modern technologies to prevent wildland fires

Baltic Peat Producers Forum

Tartu, October 2018



Agenda

1. Using thermal drones in peat production area

2. Combined trainings





SUMMER 2018

+41%

WILDFIRES

<u>Facts</u>



- 40 days of highly flammable time
- + 41% wildfires vs. L 3 Y
- 430 + ha wildland destroyed
- 29% of total rescue events were wildfires

<u>Bottlenecks</u>



- Lack of rescourses for production site monitoring
- More effective time consumtion needed for measuring internal temperatures of peat stockpiles
- Staff training challanges due to seasonality
- No agreed training regulations for subcontractors



Thermal drones in peat production area

FINDING THE SOLUTIONS ...

5

<u>Challenge for drones</u>



Weather conditions:

- Tempreature +6 C
- Wind 5m/s
- Fog+ occasional rain

Task :

Find the burning candles from peat production area Area size aprox 50ha

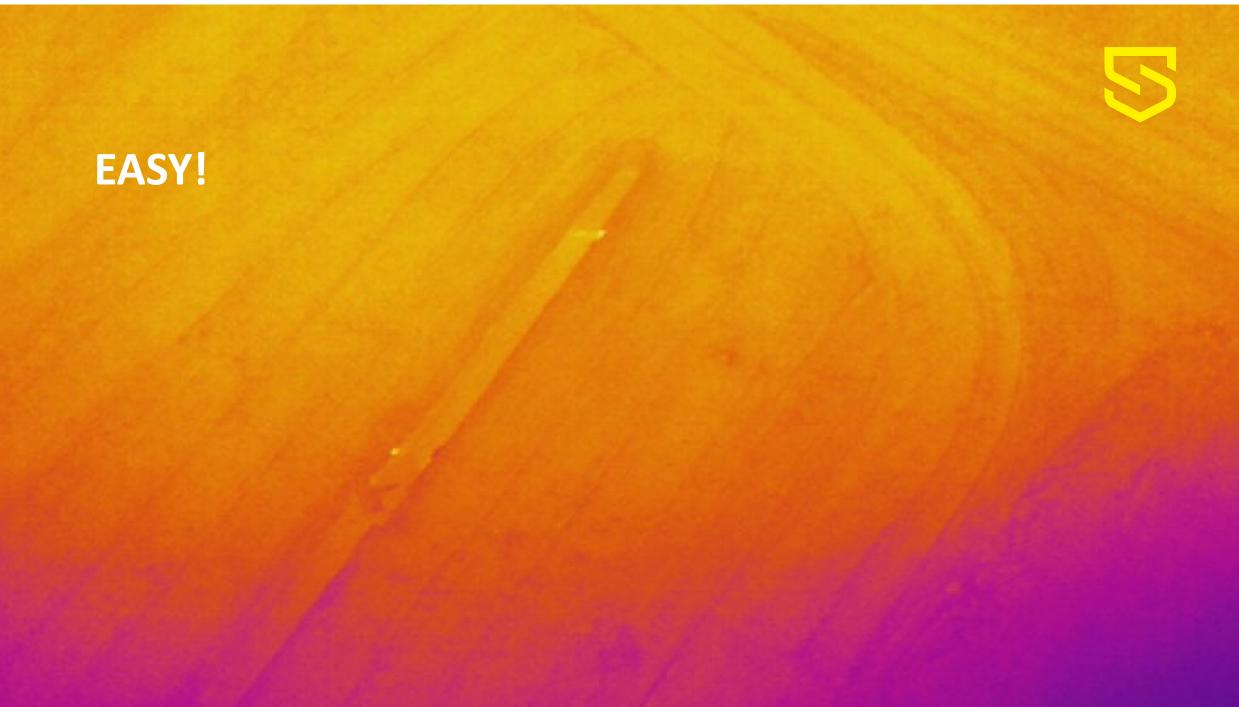






LET'S PLAY...





42,679 4	2,949 (40,664	39,88	39,898	40,072	39,933	39,88	40,229	40,681	40,612	40,595	41,408	41,355	40,993 4	0,751 4	0,751 (40,473	40,542	40,456	40,941	40,993	40,855	41,114	40,941	40,386	40,107	40,254	40,421	40,924	40,403	39,53	39,003	38,915	39,985	40,872	42,797	44,691	45,743	45,943	45,81	45,926	45,43
42,302 4	1,959	40,229	40,003	39,723	39,32	39,126	39,425	40,177	40,699	40,699	40,612	41,011	41,27	40,941 4	0,751 4	0,473	40,508	40,699	40,629	40,993	41,561	41,632	41,921	41,797	41,374	41,011	40,924	40,92	41,408	41,924	40,56	40,299	40,334	41,666	42,524	44,102	46,258	47,346	47,674	47,1	47,067	46,577
40,438 4	0,456	39,915	39,408	39,249	39,32	39,214	39,688	40,16	40,681	40,907	40,837	40,803	40,976	40,907 4	0,795 4	0,351	40,525	40,699	41,201	41,701 41,976	41,873	42,37	42,25	41,89	41,46	41,097	41,391 41,391	41,701	41,821 42,712	42,353	41,804	41,529	41,718	42,199	43,392	44,54	46,274	48,05	49,36	48,262	46,952	46,83
39,774 3	9,038	38,862	38,986	39,425	40.072	40.438	40.264	40.386	40.456	40.316	40.403	40.282	40,369	40.264 4	0.316 4	0.351	40.316	40,803	41.46	41.821		43.052		42.524	41,149	41.045	41,149	41.391	42,267	43.324	43,815	44,203	43,883	43.341	42.916	42,746	43,375	45,594	47.083	47.756	46.886	45,955
39,249 3	9,425	39,653	39,933	40,09	40,56	40,56	40,229	40,055	40,299	40,125	40,09	40,49	40,56	40,49 4	0,334 4	0,351	40,456	40,577	41,08	41,546	42,027	42,626	42,78	42,66	42,044	41,77	41,632	41,494	42,096	42,763	43,443	43,815	43,663	43,12	42,797	42,831	43,205	44,000			45,843	44,488
40,229 4	0,699 (40,473	40,681	40,716	40,647	40,456	40,037	39,828	39,95	40,334	40,334	40,334	40,803	40,82 4	0,795 4	1,097				41,322						42,507	42,609	42,199	41,821	41,804	42,096	42,729	42,814	42,455	42,37	42,524	42,831	43, 9	44,119	45,5	44,825	44,115
40,976 4	1,028	40,976	40,733	40,438	40,421	40,542	40,542	40,16	40,334	40,456	40,421		41,253		-			42,027 42,319		41,598				41,701 41,149		42,353 41,873	42,609			41,408	41,149 41,063		42,302	42,302	42,233	42,524	42,949	43, 9	M.17	41,1	43,199	42,862
40.855 4	1.097	40.681	40.351	39.74	39,933	40.334	40,889	41,132		41,443	41,477									42,319				41,529								41.201	41.374	41.694	41.27	41.511	41.975	42.201	7.65	1 A A	41.477	41.477
40,82 4	1,045	40,577	40,577	40,403	40,229	40,456	40,612	41,494	41,494	41,838	41,838	41,956	41,993	41,907 4	2,319	42,01	42,113	42,13	42,147	42,302	42,421	42,25	42,165	41,993	41,959	41,797	41,563		41,694	41,408	41,166	41,184	41,235	41,443	41,408	41,097	41,753	42, 31	42, 13	41,1	41,58	41,061
41,08 4	1,132	40,941	40,768	40,595	40,56	40,716	40,595	41,045	41,297	41,821	42,027	42,044	42,165	42,044 4	2,096 4	2,113	42,062	42,01	42,13	42,37						42,044		41,149		41,322	41,374	41,132	41,011	40,716	40,681	40,872	41,235	41,	41,374	4 P 4	41,753	41,701
41,305 4	0,976	40,56	40,525	40,421	40,438	40,595	40,733	41,063	41,253	41,684	41,959		42,404							42,353 42,147	42,558	42,643		42,473 42,473		42,438	42,558	41,753 42,49	41,27	41,339	41,511 41,529	41,27	40,751	40,612	39,618	39,845	39,828	40,055	10	40.16	41,201	42,13
39,853	39,74	40,142	40,612	40,664	40,758	40,889	40,907	41,253	41,443	41,494			42,113		12,25 4			42,302			41,89						42,455			42,147	41,797	41,322	41,443	42,165	41,821	41,546	41,166	41,132	41,297	41,201	41,305	41,590
39,372 3	9,548 3	39,775	40,647	41,132	41,374	41,339	41,305	41,322	41,46	41,356				42,182 4									42,01	42,216	41,959	42,079	42,096	42,13	41,907	41,856	41,804	41,976	42,147	42,438	42,336	42,182	41,804	41,612	41,598	41,787	42,147	42,552
39,478 3	9,653	39,583	40,316	41,201	41,942	41,993	41,89	41,615	41,494	41,253				42,044 4									41,666	41,666	42,079	42,062	41,89	41,855	41,322	41,305	41,443	41,856	42,01	42,233	42,302	41,993	41,924	42,044	42,13	42,319	42,524	42,791
39,898 4	0,072 (40,142	40,55		41,391	41,400	41,475	41,666	41,104	40 705	40,612	40,421	40 733	41,701 4 40,924 4	0.00	1 050	42,222	41 021	41 633	41 404	41,005	41, 322	41.100	41 045	41 104	41,005	41 333	41,604	41,804	41,684	41,391	41,77	41,856	42,044	41,926	41,942	41,975	42,509	42,831	43,069	43,199	40,100
40,56 4	0,837	40,647	40,49	40,386		10,901	40, 72	40, 99	40,000		47	525		40,61 40,9 40,39 39,940	.20	1.115	787	41,735	41,155	41,207	41,045	1,164	41, 12	40,993	40,976	41,053	41,184	41,114	41,443		41,132	41,753	41,529	41,632	41,735	41,942	42,096	42,302	42,592	42,678	42,763	43,015
40,629 4	0,716	40,525	40,194	39,95	40,19	40 362	40, 38	40, 51	4,27	10,699	0,62	0, 77	10,49	40, 9 4	907	0.97	41, 97	41,194	41 253	en 99	10,795	11, 141	41, 14	an 13	10,941	1 m	4,87	41,114	41,132	40,976	40,768	41,053	41,58	41,838	41,751	41,804	42,062	42,113	42,182	42,37	42,814	43,018
40,577 4	0,647	40,264	40,107	39,968	3,922	40 229	40, 09	40 56		10,647	47.47.	10,- S	1,421	40,3 9	NE L	0,54	40, 16	40,803	41 149	41 11	976	0,1	41, 45	41.45	41,2	40 924	4,00	41,132	41,322	40,976	41,045	41,27	41,511	41,649	41,751	41,907	42,044	42,062	41,701	41,77	42,199	42,606
39.00	30.95	39.91	40,612	41,210	41,201	40,837	40,612	40,542	40.525	40.542	40,612	40,473	40.072	40.072 3	1,191 4	0.542	40,629	40,229	40,430	40.612	40,542	40.92	40,941	41,009	41,528	41,529	41, 191	41,604	41,753	41,753	41,049	41.615	41.563	41,149	40.976	40,903	40.975	40,716	40,629	40,654	40,955	41,85
39,758 3	9,793	39,74	40,194	40,924	41,339	41,011	40,681	40,803	40,369	40,56			40,49				40,421	40,125			40,229			40,975						42,233	41,753	41,166	41,097	41,149	40,664	40,577	40,473	40,403	40,49	40,386	40,473	40,87
39,995 3	9,793	39,915	40,055	40,56	40,82	40,803	40,768	40,758	40,699	40,577	40,733		40,699					40,525		40,542						40,907		41,959		42,027	41,477	40,837	40,716	40,647	40,595	40,612	40,733	40,56	40,456	40,49	40,369	40,681
40,055 4	0,003	40,107	40,369	40,49	40,595	40,508	40,49	40,733	40,795	40,768	40,647	40,751	40,681	40,795 4	0,768 4	0,629	40,758	40,803	40,629	40,758	40,194	39,845	40,351	40,456	40,369	40,403	40,421	41,355	41,374	41,356	41,27	40,716	40,403	40,299	40,369	40,508	40,733	40,751	40,758	40,872	40,664	40,795
39,933	39.67	39,443	39,355	39.6	40,212	40,542	40,508	40,369	40,142	39,999	39.53	39,565	40.02	40,055 4	0,334 4	0,247	40,254	40,02	40,509	40,525	40,292	39,549	39,091	39,372	39,355	39,144	39,295	39,249	39,565	39,793	40,247	40,254	40.09	40,107	40,125	40.02	39,758	39,81	39,688	40,229	40.49	40.873
39,285 1	9,267	39,232	39,232	39,53	40,107	40,733	40,473	40,421	40,02	39,635	39,302		39,583			0,282	40,299			40,438	40,664		39,548	39,214		38,651	39,021	39,144	39,443	39, 372	39,565	39,985	39,793	40,09	40,107	39,985	39,968	39,723	39,723	39,793	39,81	40,19
39,197 1	9,056	38,927	39,038	38,933	39,548	19,615	40,072	40,177	39,863	39,583	39,162		39,479					40,369				40,716				38,809				39,425	39,302	39,495	39,618	39,758	40,003	40,072	40,072	40,055	39,933	39,968	39,98	40,000
39,337 3	9,144 1	39,056	38,862	38,721	38,827	39,562	38,845	39,565	39,295	38,915	39,162	39,408	39,495	39,775 3	9,090 4	0,142	40,142		40,768	40,768	40,525	39,933	39,705	39,828	39,898	39,705	40,037		40,351	40,16	39,425	19,038	39,443	39,915	39,88	40,177	40,177	40,49	40,473	40,612	40,508	40,436
37,995	37.3	37,211	37,479	37,792	37,995	38,261	38,137	38,615	38,739	38,545	38,208	38.99	39,408	39,723 3	9,863 3	9,863	39,863	40,003	39,968	40.072	39,618	38,862	38,633	39,162	39,81	40,003	40,316		40,508	40,681	40.647	40.09	40,229	40,299	40,254	40,334	40,299	40,194	40,125	40,142	40,351	40,380
37,586 3	6,403	35,97	36,114	36,745	37,693	38,048	38,545	39,126	39,425	39,003	38,88	39,32	39,548	39,618 3	9,775 3	9,723	39,618	39,408	39,285	39,635	40,316	39,933	39,583	39,88	39,81	40,194	40,194	40,02	40,316	40,386	40,681	40,595	40,733	40,612	40,508	40,508	40,264	40,247	39,968	40,055	40,107	40,365
38,031 3	6,529	35,553	35,589	35,897	36,999	37,443	38,208	38,95	39,635	39,635	39,408		39,583	39,618	19,46 3	9,408	39,249			39,933 39,619		40,907				40,803		40,473	40,49	40,751	40,612	40,785	40,403	40,681	40,612	40,612	40,473	40,56	40,699	40,56	40,49	40,365
37,032 3	6,277	35,097	36,095	35,099	30,259	37,014	37,657	30.00	39,232	39,126	39,039	39,179	39,337	39,39 3 39,295 3	9,337 3 9,074 3	9,074	30,95	30,721	38,915	39,003	_		40,525	40,768		40,629	40,369	40,003	40,438	39,99	40,351	39.46	40,072	39,635	39,555	40,037	40,395	40,612	41.011	41,097	40,993	40,993
36,187 3	6,367	36, 385	36,547	36,924	37,425	37,461	37,995	38,58	38,95	39,162	39,091	39,021	39,038	38,933 3	1,945 3	8,862	38,827	38,527	38,456	38,845	39,197	39,548	39,688	39,653	39,443	39,179	39,126	39,355	39,267	39,267	39,109	39,038	39,003	39,249	39,425	39,565	39,653	39,793	40,125	40,247	40,508	40,647
36,637	37,05	37,407	37,675	37,604	37,586	37,792	37,746	38,774	38,95	38,986	38,933	39,285	39,355	39,144 3	1,739	39,59	39,774			38,545			39,214	39,249		38,927	38,933	38,809	38,721	39,126	39,249	39, 32	39, 32	39,408	39,565	39,915	39,845	39,915	39,828	39,95	40,003	40,194
37,032	37,39 3	37,728	37,889	37,889	37,621	37,586	37,728	38,456	38,58	39,99	39,021	39,056	39,302	39,179 3		8,686 8,792	38,756		38,562	39,651		38,98 38,756	39,126		38,809	38,792	38,491	38,598	38,686	38,704	39,038	39,232	39,355	39,565	39,723	39,933	39,915	39,968	39,793	39,863	40,037	40,225
37,942 3	7,924	38,137	38,297	38,395	38,332	38,031	38,332	38,244	38,279	38,438	38,651	39,056	39,126	39,091 3		8,809	38,792			39,59						38,173	37,889		38,332	38,809	38,809	38,792	38,986	39,653	39,53	39,337	39,214	39,056	39,056	39,197	39,249	39.5
37,96 3	8,119	38,261	38,421	38,527	38,562	38,456	38,421	38,421	38,137	38,438	38,562	38,721	38,898	38,827 3	1,704 3	8,438	38,279	38,545	38,58	38,509	38,403	38,491	36,368	38,35	38,456	38,261	38,35	38,208	38,314	38, 314	38,226	38,226	38, 314	38,898	39, 337	39,32	39,003	38,686	38,633	38,545	38,756	39,144
37,746 3	8,137	38,226	38,244	38,403	38,58	38, 395	38,456	38,368	38,279	38,35	38,421	38,721	38,474	38, 332	10,19 3	8,119	38,155	38,208	38,226	38,19	38,438	38,137	38,19	38,35	38,456	38,509	38, 332	38,35	38,244	38,244	38,208	38,19	37,764	38,368	38,421	39,774	38,598	38,456	38,031	38,155	38,403	38,527
37,746 3	7,711	38,013	38,137	38,208	38,314	38,279	38,208	38,208	38,226	38,297	38,119	38,19	38,261	38,208 3 39,013 3	8,137 3 7,917	8,119 17.96	39,137	38,173	38,137	39,173				38,297 38,094		38,261	38,155	38,279	38,261	38,368	38,094	38,119	39,094	38,102	38,094	38,403	38,208	38,048	37,568	37,621	37,8	37,90
37,657 3	7,693	37,568	37,835	37,853	38,155	37,977	37,924	38,048	37,977	37,995	37,835	37,853	37,96	37,977 3	7,942 3	7,995	38,048	37,889	38,013	37,924						37,889	37,96	38,013	38,013	38,055	38,119	38,19	38,048	38,055	37,906	37,764	37,675	37,657	37, 372	37,532	37,746	37,764
37,711 3	7,639	37,711	37,746	37,746	37,953	37,817	37,889	37,853	37,792	38,048	37,853	37,817	37,889	37,977 3	1,031 3	8,048	37,835	37,853	37,693	37,568	37,675	37,675	37,764	37,8	37,953	37,953	37,889	37,871	37,871	38,013	37,817	37,942	38,048	38,066	38,031	37,746	37,711	37,55	37,568	37,568	37,746	37,725
37,532 3	7,764	37,8	37,764	37,764	37,924	37,835	37,871	37,977	38,048	38,226	37,942	37,871	37,906	37,835 3	1,013 3 1,102 3	7,989	37,96	37,764	37,657	37,942 38.055	37,8	37,792	37,764	37,764	37,906	37,924	37,999	37,853	37,977	37,995	37,995	37,977	37,942	38,048	37,853	38,137	37,835	37,711	37,586	37,639	37,693	37,5
37,621 3	7,532	37,675	37,711	37,764	37,977	37,924	38,013	38,155	38,226	38,244	38,19		38,456			8,314	38,102	38,119		38,279	-	38,474	38,19	-		38,173	38,279	38,491	38,438	38,545	38.35	38,297	38,244	38,137	38,031	38,438	38.35	38,314	38,094	38,031	38,314	38,244
37,604 3	7,675	37,835	37,942	37,871	38,173	38,102	38,137	38,19	38,279	38,297	38,35	38,545	38,403		1,208 J	6,438 3	38,438			38,456			38,509			38,421	38,368		38,809	38,686	38,58	38,421	38,279	38,314	38,19	38,244	38,455	38,58	38,562	38,438	38,403	38,596
37,639 3	7,675	37,835	38,066	38,261	38,279	38, 332	38,314	38,261	38,226	38,332	38,35		38,491	38,297 3	1,385 3	8,314	30,360	38,456		38,562	_	38,756		38,633	38,686	38,545	38,598		38,704	38,58	38,633	38,545	38,456	38,35	38, 261	38,421	38,527	38,421	38,403	38,403	38,368	38,403
37,899	7,924	37,924	38,297	38,491	30,545	30,721	30,305	30,226	30,155	37,942	37,817	38,332	38,35	10, 102	18,35 3 18,19 3	0.173	30,279	38,509	30,515	38,686			38,739	38,651	38,739	38,009	38,491		38,509	38,509	38,545	38,545	37.977	38,013	38,474	30,305	38,359	30,505	30,527	30,704	30,527	30,322
38,013 3	8,137	38,297	38,35	38,562	38,615	38,615	38,155	37,871	37,871	37,995	37,621	37,675	37,461			7,906	38,545	38,35	38,456	38,845			38,633	38,598	38,633	38,668	38,615			38,137	38,155	38,013	38,048	38,013	38,031	38,208	38,297	38,562	38,651	38,721	38,809	38,845
38,119 1	8,438	38,403	38,509	38,491	38,509	38,297	37,977	37,835	37,746	37,515	37, 336	37,425				7,906			38,456	38,474		38,562	38,774	39,59		38, 314			38, 368	38,297	38,155	37,906	38,048	38,066	38,048	38,102	38,137	38,456	38,491	38,704	38,756	38,721
38,35 1	8,385 9,615 ·	39,59	38,721	10,668	38,651	38,173	37,621	37,264	37,515	37,425	36,96	37,068	37,193	37,193 3	7,229 3	7,372	37,995	_		30,474				38,421		38,031	37,924			37,871	37,905	37,657	37,905	38,013	38,013	39,094	38,094	38,209	38,226	36,35	38,474	36,73
30,774 1	8,774	38,898	39,197	39,98	38,809	38,261	37,639	37,425	37,014	37,068	37, 193	37,354	37,292	37,497	17,39 3	7,461	37,711	37,924	37,889	38,314	38,368	38,155	38,055	37,924	37,889	37,586	37,497	37,443	37,497	37,55	37,407	37,515	37,621	37,889	38,119	38,137	38,314	38,279	38,119	37,905	37,905	37.947
38,421 3	8,527	38,927	38,98	38,633	38,456	38,244	37,8	37,497	37,425	37,443	37,497	37,792	37,729	37,889 3	7,792 3	7,711	38,066	38,031	38,226	38,244	38,297	38,19	38,013	37,8	37,479	37,461	37,157	37,318	37,086	37,336	37,425	37,425	37,532	37,792	38,208	38,102	38,314	38,208	38,155	37,942	37,817	37,817
38,385 1	8,651	38,615	38,509	38,297	38,208	37,924	37,657	37,657	37,639	37,711	37,924	38,102	38,155	38,155 3	1,119 3	8,155	38,208	38,137	38,314	38,173	38,066			37,675		37,354	37,336	37,175	37,211	37,264	37,39	37,461	37,604	37,871	37,96	38,031	38,155	38,066	37,792	37,8	37,443	37,53
37,497	7.693	37,746	37,754	37,389	37,782	37,497	37,372	37,372	37,711	37,989	38,421	30,305	38,297	38,314 3	1,297 1,173 3	10,19 0.013	36,173	37,792	38,094	38,048	37,792		37,693 37,586	37,515 37,264		37,318	37,336	37,264	37,461	37,443	37,515	37,461	37,568	37,728	37,725	38,013	39,013	37,96	37,725	37,817	37,604	37,475
37,443 3	7,532	37,728	37,568	37,792	37,657	37,96	37,835	37,906	37,906	38,119	38,297	38,19		37,942 3	7,711 3	7,871	37,621												37,372	37,764	37,906	37,995	37,942	38,066	37,906	38,261	38,102	37,977	37,96	37,693	37,586	37,425
37,693	37,55	37,728	37,835	37,817	38,048	38,35	38,368		38,455						37,8 3	7,657	37,711		37,586	37,693	37,639	37,515	37,443	37,3	37,39	37,175	37,139	37,05		37,39	37,853		38,173	38,19	38, 395	38,545	38,314	38,173	37,995	37,711	37,515	37,475
37,497 1	7,639	37,639	37,977	37,693	38,155	38,332	38,615	38,368					38,031			7,746	37,621			37,782						36,996	36,87		37,157	37,586	37,792		38,261	38,261	38,332	38,403	38,314	38,102	37,924	37,657	37,497	17,35
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														37,292 3																												
														36,791 3 36,395																												
														35,226 3																												
33,834 3	4,385	34,22	34,257	34,879	35, 39	35,716	35,299	35,244	34,989	34,77	34,825	34,147	34,294	33,815	13,87 3	6,312	33,926	34,129	34,018	33,741	32,666	32, 191	31,495	30,749	30,692	30,102	29,987	30,235	30,426	31,194	31,674	31,712	31, 373	31,448	31,448	31,956	32,536	33,205	33,594	33,557	33,612	33,999
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Keep your feet on the ground and monitor the process

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MENU

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Pilot projects main learnings:

- General mapping of the area of 50 ha possible in 10 minutes
- Gathered data easy to analyze
- Testing in different seasons needed
- Testing in different weather conditions needed
- Dual camera drone makes the monitoring process most efficant







Combined trainings

Trainings for personell - result orientated Solution of a formality?

What is the most efficient way?





E-learning solution

SAMPLE - solution for Utilitas Tallinn Power Plant





Thank you !