

AVEVA PI WORLD

Eyes on, hands off at ProRail

How the AVEVA PI platform meet ours monitoring needs

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AVEVA



ProRail

About ProRail

Infrastructure manager Dutch railway network

- Connecting people and freight by rail
 - Safe
 - Sustainable
- What we do
 - Maintain the network
 - Traffic control
 - Divide the capacity over different operating companies
- Facts and figures
 - 3000 km track and 5000 centrally controlled Switches
 - More than 3 million trains per year

ProRail is responsible

Work is done by service contractors

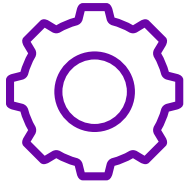
- Network is divided in service-contract-area's
- 4 contractors for maintenance
- Every area is maintained by a contractor for 5 years
- ProRail sets KPIs for the results

Contract area's



Contractor

Make a switch to preventive maintenance



Challenge

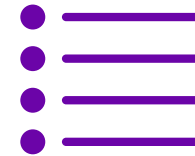
Increase the number of trains running over our railway network in the future while our network is already used very intensively



Solution

ProRail monitoring platform, PMP based on the PI system

To switch from corrective or periodic to condition based and predictive maintenance



Benefits

Continuity in our monitoring data

Combining data = more information

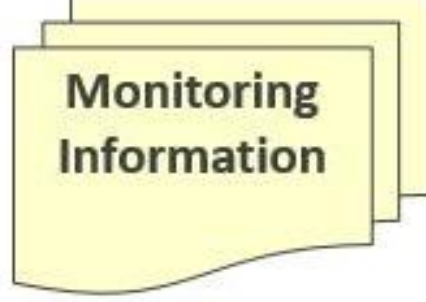
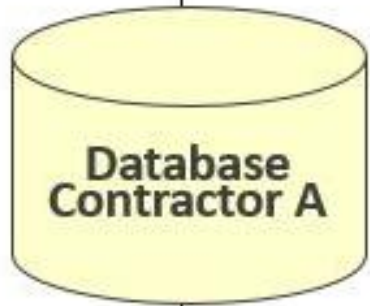
More insight in the behavior of our assets

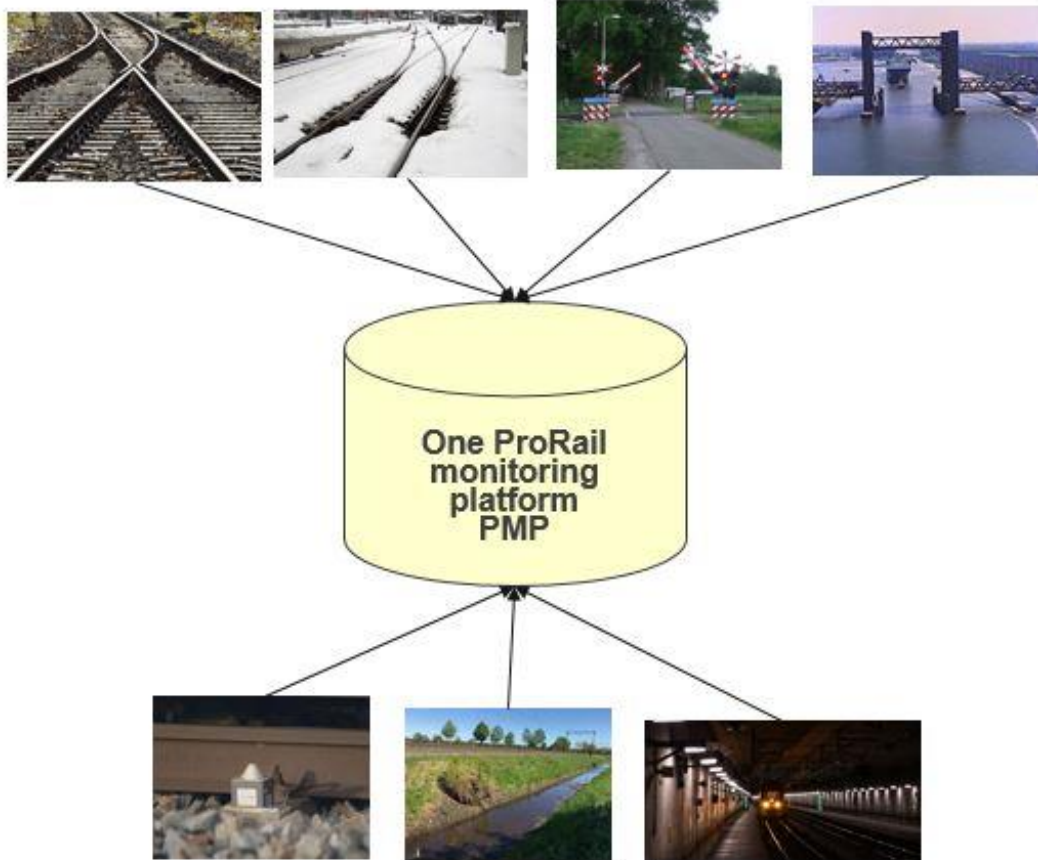
Data driven asset management

Higher availability of our network

Our monitoring data was divided Every contractor had his own system

- Every 5 years we start all over again with collecting data
- Every system has its own data format





Make a switch to one monitoring system

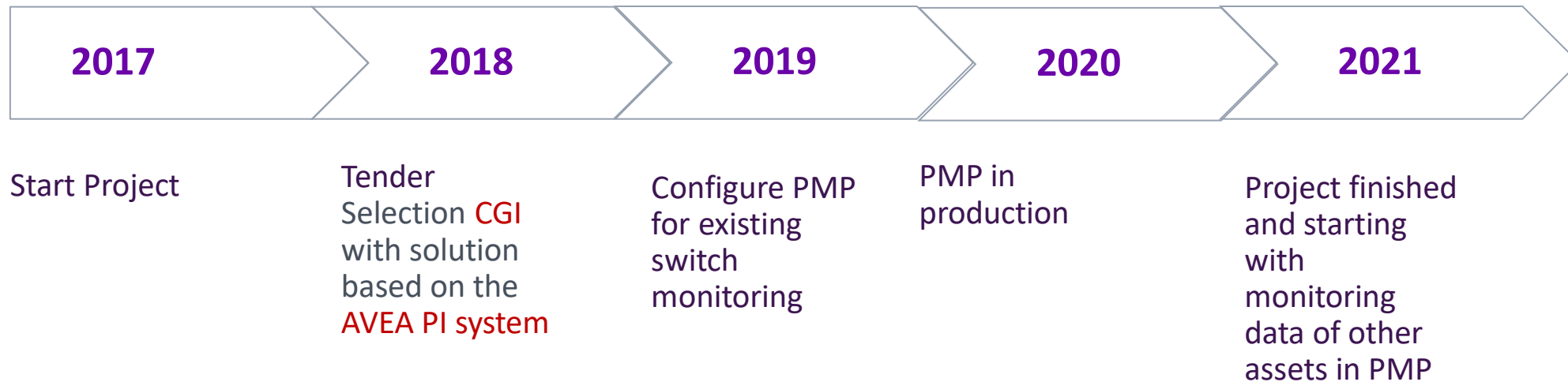
The ProRail monitoring platform PMP

- Continuity
- Combining data
- Trend analyses
- Making more information from our data

“Goal of the PMP project: select a platform for real-time asset monitoring and configure it for the existing monitoring of switches.”

The development of PMP started in 2017

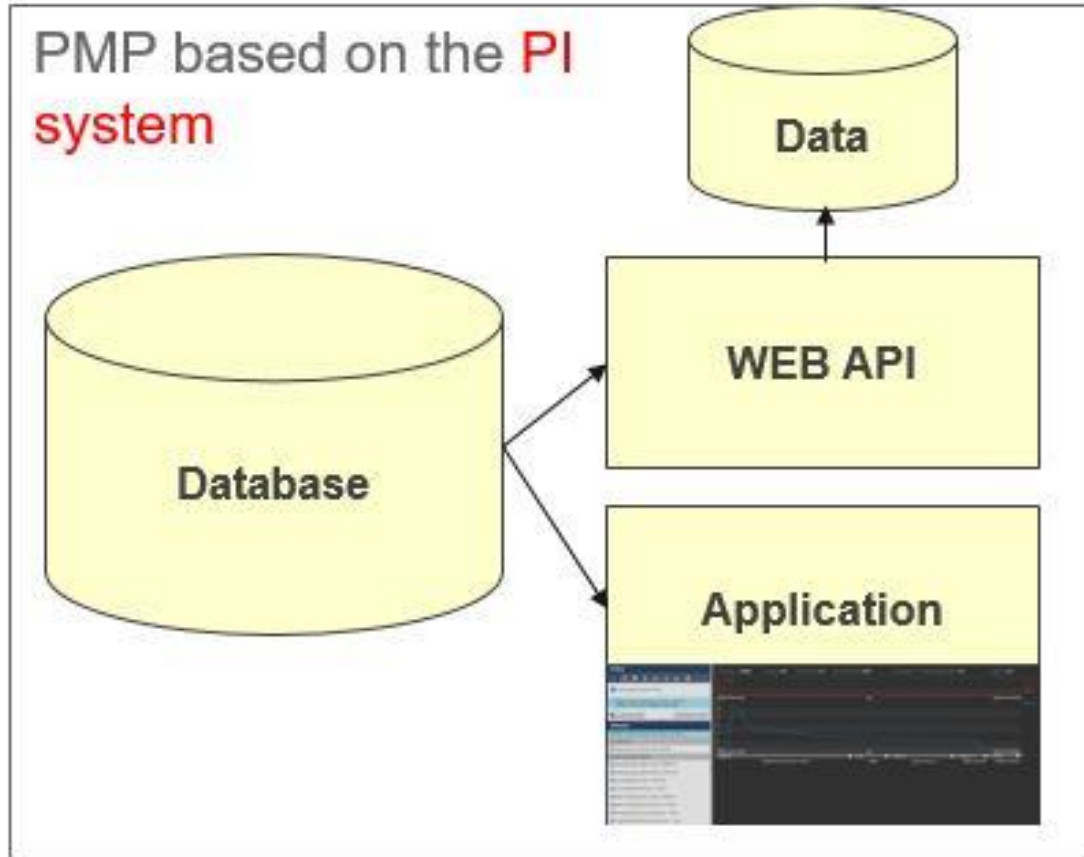
ProRail



PMP

ProRail Monitoring Platform

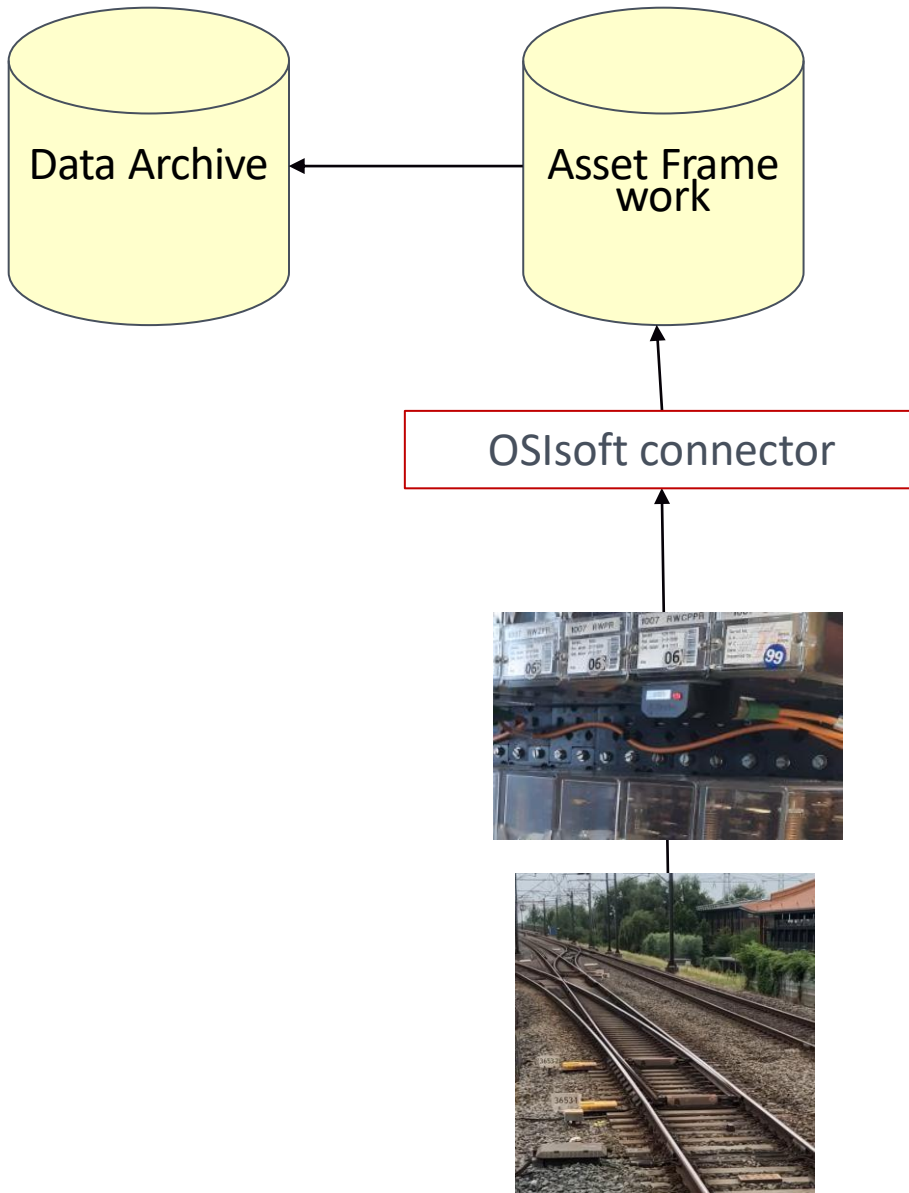
- One database
- Application with business rules to consult the data, warnings and alarms
- Web API to get the data for use in ones own application



Store switch data

Getting motor current data in our Data Archive

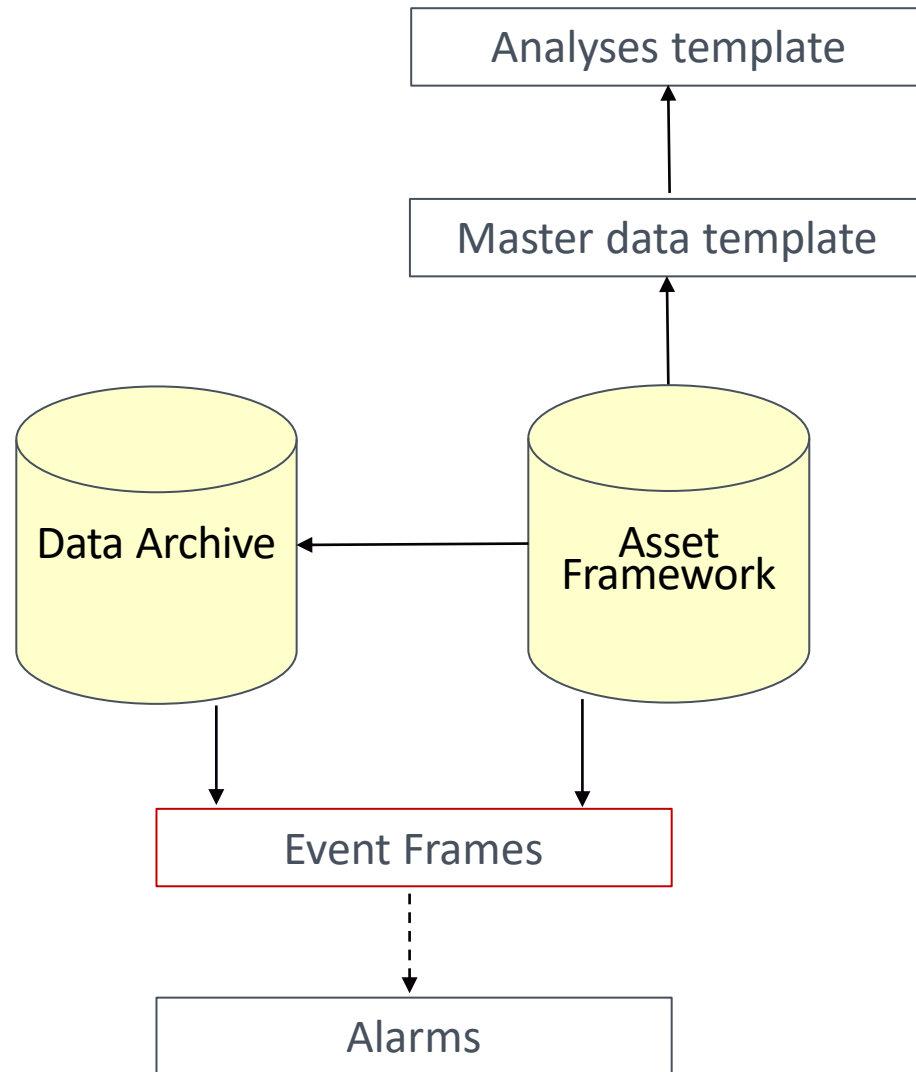
- Switch changes position from left to right
- Motor current data is stored in the *data logger*
- Motor current data is sent by connector to our Asset Frame work
- If the switch is 'known' in the Asset Frame work motor current data is sent to the Data Archive



Organize monitoring data

How asset and monitoring data are organized

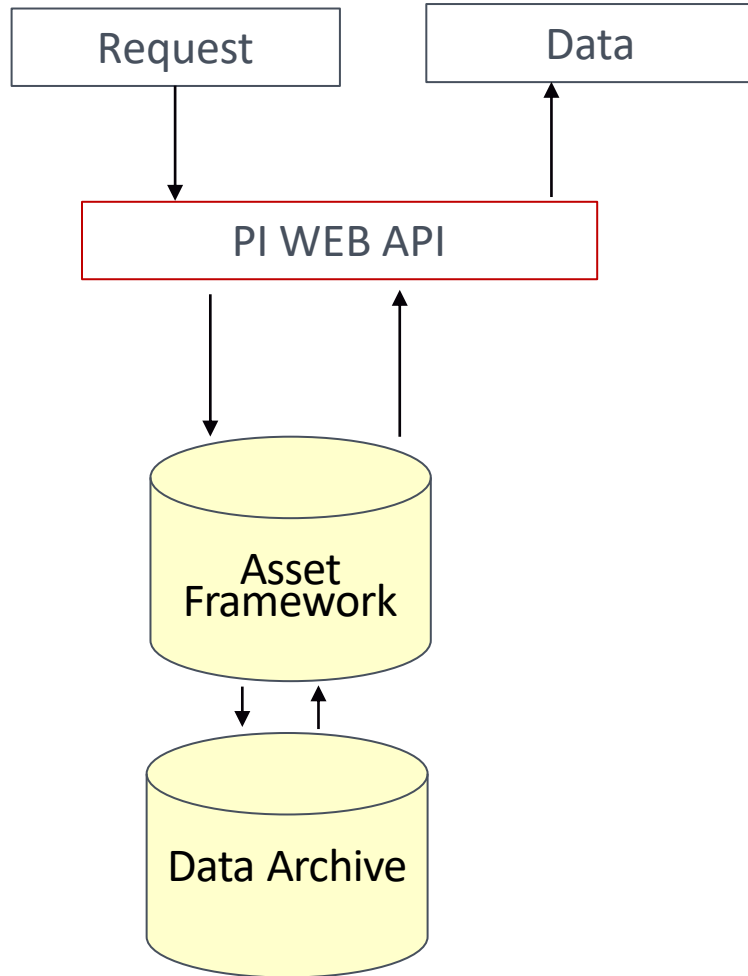
- For every asset which is monitored, data are stored in *Asset Framework*
- We store monitoring data in the *Data Archive*
- For every type of asset we have a *Master data template* and a *Analyses template*
- Every type of switch has its own templates



Get data to the end user

How to get data using the WEB API

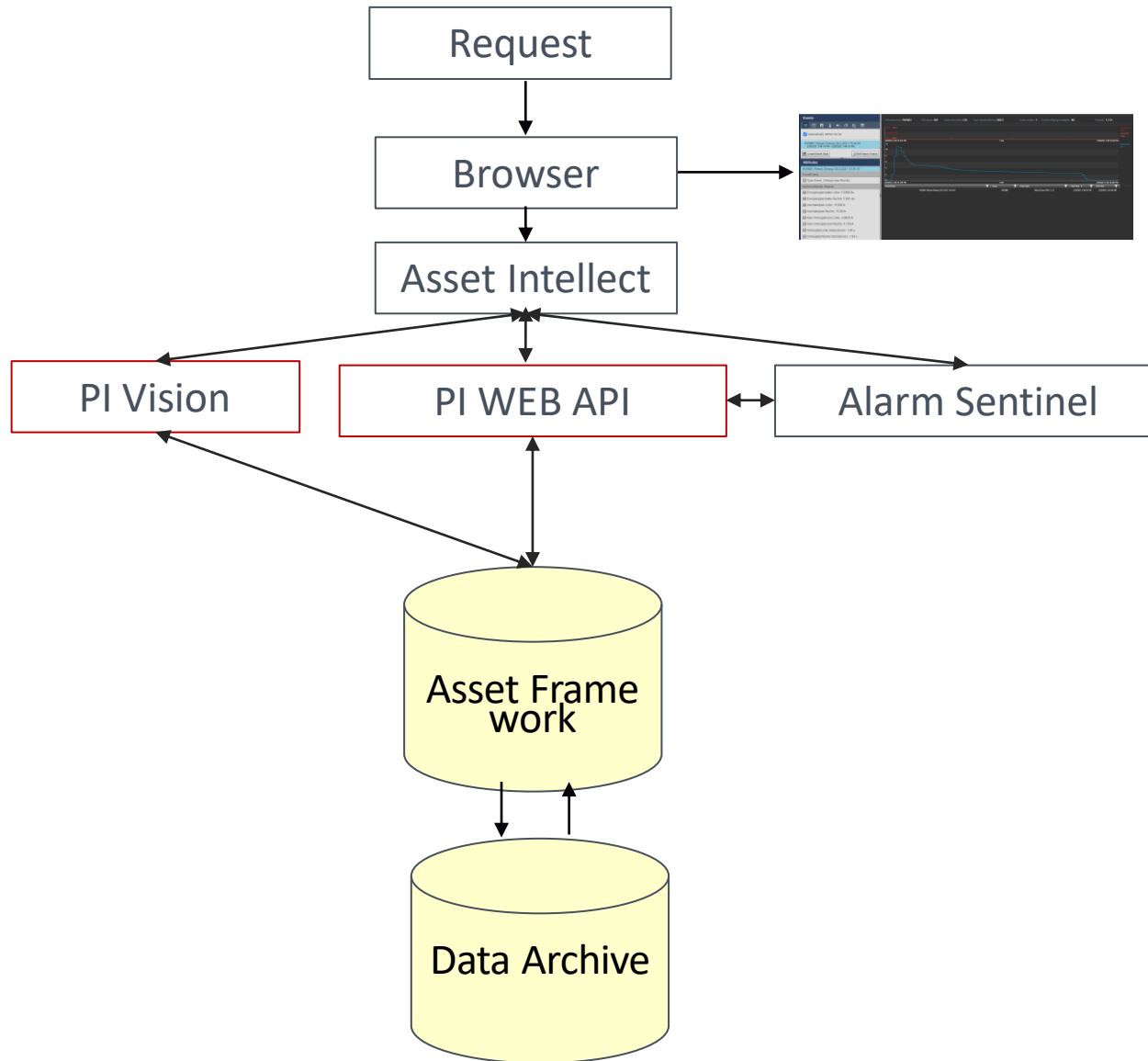
- End user, maintenance engineers sends a request to the PI WEB API with assets and time
- WEB API sends it to Asset Frame Work
- Asset Frame Work selects assets and sends request to Data Archive
- From Data Archive data is sent back and PI WEB API sends it to the end user



Get data to the end user

How to get data web browser

- Request is send to the browser and Asset Intellect
- PI Vision is used to make a graph
- Data can be requested by PI WEB API
- Alarms can be requested by Alarm Sentinel

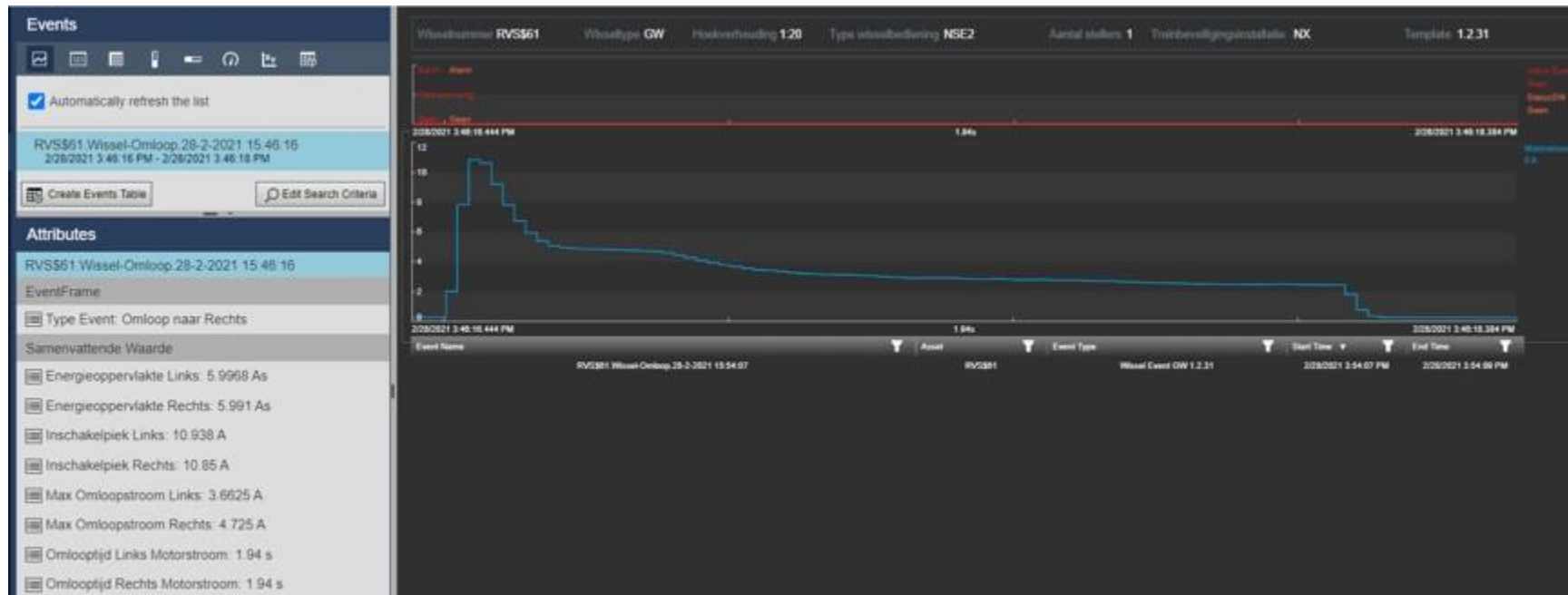


Asset Intellect and Alarm Sentinel are products of Dimension Software

Some examples of switch monitoring data

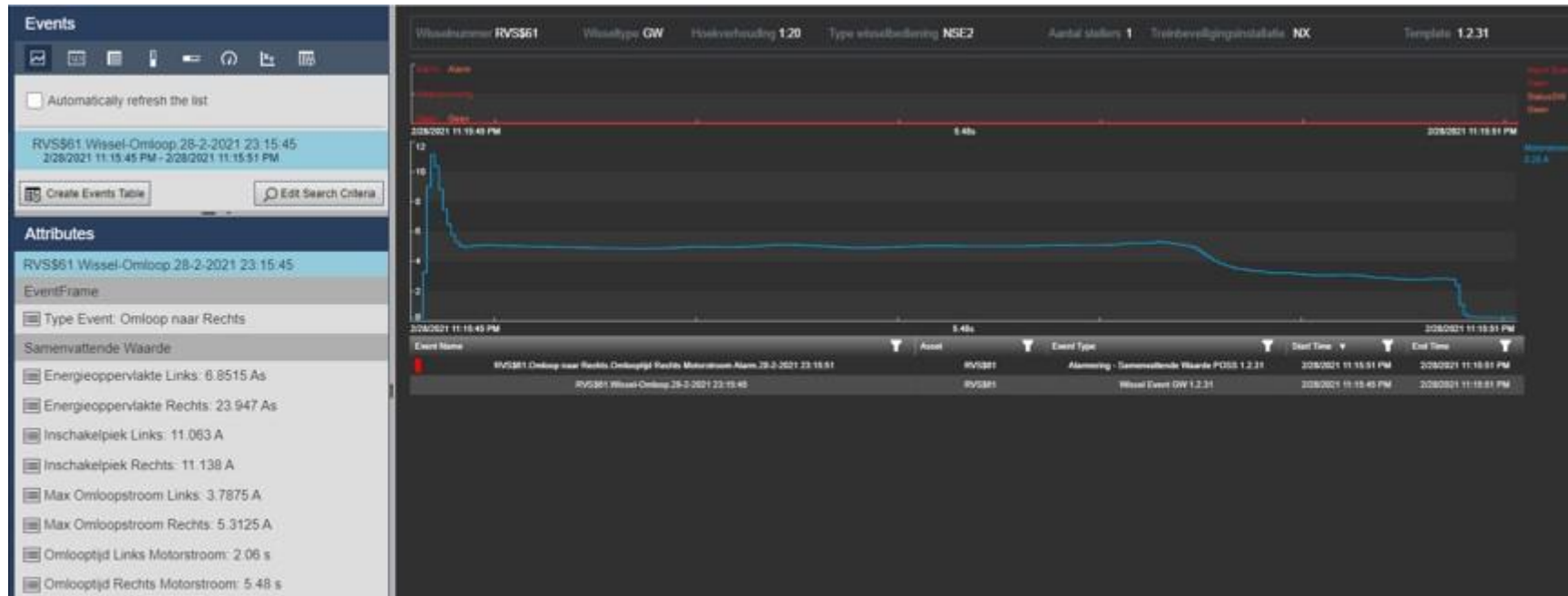
Switch RVS\$61: going to the right (no alarm)

Energy Right ≈ 6 [As] and Time Right ≈ 2 [s]



Switch RVS\$61: Going to the right (1), needs more energy

Energy Right ≈ 24 [As] and Time Right $\approx 5,5$ [s]



RVS\$61: Not going to the right (2), Alarm!

Energy Right ≈ 110 [As] and Time Right $\approx 20,5$ [s]



Summary events of Switch RVSS61

With alarms

Nederland > Zuid-West > Betuwe > RVS > Wissel > RVSS61

Meldingen Overzichtslijst Meetband Tijdslijn Trendanalyse X-Y Plot Documenten

Source: ProRail>Wissels>Meldingen

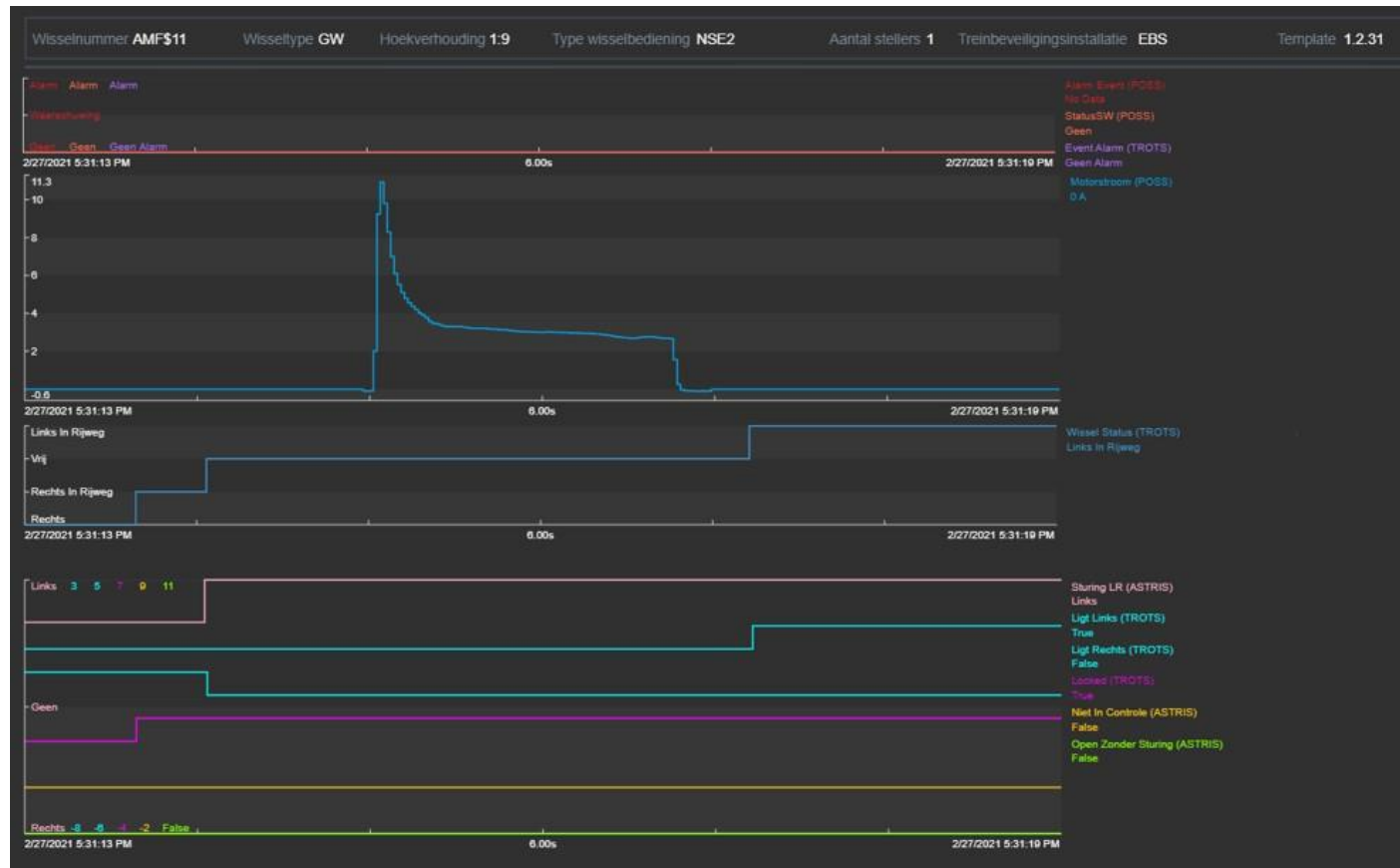
From: 27-Feb-2021 00:36 To: 14-Mar-2021 00:37

Filters: [objectnaam]='RVSS61'

	Time Stamp	Melding-ID	PPLG	Objectnaam	Eerste overschrijding	Tijdsduur	Aantal	(Laatste) Event	Status
	2021-03-01 21:51:00	Wissels-2063713	RVS	RVSS61	2021-02-06 23:10:17	22d22h40m43s	130	Stuurprobleem Links Alarm	Open
	Time Stamp	(Laatste) Event			Status	Toelichting			
	2021-03-01 21:51:00	Stuurprobleem Links Alarm			Open				
	2021-03-01 21:51:00	Omlooptijd Links Motorstroom Alarm			Open				
	2021-03-01 21:50:55	Omloopprobleem Rechts Alarm			Open				
	2021-03-01 21:50:55	Omlooptijd Rechts Motorstroom Alarm			Open				
	2021-03-01 21:50:30	Stuurprobleem Links Alarm			Open				
	2021-03-01 21:50:30	Omlooptijd Links Motorstroom Alarm			Open				
	2021-03-01 21:46:40	Omloopprobleem Rechts Alarm			Open				
	2021-03-01 21:46:40	Omlooptijd Rechts Motorstroom Alarm			Open				
	2021-02-28 23:15:51	Omlooptijd Rechts Motorstroom Alarm			Open				

Combining monitoring data

Motor current graph and response time to a command of traffic control of a healthy switch



Motor current graph

Response to command of traffic control

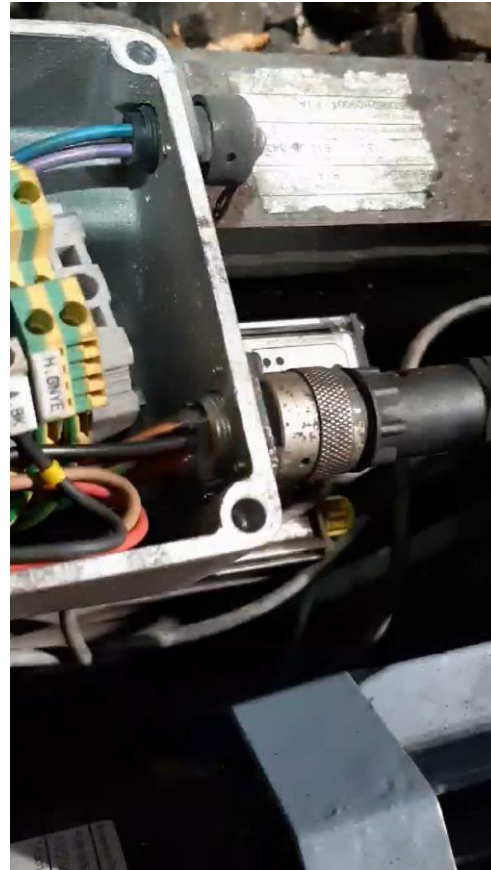
Switch in serious trouble

Energy Right ≈ 110 [As] and Time Right $\approx 20,5$ [s]



What was the matter

Not a smoking gun but a smoking cable



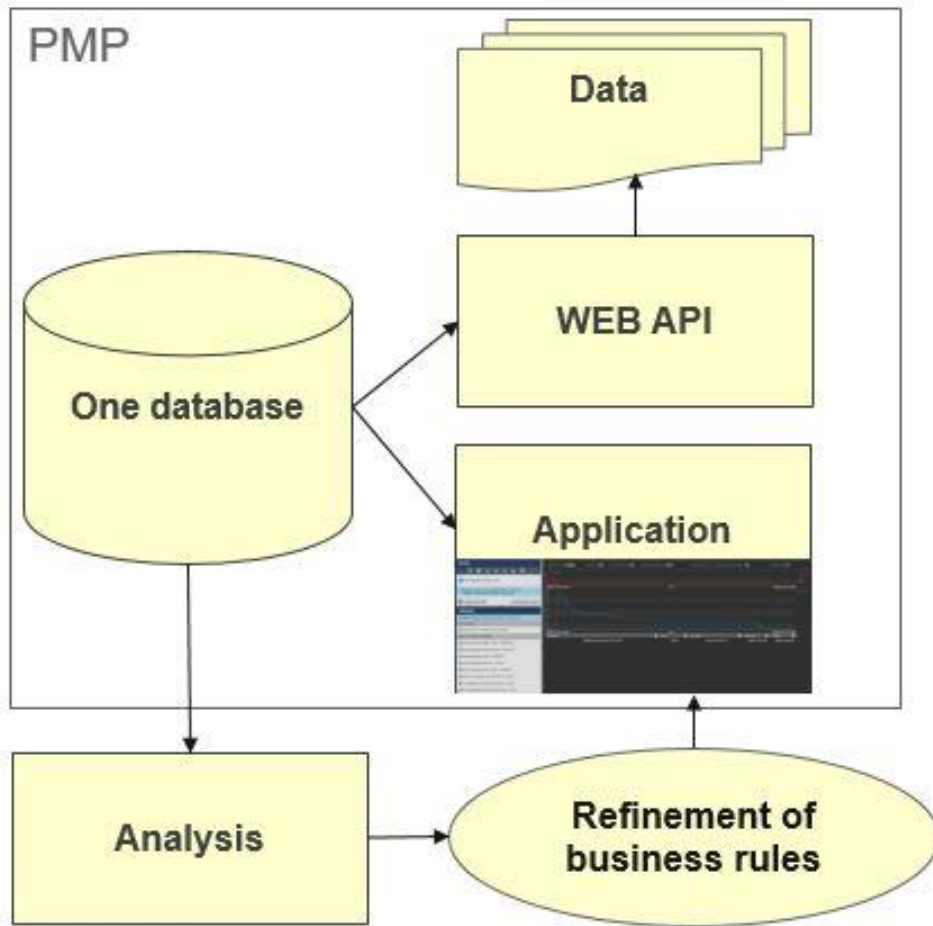
The advantages and future of PMP

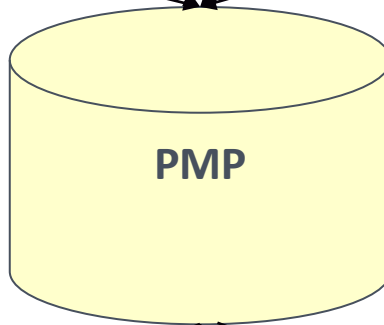
Strong points of PMP

- One database with all our monitoring data
- Possibility of combining data
- Warnings and alarms based on business rules

To develop

- Trend analysis to refine business rules has to be done with other tools
- Not possible to use data from the past for warnings and alarms
- Many templates makes maintenance of the application time-consuming and costly





System specialist

Inspectors

Data lab

Contractors

Manufacturers

Research institutes

Universities

Is PMP finished?

No, we are just starting

- Adding monitoring data of:
 - Switch heating
 - Sections
 - Tunnels en movable bridges

Broader use of the data

One platform

The advantages of one monitoring platform

- Continuity in monitoring data
- All parties involved in maintenance of assets look at the same data
- Data can be used for the operation and analysis
- Results of analysis for improving PMP
- Combining monitoring data leads to more insight of the behaviour of assets

**Data driven
asset
management**

**Predictive
maintenance**

**More eyes,
less hands**



**Higher
availability**

One monitoring platform helps
us to perform maintenance in
a more efficient and effective
way ...

AVEVA



ProRail

... so we can bring more people and freight
from A to B on time, in a safe and
sustainable way



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THANK YOU

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DANKIE

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GRACIES

WHAKAWHETAI KOE

DANKON

TANK

TAPADH LEAT

SALAMAT

SPASIBO

GRAZIE

MATUR NUWUN

ХВАЛА ВАМ

MULŦUMESC

PAKMET CIZGE

고맙습니다

GRAZIE

شكرا

FAAFETAI

ESKERRIK ASKO

HVALA

GO RAIBH MAITH AGAT

БЛАГОДАРЯ

GRACIAS

ТИ БЛАГОДАРАМ

MAHADSANID

MAHALO IĀ 'ŌE

TAKK SKAL DU HA

TEŞEKKÜR EDERİM

OBRIGADO

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DI OU MÈSI

ĎAKUJEM

RAHMAT

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PAKKA PÉR

HATUR NUHUN

PAXMAT CAĠA

CẢM ƠN BẠN

WAZVIITA

FALEMINDERIT

ありがとうございました

SIPAS JI WERE

TERIMA KASIH

UA TSAUG RAU KOJ

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ТИ БЛАГОДАРАМ

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