

OCTOBER 24, 2023

Petrobras: Digital Operational Status of Offshore Platforms – SITOP Digital

How AVEVA PI System drove us to look forward on operational reports

Gondiberto Carvalho

Vinicius Souza

AVEVA



One of the
biggest
Brazilian
companies

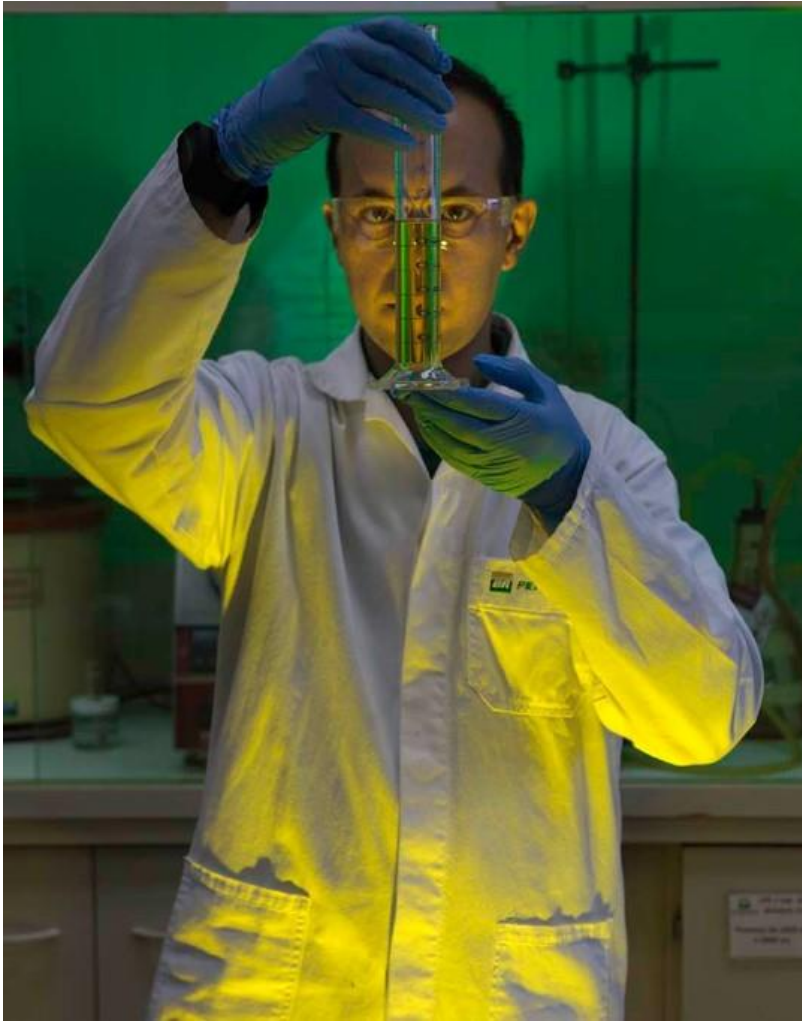


Petrobras headquarter in Vitoria-ES



Over **40,000**
direct employees

And over
100,000 indirect



Worldwide reference in
research, development
and **innovation** for the
global O&G industry

Production around
2.0 million barrels
of oil per day



70 years producing
oil and gas



15 years from the
first pre-salt oil
produced in the world

Strategic Plan – 2023/2027

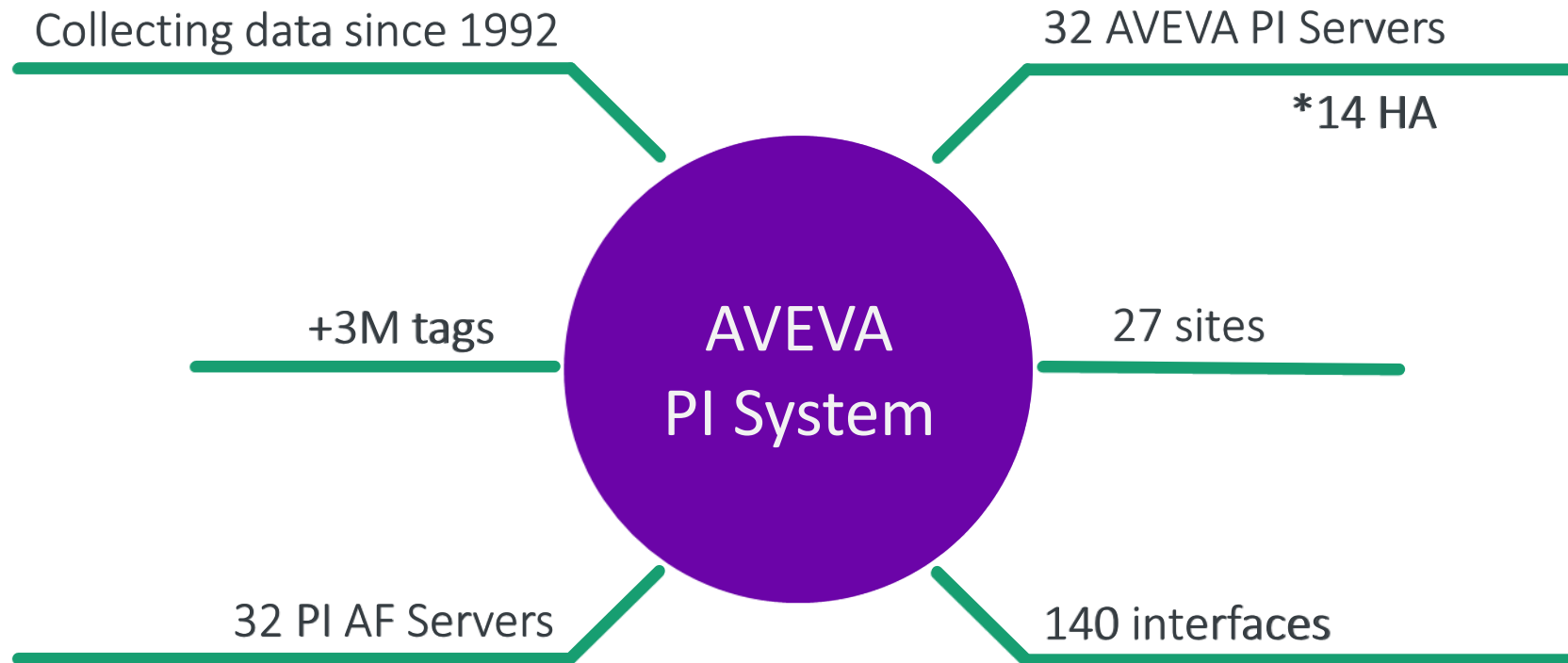


Investing even more in
reduced carbon emissions
technologies

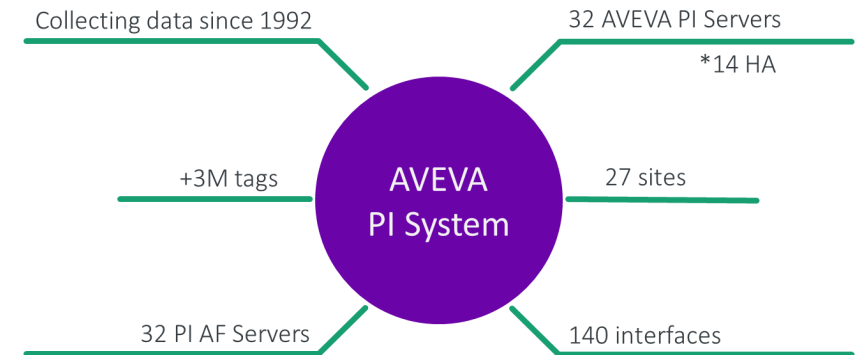
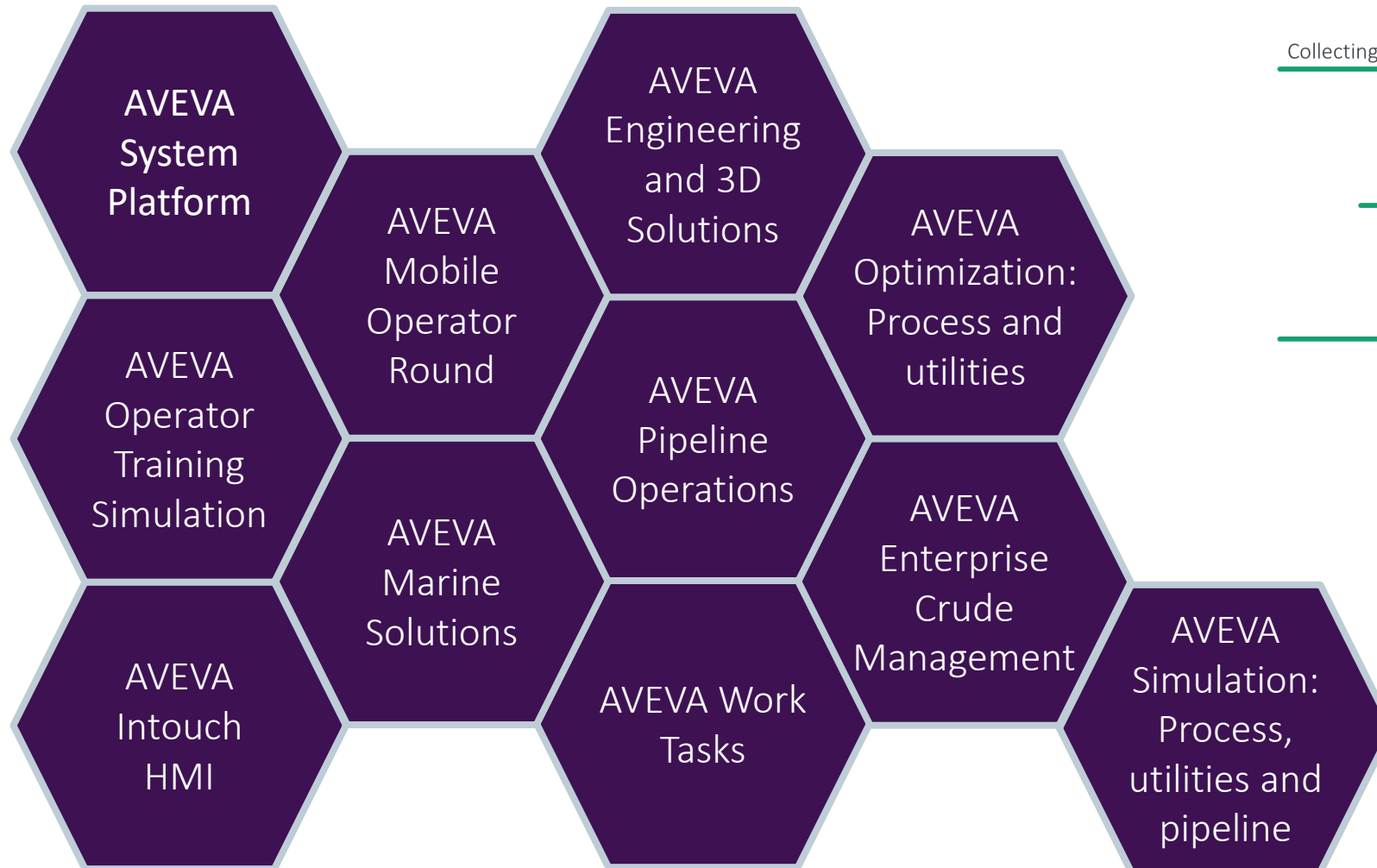
11 new oil platforms,
including all-electric projects

Goal of producing
3.6 million barrels per day

Overview of AVEVA Products used in Petrobras



Overview of AVEVA Products used in Petrobras



PETROBRAS

Agenda

- Context
- Timeline
- Product development
- System Architecture
- PI Asset Framework implementation details
- SITOP Digital results
- Questions

Memory test

Memory test

Have anyone bought
a newspaper today?

At least, do you
remember the last time
that you bought one?



What is a newspaper?

- ✓ Printed sheets of paper
 - ✓ Information from yesterday
 - ✓ Information from a prior day

Does it sound familiar???



SITOP – Offshore Operational Status

ÓLEO		GÁS	
PL0:	5.838 m ³ /d	PGAS:	1.363x10
	36.721 bbl/d	GL:	0x10
POT:	5.837 m ³ /d	GCOMB:	207x10
	36.773 bbl/d	QUEIMA:	8x10
QB:	8.639 m ³ /d	GEXP:	1.148x10
BSW-entr:	32,40 %	EXP:	17
BSW-tanq:	0,20 %		

----- ÁGUA PRODUZIDA -----
 ÁGUA PRODUZIDA: 2.790 m³/d
 ÁGUA DESCARTADA: 0 m³/d

----- INJEÇÃO DE ÁGUA -----
 POTENCIAL: 15.480 m³/d
 INJETADO: 10.877 m³/d

----- ESTOQUE -----
 Estoque total de óleo: 143.703 m³
 Espaço disponível: 107.443 m³
 Estoque para offloading: 83.869 m³
 Estoque água produzida: 0 m³
 Tancagem atual: 267.184 m³
 Previsão de TOP: 24/02/2019 06:19

----- DIESEL -----
 ESTOQUE MÁXIMO: 3.000 m³
 ESTOQUE MÍNIMO: 2.000 m³
 ESTOQUE CRÍTICO: 1.500 m³
 COTA MÍNIMO RECEBIMENTO: 600 m³
 SISTEMA DISPONÍVEL: NÃO
 CONSUMO: 1 m³
 RECEBIDO: 0 m³
 ESTOQUE NÃO TRATADO: 2.007 m³
 DISPONÍVEL RECEBIMENTO: 992 m³

TELEGRAMA

PARA USO DA ESTAÇÃO

1º RÁDIO DO 1º POÇO PRODUTOR DA BACIA DE CAMPOS

RECEBI EM 15/08/77
AS 2250
M

ENDEREÇO: DEXPRO/DIPRO/GIMN/DECOM/DIPLAN
C/C DIRPRO/REPBA/DIGUAR

DISUD-T 40.540/77 DE 15.08.77

PRODUÇÃO PETROLEO DIA 13.08.77 EM METROS CUBICOS
 746 ASSIM DISTRIBUIDA BIPT FAZENDA CEDRO 280
 ENXOVA 360 CAMPO GRANDE 4 SAO MATEUS 60 RIO PRETO
 22 CEDRO NORTE 20 PT OBS ENXOVA EM TESTE DE
 PRODUÇÃO PT PERDA DE PRODUÇÃO BIPT FAZENDA CEDRO
 AGUARDANDO SPT (30) SEM CONDIÇÕES SURGENCIA (70) PT

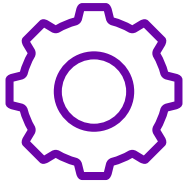
JARDIM/DIRPRO

RGJ/mpff

Assinado por JOSE ELVO G. DE ALMEIDA

#TBT

World-class upstream operations



Challenge

- Change the culture of using a text-based report, in use for 40 years, to a new model, more agile, dynamic and based on Digital Transformation



Solution

- Develop a new system, named SITOP Digital, using PI System as base
- Allow updates when necessary
- Allow corporate database queries
- Allow data analytics queries

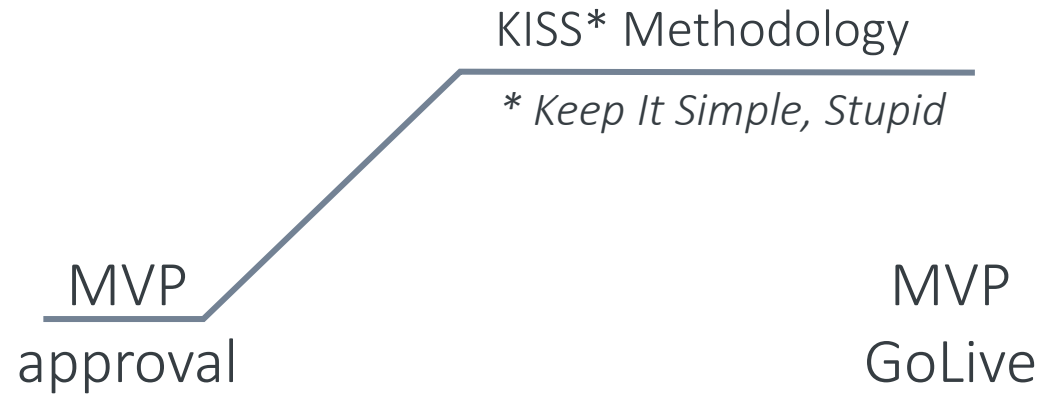


Benefits

- More reliable reports, varying according to operational condition
- Around \$500,000/yr in man-hour savings
- Provide more hours for operations staff to work safely and efficiently

Development Timeline

Project start
with DT Team



May
2018

Jul
2019

Sep
2019

2020 /
2021*

May
2021

Aug
2021

Lean Inception
with IOCs and
IT Team

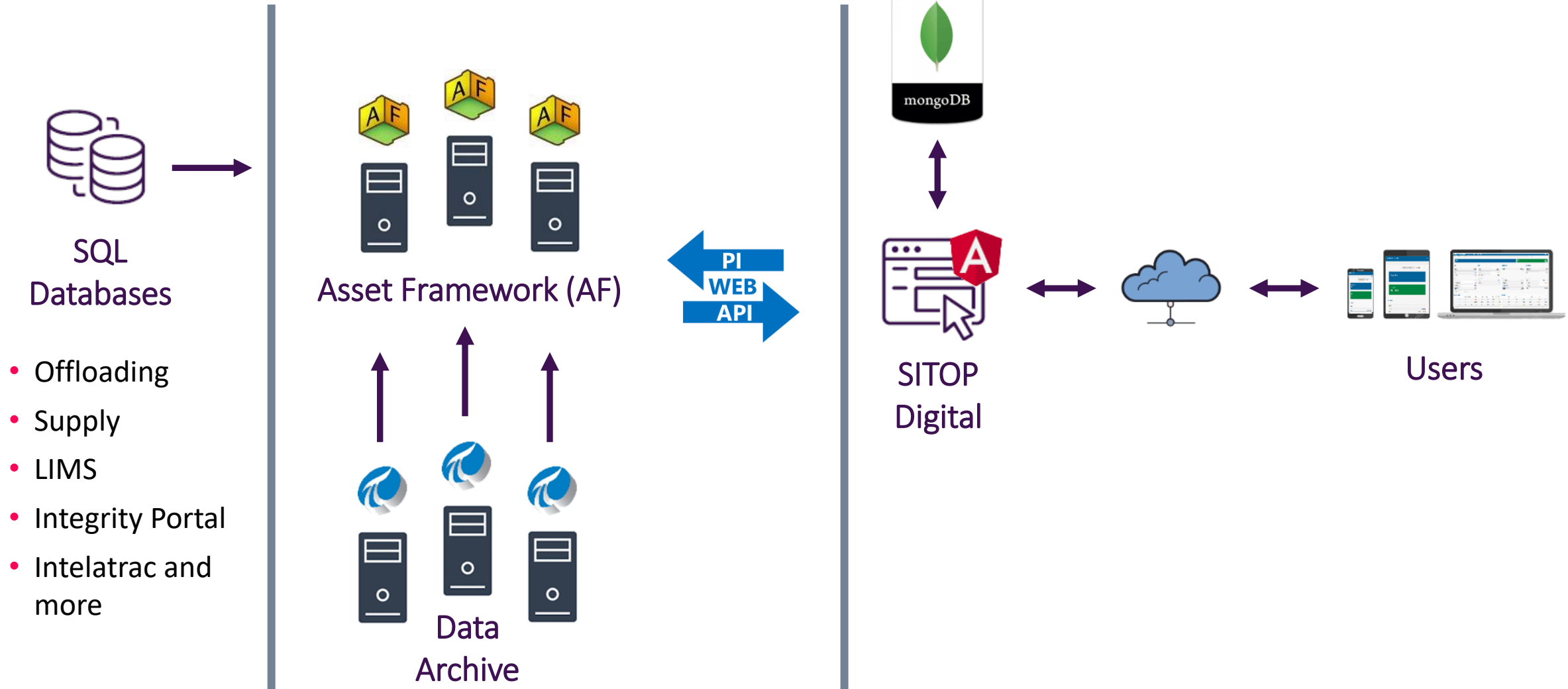
Product
development

Product
release

SITOP Digital Architecture

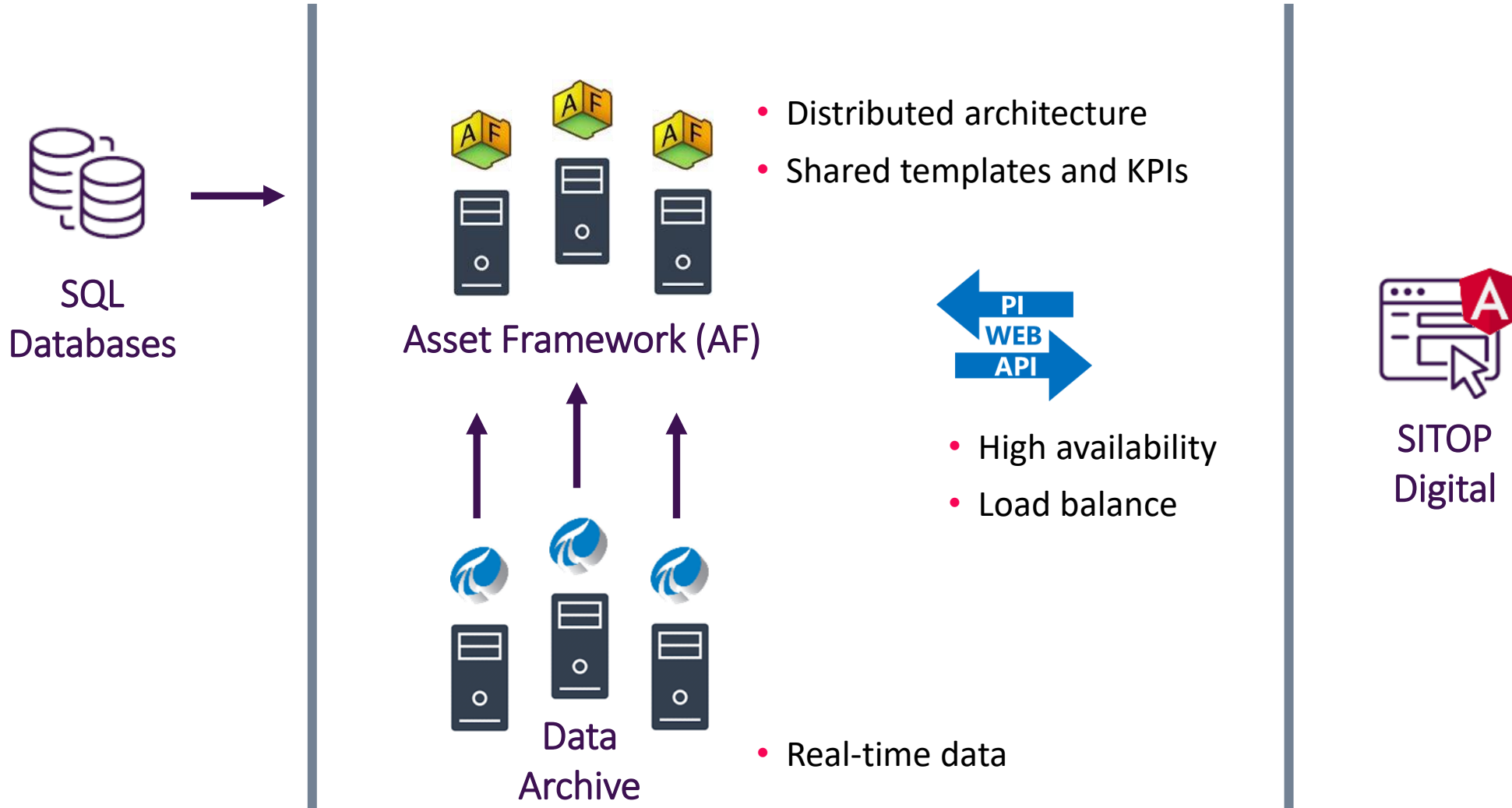


SITOP Digital Architecture

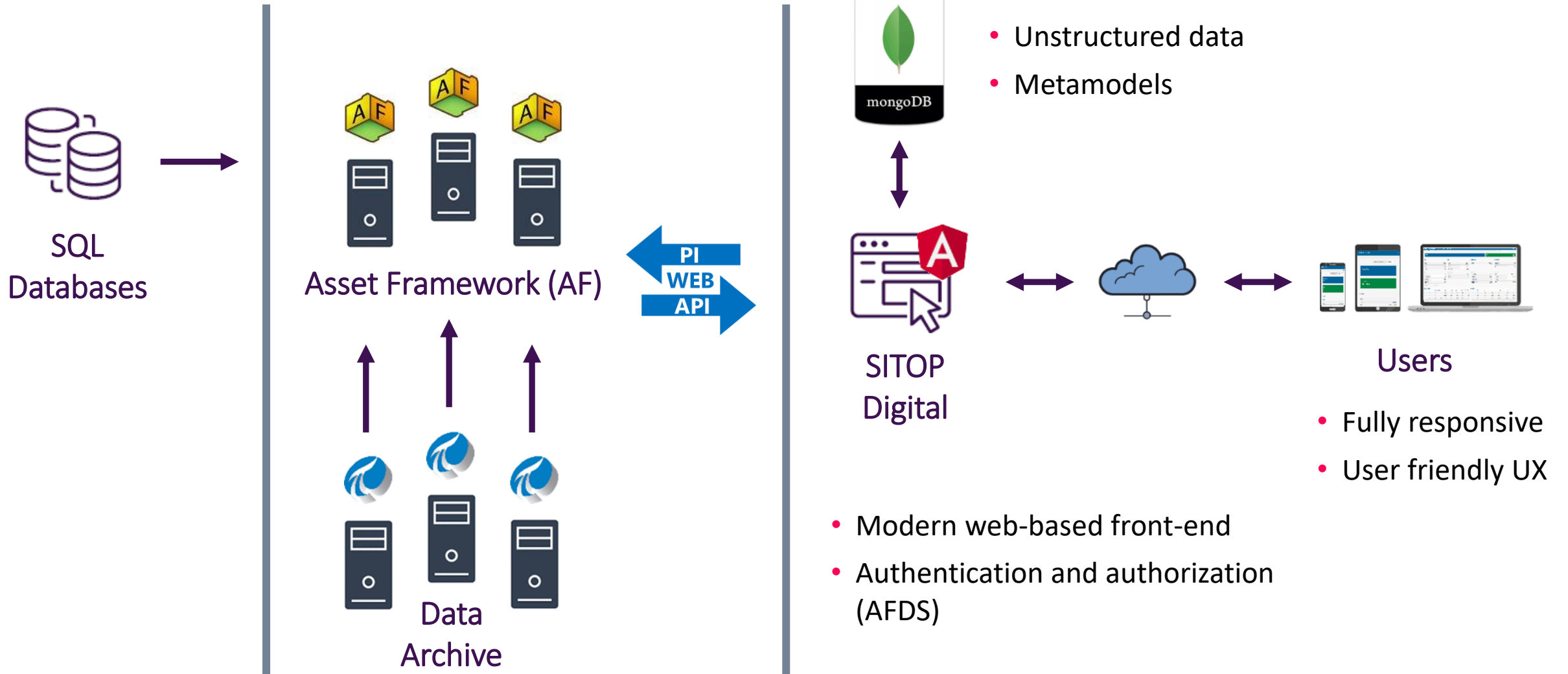


- Offloading
- Supply
- LIMS
- Integrity Portal
- Intelatrac and more

SITOP Digital Architecture



SITOP Digital Architecture



- Unstructured data
- Metamodels

- Modern web-based front-end
- Authentication and authorization (AFDS)

- Fully responsive
- User friendly UX

PI AF implementation details

Template based – start small, but think big

- **Scalability:** Fast deploy for the other business units
- Easy to **maintain** and to include new **KPIs**
- **Reduce** deployment costs

Name	Description	Default Value
BSW de Entrada		0 %
BSW de Tanque		0 %
EFICIÊNCIA		0 %
PLO		0 bbl
Automatico		0 bbl
Fonte	Cálculado	0
Manual		-1 bbl
Path		0
PLO (m3/d)		0 m3
POT		0 bbl/d
POT (m3/d)		0 m3/d
QB	m3/d	0 m3/d



Name	Value
BSW de Entrada	84,85 %
BSW de Tanque	0,71 %
EFICIÊNCIA	96,47 %
Plataforma	[REDACTED]
PLO	38828 bbl
PLO (m3/d)	6173 m3
POT	40250 bbl/d
POT (m3/d)	6399 m3/d
QB	313956 bbl/d
Servidor	[REDACTED]
VAZÃO BRUTA	6195 m3/d

PI AF implementation details

Manual data entry

- Overwrite the calculated data
- **Persists** data back in PI AF/Data Archive

Óleo

General Child Elements Attributes Ports Analyses Notification Rules V

Filter

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QB	313956 bbl/d
Servidor	
VAZÃO BRUTA	6195 m3/d

SITOPD GONDIBERTO HAASE DE CARVALHO > UN-ES

Boletins Modelos Assuntos Domínios

Boletim

BSW 0,71

PI
WEB
API

ÓLEO

PLO (m³/d)	6.184 m3
PLO (bpd)	38.896 bbl
POT (m³/d)	6.399 m3/d
POT (bpd)	40.250 bbl/d
QB	313.954 bbl/d
BSW	* 0,71 %
EFICIÊNCIA	96,64 %

PI AF + PI WebAPI benefits

Data democratization

SITOP Digital

ÓLEO

PLD (m³/d)	6.554 m³/d
PLD (m³/d)	98.859 m³/d
POT (m³/d)	6.999 m³/d
POT (m³/d)	40.241 m³/d
OR	114.126 m³/d
BSW	0,71 %
EFICIÊNCIA	96,38 %

GÁS

PRODUZIDO	201 m³/m²/d
GÁS LÍQ	1.577 m³/m²/d
COMBUSTÍVEL	66,411 m³/m²/d
QUEIMA	01 m³/m²/d
IMPORTADO	0 m³/m²/d
EXPORTADO	342 m³/m²/d
PRESSÃO EXPORTAÇÃO	186 kgf/cm²

INJEÇÃO DE ÁGUA

INJE LADO	8,26 m³/d
POTÊNCIA	55,41 m³/d
EFICIÊNCIA	90,09 %

ÁGUA PRODUZIDA

ÁGUA PRODUZIDA	42.841 m³/d
ÁGUA RECICLADA	840 m³/d
ÁGUA REINJETADA	24.744 m³/d
LÍMITE DE REINJEÇÃO	57.800 m³/d
EFICIÊNCIA	55,87 %

DIESEL

CONSUMO	0 m³
COTA MÍNIMA	300 m³
RECEBIMENTO	1.913,74 m³
ESTOQUE	1.886.660 m³
ESTOQUE LIMÍTO	1.860 m³
ESTOQUE MÍNIMO	1.860 m³
ESTOQUE MÁXIMO	1.860 m³
RECEBIDO	0 m³

ÁGUA POTÁVEL

CONSUMO	67 m³
ESTOQUE	221 m³
PRODUZIDO	58 m³
RECEBIDO	0 m³

ESTOQUE

CAPACIDADE OPERACIONAL	302 m³
DT. REFERÊNCIA	05/10/2023
USQUO ESPONJAVEL	102.389 m³
ESTOQUE PI OFFLOADING	59.639 m³
ESTOQUE TOTAL DE ÓLEO	89.139 m³
ESTOQUE AGUA LIMPE	1.640 m³
PREVISÃO DE PRODUÇÃO 21h4	6.336 m³
PREVISÃO DE TOP	22/10/2023

OFFLOADING

ALINHADOR	SÃO SEBASTIÃO
BSW DA EXPORTAÇÃO	
CARGA PRODURADA	70.000 m³
CARGA TRANSFERIDA	
ESTOQUE DE ÁGUA	
PRZE OPERAÇÃO 15:00:01	21.11.2023
SITUAÇÃO	PROGRAMADO

SITOP Digital

SITOP Digital



Custom Rest API



SITOP in numbers



72 oil platforms



09 ad hoc bulletins



~500 daily users

Results



Measurable

vs.

Non-measurable

Results

Non-measurable

Dynamic information

Data integration – Single point of truth

Decision making agility

Confidence and availability

Results

Measurable

Barrels per Day



AVEVA

Results

Measurable

Man-hour

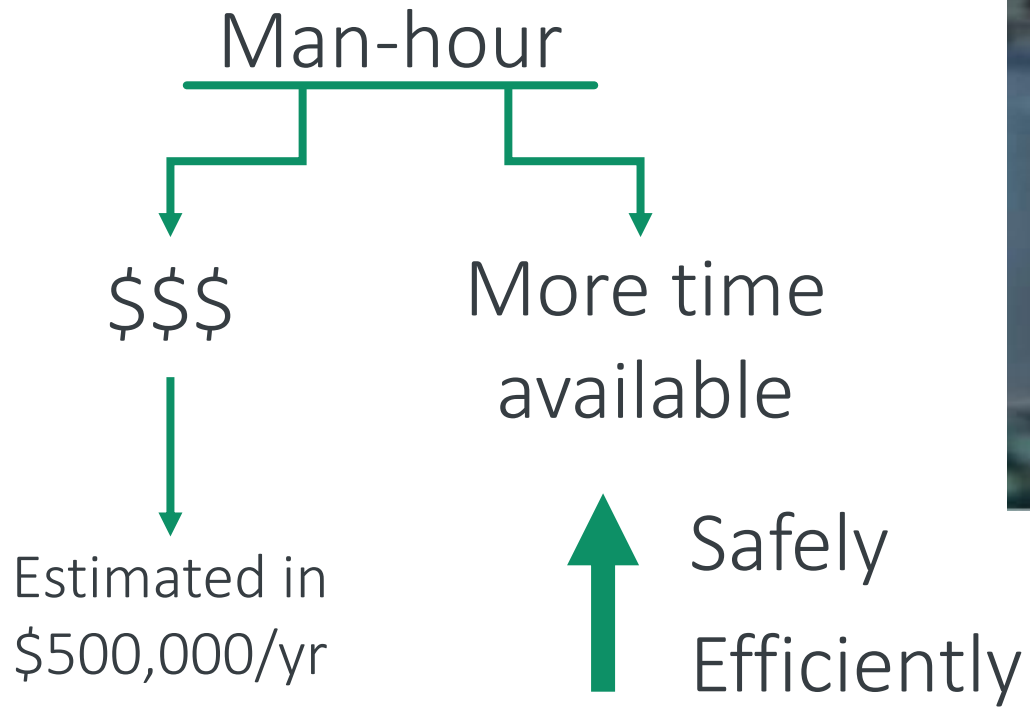
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Estimated in
\$500,000/yr



Results

Measurable



“It’s not about the money
It’s about sending a message”
The Joker – The Dark Knight

Results

Man-hour

More time available

Safely Efficiently

✓ Smart use

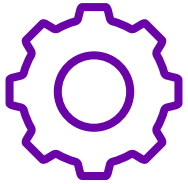
✓ Added value



“It’s not about the money
It’s about sending a message”

The Joker – The Dark Knight

World-class upstream operations



Challenge

- Change the culture of using a text-based report, in use for 40 years, to a new model, more agile, dynamic and based on Digital Transformation



Solution

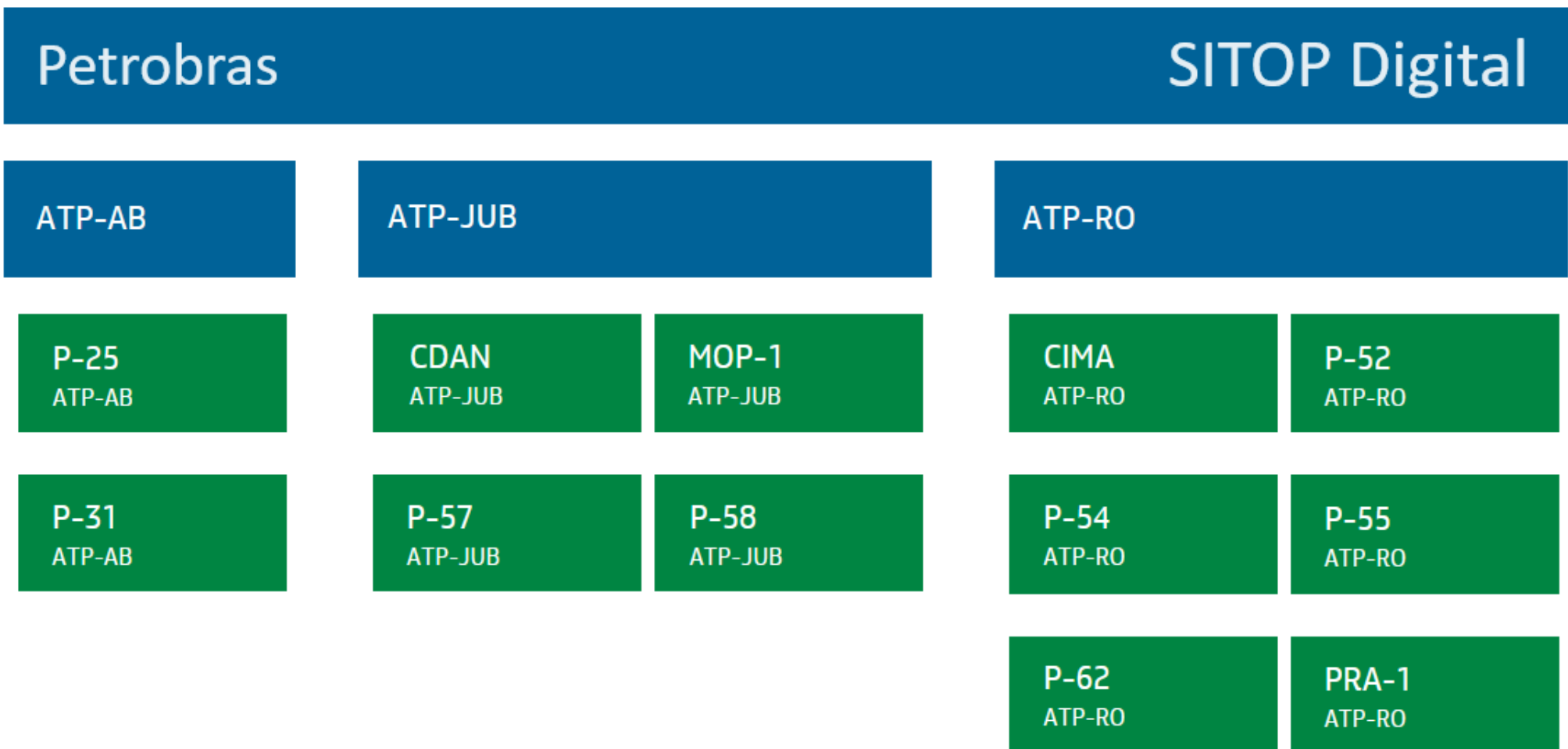
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- Allow updates when necessary
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- Allow data analytics queries



Benefits

- More reliable reports, varying according to operational condition
- Around \$500,000/yr in man-hour savings
- Provide more hours for operations staff to work safely and efficiently

Conclusion



Conclusion

Boletim
UEP

SITOP Digital

ÓLEO

PLO (m³/d)	6.334 m³
PLO (bpd)	39.839 bbl
POT (m³/d)	6.399 m³/d
POT (bpd)	40.250 bbl/d
QB	314.126 bbl/d
BSW	0,71 %
EFICIÊNCIA	98,98 %

GÁS

PRODUZIDO	351 mil m³/d
GAS LIFT	1.377 mil m³/d
COMBUSTÍVEL	66,431 mil m³/d
QUEIMA	61 mil m³/d
IMPORTADO	0 mil m³/d
EXPORTADO	242 mil m³/d
PRESSÃO EXPORTAÇÃO	106 kgf/cm²

INJEÇÃO DE ÁGUA

INJETADO	36,93 mil m³
POTENCIAL	53,45 mil m³/d
EFICIÊNCIA	69,09 %

ÁGUA PRODUZIDA

ÁGUA PRODUZIDA	42.947 m³/d
ÁGUA DESCARTADA	842 m³/d
ÁGUA REINJETADA	24.144 m³/d
LIMITE DE REINJEÇÃO	37.800 m³/d
EFICIÊNCIA	63,87 %

DIESEL

CONSUMO	0 m³
COTA MÍNIMA RECEBIMENTO	300 m³
DISPONÍVEL RECEBIMENTO	1.913,34 m³
ESTOQUE	1.886,660 m³
ESTOQUE CRÍTICO	1.800 m³
ESTOQUE MINIMO	3.000 m³
ESTOQUE MÁXIMO	3.800 m³
RECEBIDO	0 m³

ÁGUA POTÁVEL

CONSUMO	67 m³
ESTOQUE	221 m³
PRODUZIDO	58 m³
RECEBIDO	0 m³

ESTOQUE

CAPACIDADE OPERACIONAL	202.478 m³
DT REFERÊNCIA	05/10/2023
ESPAÇO DISPONÍVEL	102.309 m³
ESTOQUE P/ OFFLOADING	59.638 m³
ESTOQUE TOTAL DE ÓLEO	89.135 m³
ESTOQUE ÁGUA LIVRE	1.444 m³
PREVISÃO DE PRODUÇÃO 24H	6.334 m³
PREVISÃO DE TOP	22/10/2023

OFFLOADING

ALIVIADOR	SÃO SEBASTIÃO
BSW DA EXPORTAÇÃO	-
CARGA PROGRAMADA	70.000 m³
CARGA TRANSFERIDA	-
ESTOQUE DE ÁGUA	-
PRÓX. OPERAÇÃO PREVISTA	21.11.2022
SITUAÇÃO	PROGRAMADO



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Questions?

Please wait for the microphone.
State your name and company.



Please remember to...

Navigate to this session in the mobile app to complete the survey.



Thank you!

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AVEVA is a world leader in industrial software, providing engineering and operational solutions across multiple industries, including oil and gas, chemical, pharmaceutical, power and utilities, marine, renewables, and food and beverage. Our agnostic and open architecture helps organizations design, build, operate, maintain and optimize the complete lifecycle of complex industrial assets, from production plants and offshore platforms to manufactured consumer goods.

Over 20,000 enterprises in over 100 countries rely on AVEVA to help them deliver life's essentials: safe and reliable energy, food, medicines, infrastructure and more. By connecting people with trusted information and AI-enriched insights, AVEVA enables teams to engineer efficiently and optimize operations, driving growth and sustainability.

Named as one of the world's most innovative companies, AVEVA supports customers with open solutions and the expertise of more than 6,400 employees, 5,000 partners and 5,700 certified developers. The company is headquartered in Cambridge, UK.

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