

Immersive Learning in Petroleum Asset Management and Petroleum Engineering



CONCEPT



WE TRAIN ROBOTS
AND ROBOTS TRAIN PEOPLE!

What is this

PetroCup is an on-line interactive training and testing program in various Upstream activities, including exploration, field development planning and well & reservoir management.

It's powered by the **PolyPlan** software which implements a digital twin of synthetic petroleum assets so that a professional petroleum asset team can go through many years of field exploration and production in just a few days or a few weeks and learn a lot of practical lessons in key petroleum disciplines, cross-discipline interaction and asset management.

APPLICATION



Why doing this

- ✓ Team-training for Asset Management
- ✓ Cross-discipline training
- ✓ Practical training for young specialists
- ✓ Certification/Testing
- ✓ Corporate championship
- ✓ Cross-corporate competition

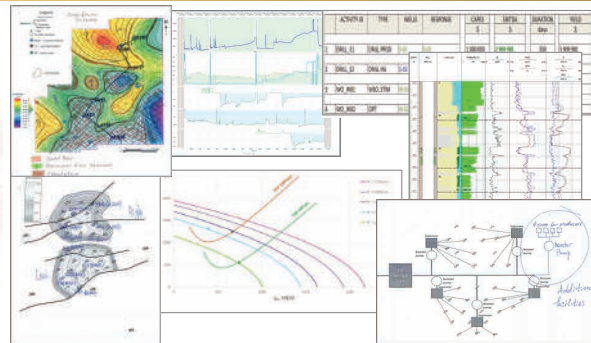
TARGET AUDIENCE



Who needs this

- ✓ Assets Manager (the captain of the team)
- ✓ Economics & Procurement engineer (economics and prioritisation)
- ✓ Facility Engineer (surface infrastructure, production gathering and water supply)
- ✓ Well & Reservoir Engineer (drilling, workovers, production targets)
- ✓ Production Technologist (production optimisation)
- ✓ Simulation Engineer (current reserves and pressure)
- ✓ Geologist (initial reserves)
- ✓ Petrophysicist (core analysis and OH log interpretation)
- ✓ Well Test Engineer (pressure-rate design and interpretation)
- ✓ Well & Log Analyst (production logging design and interpretation)

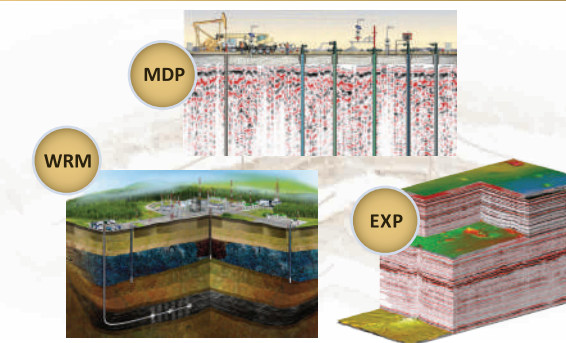
SKILLS



What is required and acquired

- ✓ Investment Project Economics
- ✓ Exploration
 - G&G Data Analysis
 - Booking Reserves
- ✓ Field Development Planning
 - Designing & Optimising Surface Facilities
 - Drilling, Workovers, Fracturing
 - Production Optimisation
- ✓ Field Surveillance
 - Seismic Analysis
 - Open-Hole Log Analysis
 - Cased-Hole Log Analysis
 - Pressure/Rate Transient Analysis
- ✓ Field Studies
 - Nodal Analysis
 - Well Performance Analysis
 - Localising reserves opportunities
 - Identifying pressure support opportunities
 - Assessing reservoir properties
 - Material balance analysis
 - Cross-well connectivity

SESSION FORMAT



Engineering Domains

- ✓ **Petrocup WRM** sets a focus on training/testing in well and reservoir management of the brown and mature fields
- ✓ **Petrocup MDP** sets a focus on training/testing in the master development planning of a newly explored field based on G&G data, Reserves Booking and a few years of trial production
- ✓ **Petrocup EXP** sets a focus on training/testing in hydrocarbon exploration, petroleum geology, petrophysics and the reserves booking

SESSION FORMAT



Practicum

Practicum is a one-day on-line stand-alone **PetroCup** session where user can place shots at will, monitor the performance metrics in real-time, rewind back to previous **Shot** and try different field operations or restart the session anew. In other words a user rents the **PetroCup** engine for the whole day with the full access to **Debriefing** metrics. The **Practicum** session is fully automated and does not involve **Nafta College** specialists. A user can go through the **Practicum** session alone or make up a team. It provides an excellent experience in corresponding domains (**MDP**, **WRM** or **G&G**) and prepares a user or a team for the **PetroCup Tournaments** and **PetroCup Certification**.

SESSION FORMAT

October 2019 (10.10.2019 ASXP-5 ASD)

Team		#1	#2	#3	#4	#5	ENPV	min. S	Team / Reference FDP %
Reference FDP		19.1	16.8	18.7	16.4	13.9	14.9	100%	
Jura	Almetyevsk State Oil Institute	6.6	9.6	7.9	8.2	8.6	8.9	48%	
Ordin	Tyumen State University	8.8	7.1	8.6	7.9	6.8	79.4	46%	
Pern	Kazan Federal University	7.4	8.1	7.4	8.1	7.5	30.4	45%	
Carbon	Almetyevsk State Oil Institute	5.8	7.7	7.5	9.8	8.6	37.9	45%	
Camby	Saint-Petersburg Mining University	7.8	8.1	6.8	5.3	6.6	33.9	40%	
Tras	Udmurt State University	6.1	4.7	6.3	5.9	6.5	29.5	35%	
Sbur	Tyumen Industrial University	4.8	4.9	4.8	5.5	5.4	25.8	30%	
Archy	Ufa State Petroleum Technical University	5.7	4.3	5.5	5.2	4.7	25.4	30%	
Negone	Ukhta State Technical University	4.2	4.8	3.9	6.7	5.5	24.3	29%	
Devon	Pern National Research Polytechnic University	3.8	3.2	7.2	4.8	5.1	23.4	28%	

Tournament

Tournament is a multi-team competition with the limited time frame for each **Shot** (usually one or few hours). It starts with introduction to **PetroCup** regulations, followed by detailing of the current **Session** specifics. The **Tournament** may last one or few days and consists of several **Shots** (usually from 3 to 10) each of them representing a one year production period of synthetic field. The **Tournament Standings** are available to all teams after each **Shot** thus manifesting the progress of each team in terms of Net Present Value of the gross Asset Profit and instigating the further competition. After the **Tournament** the **Session Moderator** performs a **Debriefing** on teams' performance and eventually proceeds into a Winner Award Ceremony.

TOURNAMENT

SHOT

DEBRIEFING

DEBRIEFING

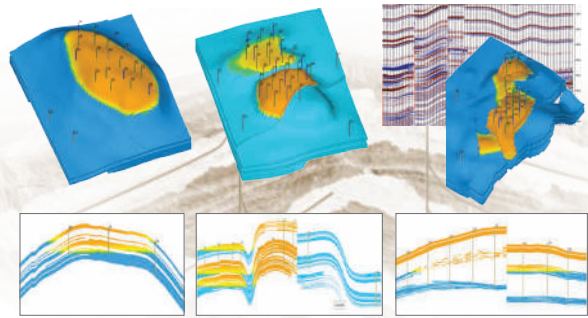
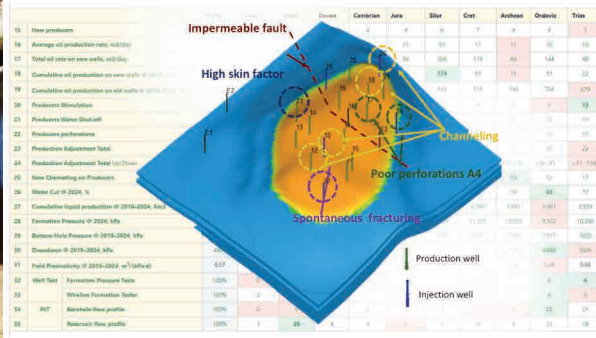
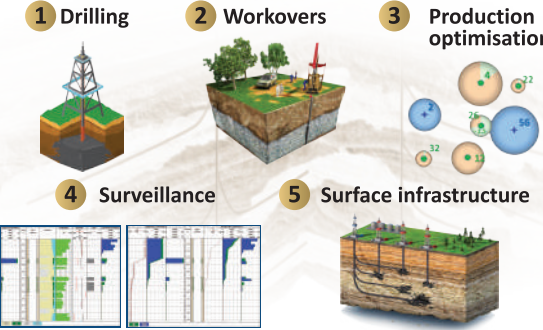
TESTING

TOOLS

ASSET RESOURCES

HUMAN RESOURCES

JANUARY						
M	T	W	T	F	S	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		



Schedule

Field Operations

Performance Analysis

Formats

Certificate

PetroCup

Petroleum Assets Library

Nafta Team

A typical 1-day, 5-shot **Tournament** schedule is:

Day 1	
08:30	Briefing
09:30	Start Tournament
11:30	Shot 1 Time-out
13:30	Shot 2 Time-out
14:30	Shot 3 Time-out
15:30	Shot 4 Time-out
16:30	Shot 5 Time-out
16:30	Debriefing
17:30	Awarding Ceremony

This can be extended to a few days and less or more shots and customised to specific needs.

The **Tournament** consists of **Shots** with the following activities:

- ✓ Building/Modifying surface facilities
- ✓ Drilling
- ✓ Side-Tracks
- ✓ Workovers
- ✓ Lift settings for producers
- ✓ Choke settings for injectors
- ✓ Seismic survey
- ✓ Open-hole logging
- ✓ Cased-hole logging:
 - Production Logging
 - Corrosion Logging
 - Leak Detection
- ✓ Well testing:
 - BUS/FOS
 - Multi-rate
 - Interference Test
 - Formation Testing
- ✓ Production Analysis:
 - Prime Analysis
 - Material Balance
 - RTA/MRT

Debriefing is the analysis of session performance based on video-presentations and auto-generated performance metrics.

It helps understand the true properties of the asset which were initially undisclosed and compare it with what participants have managed to reveal.

It also helps to understand the efficiency of teams actions by comparing the key performance indicators to those of the **Reference Production Scenario** and to the other teams.

Debriefing can be performed autonomously by each team or can be facilitated on-line or face-to-face by **Nafta College** specialist.

- ✓ **OMR** (Open Map Review) is an online video presentation, explaining the actual Asset properties and performance/complication of each Asset node
- ✓ **CAS** (Consolidated Activity Statistics) is a set of autogenerated on-line metrics on team performance which explain the field development strategy each team undertook during the **Tournament**
- ✓ **AAA** (Activity by Activity Analysis) is a set of autogenerated on-line metrics explaining the performance of each and every action which team undertook at each **Shot**
It is available as online video for the **Reference Production Scenario** and as a web-presentation for each of the **Tournament** Teams.

PetroCup program provides the **Certification** mechanism by running a one-day 5-shots **PetroCup Tournament** on a face-to-face basis in one of **Nafta**'s Certified Centres. The **PetroCup Certificate** can be verified any time in future on-line at **Nafta** website.

The **Certificate** sessions provide the unbiased automated assessment of practical skills in key petroleum and management disciplines including the:

- ✓ Field Development Planning
- ✓ Well and Reservoir Management
- ✓ Geology, Geophysics and Exploration

PetroCup software implements a digital twin of Petroleum Asset, replicating the behaviour of:

- ✓ Various Asset facilities
 - rocks, reservoirs, wells
 - surface pipelines, pumps, processing plants
- ✓ Various types of flows through the Asset facilities
- ✓ Various Asset Activities
 - drilling, workovers, well completions
 - lift settings, surface pumps and pipelines
 - well & pressure tests
 - open-hole and cased-hole logging, tracers
- ✓ Asset Economics
 - Net Present Profit Value
 - Profit And Loss
 - Cash Flow
 - Balance Sheet
- ✓ Procurement & Contract Logistics

- ✓ Saturated fields
- ✓ Undersaturated fields
- ✓ Gas fields
- ✓ Bottom-water and edge water
- ✓ High to Low permeability
- ✓ High to Low viscosity
- ✓ On-shore & Off-shore

Nafta is proud to have a strong international multi-disciplinary team of industry specialists who create synthetic assets and realistic production scenarios from accumulated worldwide experience.

They also perform training, master-classes and moderate **PetroCup** sessions.