Building large RAS facilities: Risk Mitigation by Turn-Key

Heidi Kyvik

Aquaculture Innovation Worskop – Miami_ December 2018

WATER TECHNOLOGY

Veolia

The **only company** in the world able to cover the entire range of environmental solutions

$25,125 billion
168,800 employees

Activities:

Water

The global benchmark for water services and technologies

Energy

The global benchmark for energy optimization

Waste Management

The global benchmark for waste management and resource recovery

Veolia WT Aquaculture Center of Competence (CoC)

- *a strategic tool for global aquaculture operations*

Veolia WT Aquaculture

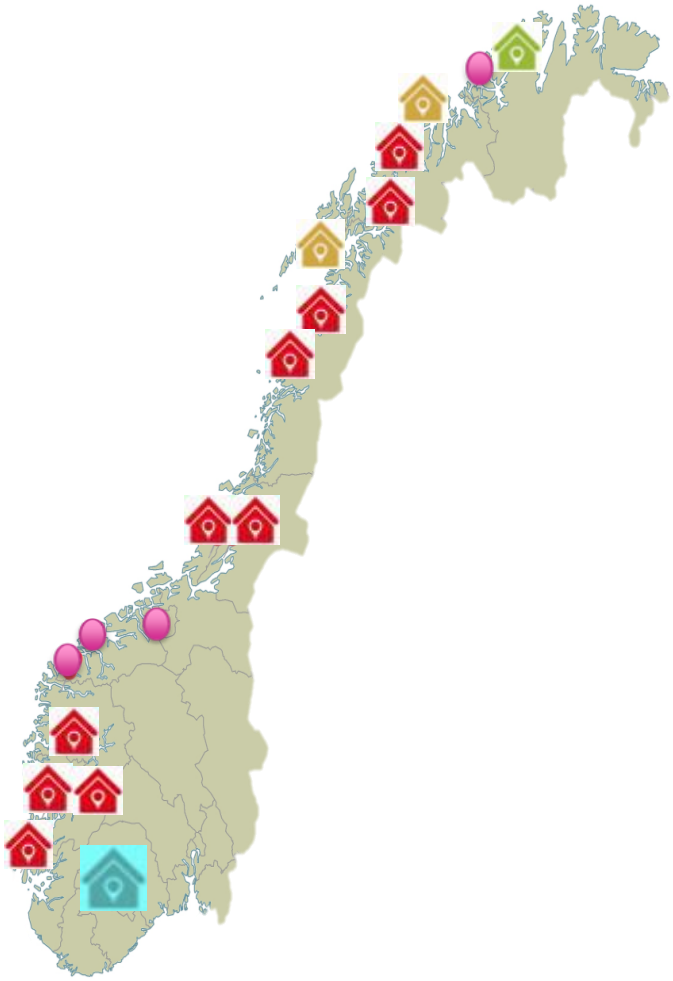
Application BU (KK)	Application BU (KGR)

Aquaculture Center of Competence

Fish expertise is the most important knowledge to **manage risk** and **performance** of aquaculture RAS solutions.

The Veolia WT Aquaculture Center of Competence - a **strategic tool** for growing Veolia WT Aquaculture operations **globally**.

Veolia WT Aquaculture - Referances Norway



Kaldnes® RAS

Recirculating Aquaculture Systems

	Dalsfjord	Sundsfjord Smolt	Osland Settefisk	Steinsvik	Astafjord Smolt	Sævareid Fiskeanlegg	Salmar Follafoss	Salangfisk	Helgeland Smolt	Lerøy Sjøtroll Kjærelva
Client	Marine Harvest	Sundsfjord Smolt	Osland Settefisk	Marine Harvest	Astafjord Smolt	Sævareid Fiskeanlegg	Salmar	Salaks	Helgeland Smolt	Lerøy
	2010	2012	2016	2016	2017	2017	2017	2017	2017	2019
Capacity (Tones of smolt per year)	800	850	625	1 325	900	900	1 500	1 500	4 000	4 700
Tank volume (m³)	4 850	3 000	1 700	10 900	3 000	7 200	11 700	10 000	21 700	24 000
Peak feeding (kg feed per day)	5 000	3 200	1 500	10 000	3 500	9 000	8 000	7 500	20 400	21 600

Risk Factors

Risk Factors

How do we do it?

Strong strategic relationship

- **Turn Key concept for the Aquaculture marked**
- **Close Company integration**
- **Sales and strategy**
- **Research and development**
- **Hugh combined experience gained**
- **Both use responsible known sub-suppliers**

10 Projects executed as Turn Key
4 in design phase

Be a part of innovative R&D

CtrlAQUA

Centre for Research-Based Innovation in Closed-Containment Aquaculture for Atlantic salmon post smolt

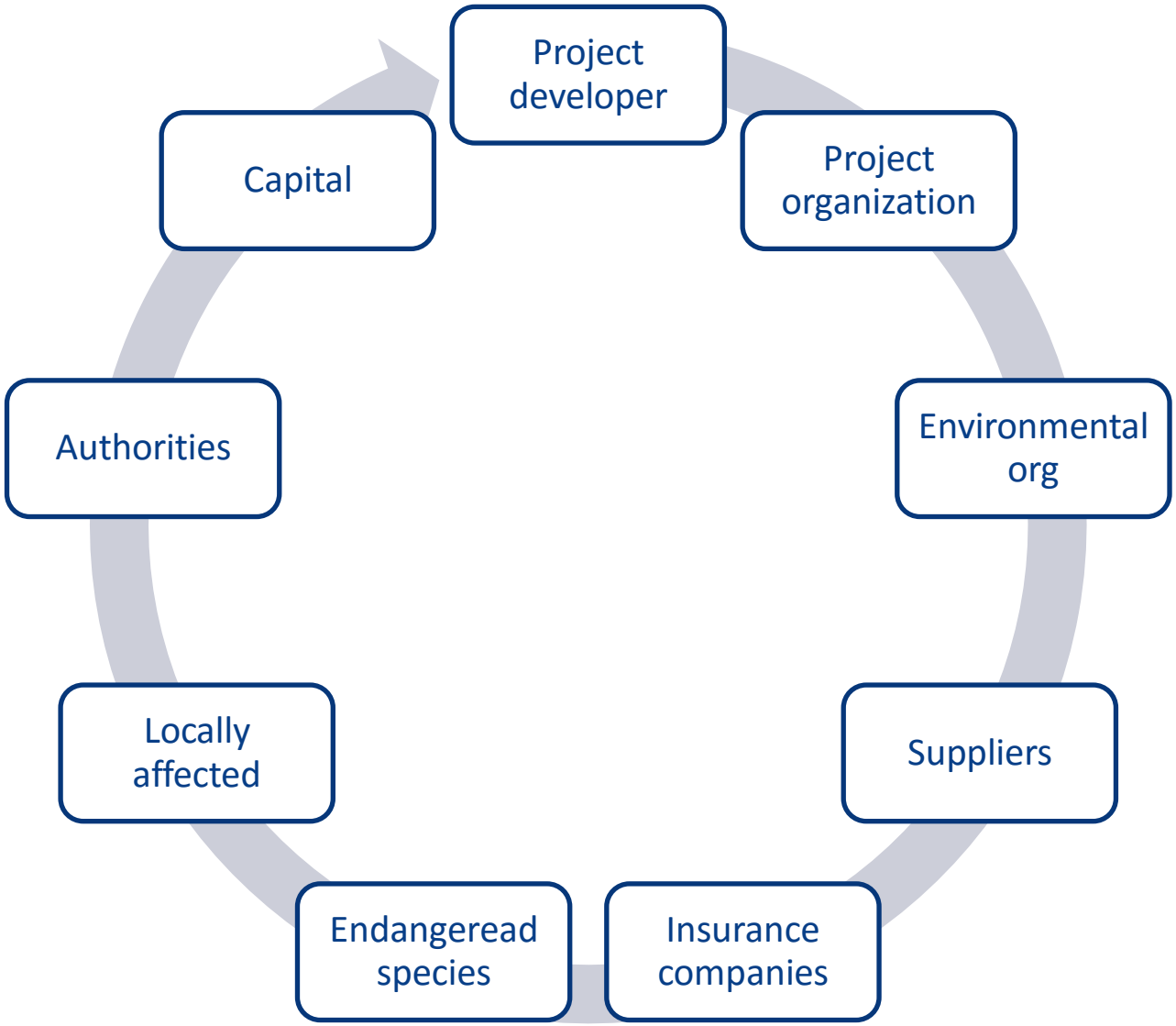
21 partners

Technology providers

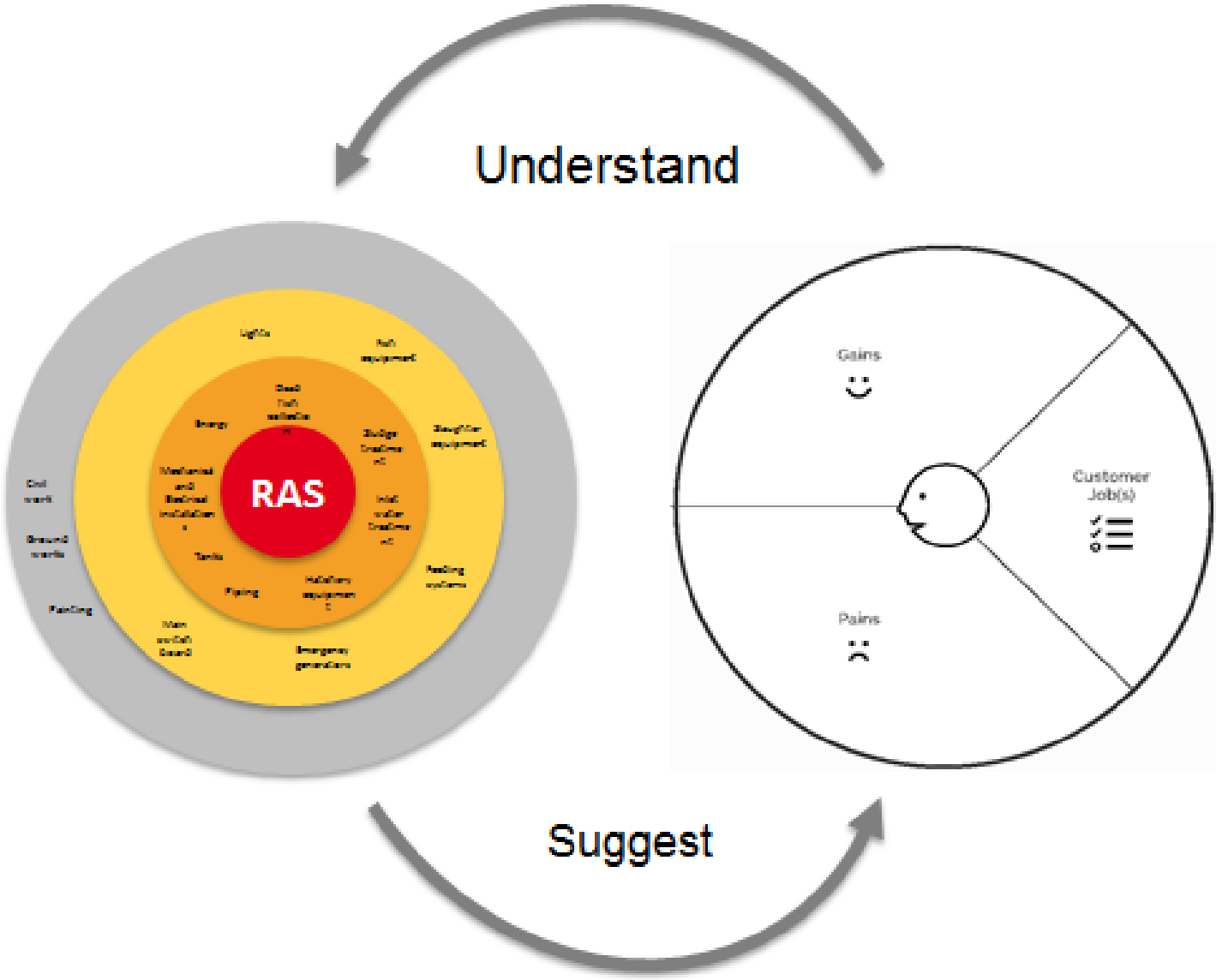
Research

Industry

Understand stakeholders interests



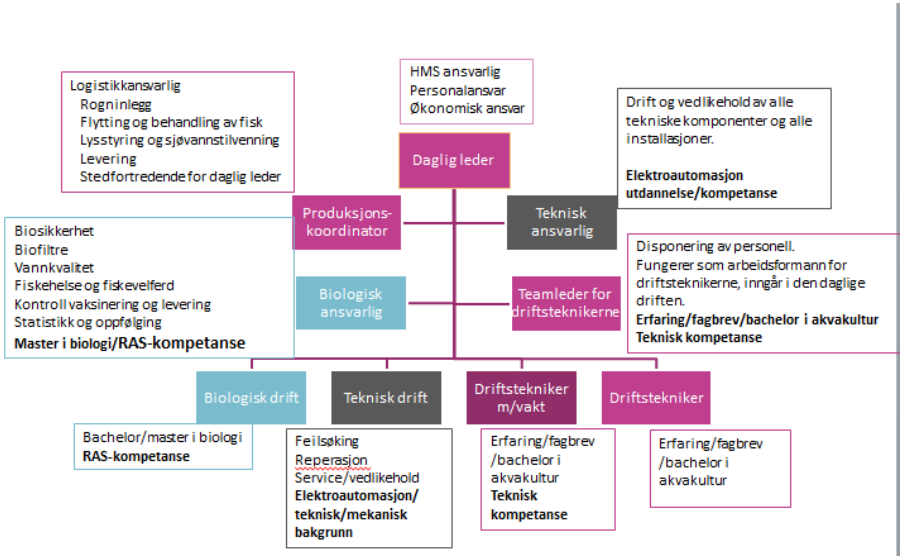
Understand your clients business case

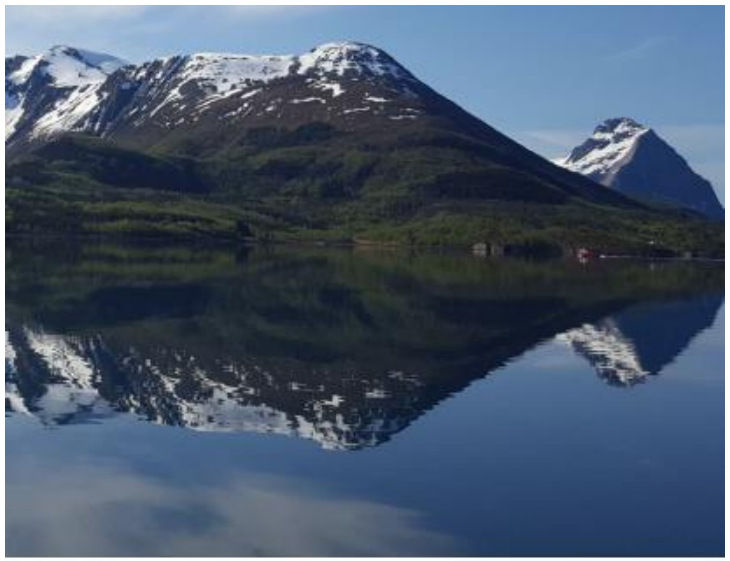


Understand clients responsibilities

- Land (water, ground, access, logistic)
- Licenses & Permits (intake, effluent, production, construction start up)
- Infrastructure
- Business case and marked plan
- Finances
- Client Project organization

With support from
Veolia and TotalBetong





Planning - is the solution for risk mitigation

"Sales - phase"

"Pre-project phase"

Engineering phase

Execution phase

Service, Operation and support

Sales-Phase

"Sales - phase"

Risk: The consultant description

The production plan

Design = Bad logistic during construction and operation

Biological security

Splittet contracts

Risk mitigation

Optimized the production plan

New Layout - Optimized the utilization of the site

Included the client organization in planning of basic design

Signed a intentional agreement (LOI) for next step – «Pre-Project Phase»

Offered a Turn Key solution

Pre-Project phase

Pre-project phase

Task force between Client, Veolia and TotalBetong :

- Basic design (process and Civil)
- Ground work plan
- Detailed Split matrix
- Detailed Time schedule
- Complete 3D BIM model including all process and civil scope

Participants in the pre project phase: Client, Veolia and TB:

Aquaculture knowledge, mechanical engineering, project management, Sales, Process engineers and Client operational organization and management

Engineering phase

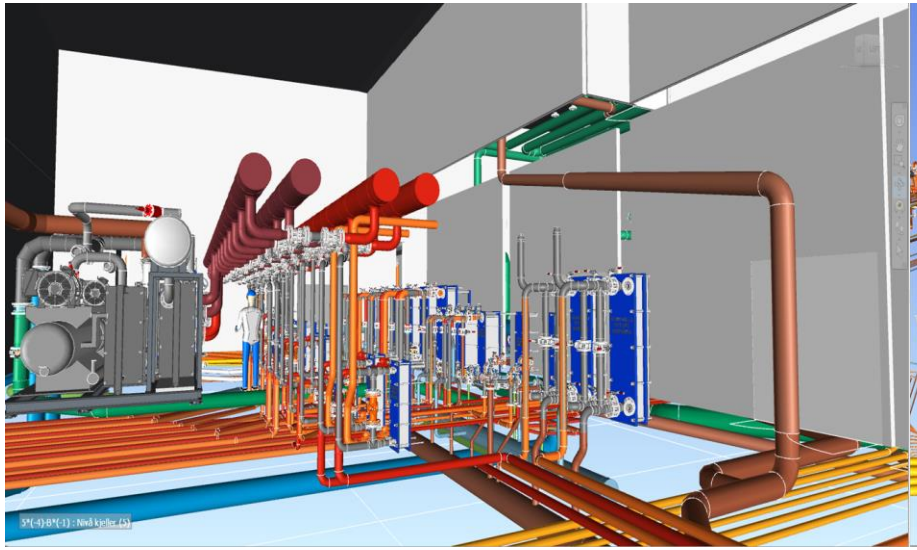
Engineering phase

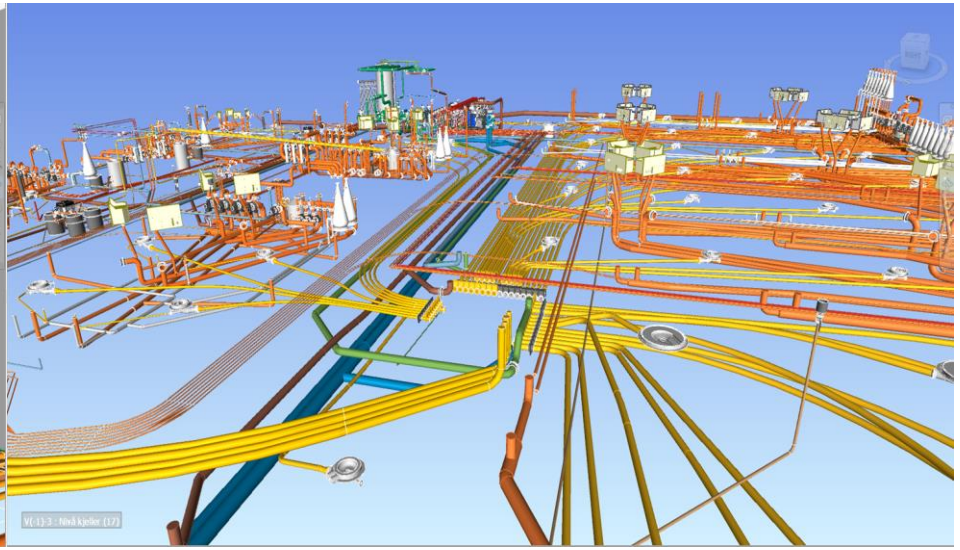
Risk:

- Many interphases between process solutions and towards Civil
- Complex hydraulic system - 90% under ground and high water flow
- Bio-secure solutions – 100% drainable and washable
- Very compact site

Risk mitigation:

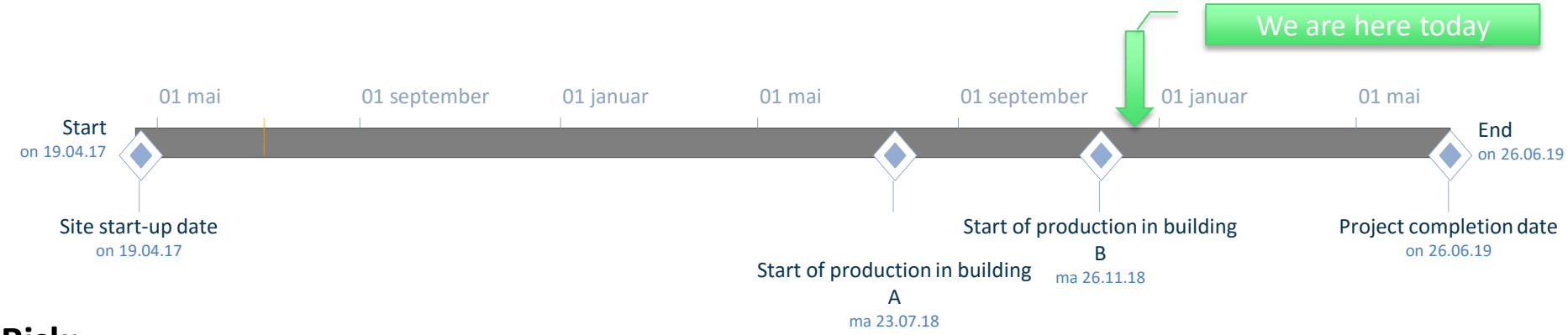
Due to participation in pre project phase – the engineering team was already familiar with basic design, interphases and risks.





Execution

Execution phase



Risk:
SAFETY – COST– TIME SCHEDULE

Risk mitigation:
Well known and common safety procedures

Well defined interphases and time schedule

Project management participated in the planning phase

After 70% completion, on budget and on time.

Service, operation, maintenance

Service, Operation and support

Service department participated during the planning phase and know the facility before start up

Implemented Veolia SCADA system including maintenance program
Extended operational presence the first years after completion

Risk mitigation:
The client take care of the fish
Veolia take care of the water

Shared knowledge and experience

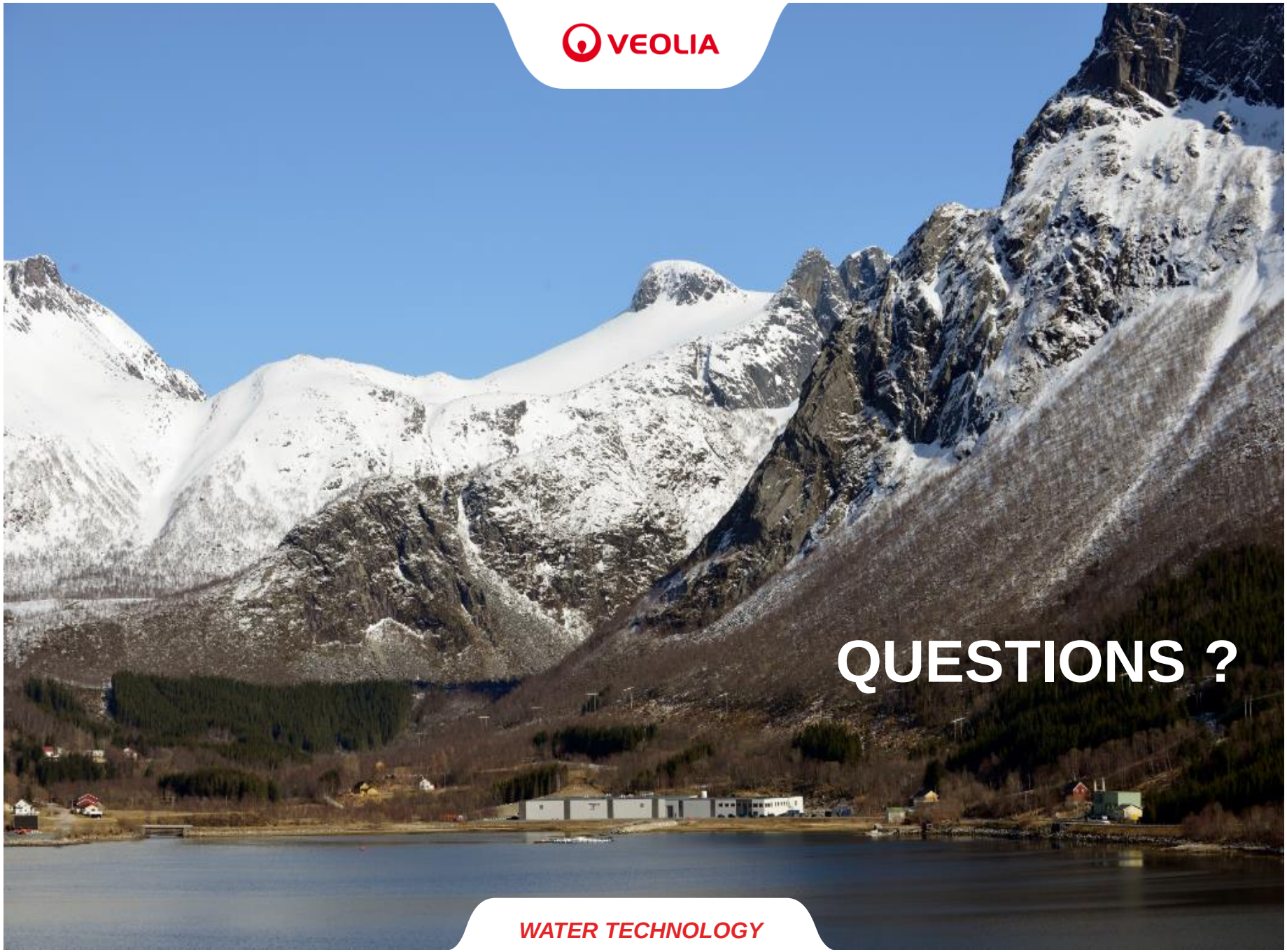
Risk mitigation by Turn Key

Is to know how to address interphases between the different disciplines in the project

Is to understand the stakeholders and risks

Learn form experience.

Experience – Knowledge - Planning


VEOLIA
QUESTIONS ?
WATER TECHNOLOGY