University of Stavanger

CIAM

CLUSTER ON INDUSTRIAL ASSET MANAGEMENT

A COLLABORATIVE COMPETENCE CLUSTER

ANNUAL REPORT
2018

Cluster for Industrial Asset Management

Message from Chair & Chairman of Board

Thom Fosselie, DNV-GL,
Chairman of the Board

Jan Frick, UIS Professor
CIAM Chair
from November 1st 2018

Jaynata P. Liyanage,
UIS Professor
CIAM Chair
until November 1st 2018

From the Chairman of the board:

CIAM marked the 20-years anniversary in 2018 and the occasion was celebrated with a special dinner at WCEAM. Professor J.P Liyanage, chair of CIAM for many years, received well deserved recognition for his devotion and hard work to make CIAM a success. CIAM founder professor emeritus Ivar Langen summarized the history of CIAM from SDV to the vibrant cluster that we have today. CIAM has a strong history with many of the founding industrial partners still very dedicated in the board and in the HUBs.

2018-19 will be a year of change for CIAM as the AGM in 2018 decided to start a process reviewing the organizational model and the role of CIAM at UiS. A task committee led by vice dean professor Helge Bøvik Larsen was nominated to give advice to the CIAM board and UiS on how to best restructure CIAM for future growth and better benefit for both industry and academia. The advice was to anchor CIAM higher up in the organization at UiS and becoming a cluster with a tie to more faculties and with a strong bonding to R&D. The importance of having key industry partners meet with key academics will still be the foundation of our CIAM cluster.

The CIAM board has together with UiS and with professor Jan Frick as chair worked hard to give CIAM a more primary position at UiS and to create a stronger commitment from both academia and industry. The HUB activities are taking a new form focusing solutions to present and future challenges of industry asset management in the bigger sense.

CIAM has the ambition to be a catalysator for cooperation between industry and academia for the benefit of development of our region.

We will invite all industries, private and public sectors, to join forces in finding good solutions for a sustainable and prosperous future for coming generations. O&G has been an important industry in our region for many years and will remain to be so, but at the same time we need to look for new opportunities, seek to develop a divers private industry sector together with a strong and efficient public sector. The future is taking shape now and CIAM will take a role in finding solutions for the benefit of present and future generations.

CIAM is dependent on the engagement of individuals for the common good, so be invited into our competent cluster.

Chairman of the CIAM Board

Thom

From the CIAM chair:

2018 has been an eventful year for CIAM.

We have had HUBs working and producing White Papers, we have one experience based master course, we had 5 board meetings, and not at least the top of the year was the WCEAM international conference.

The WCEAM had 160+ delegates and was conducted by the CIAM staff. That included a lot of support work from the UiS Master students.

Important and open issues for the future are how to involve more employees from member companies and UiS employees in the CIAM events. These issues are not solved yet, but the cluster goes on with HUB meetings, seminars, courses and projects.

Master Thesis & Publications on CIAM related issues are available on internet in Brage and Cristin public databases.

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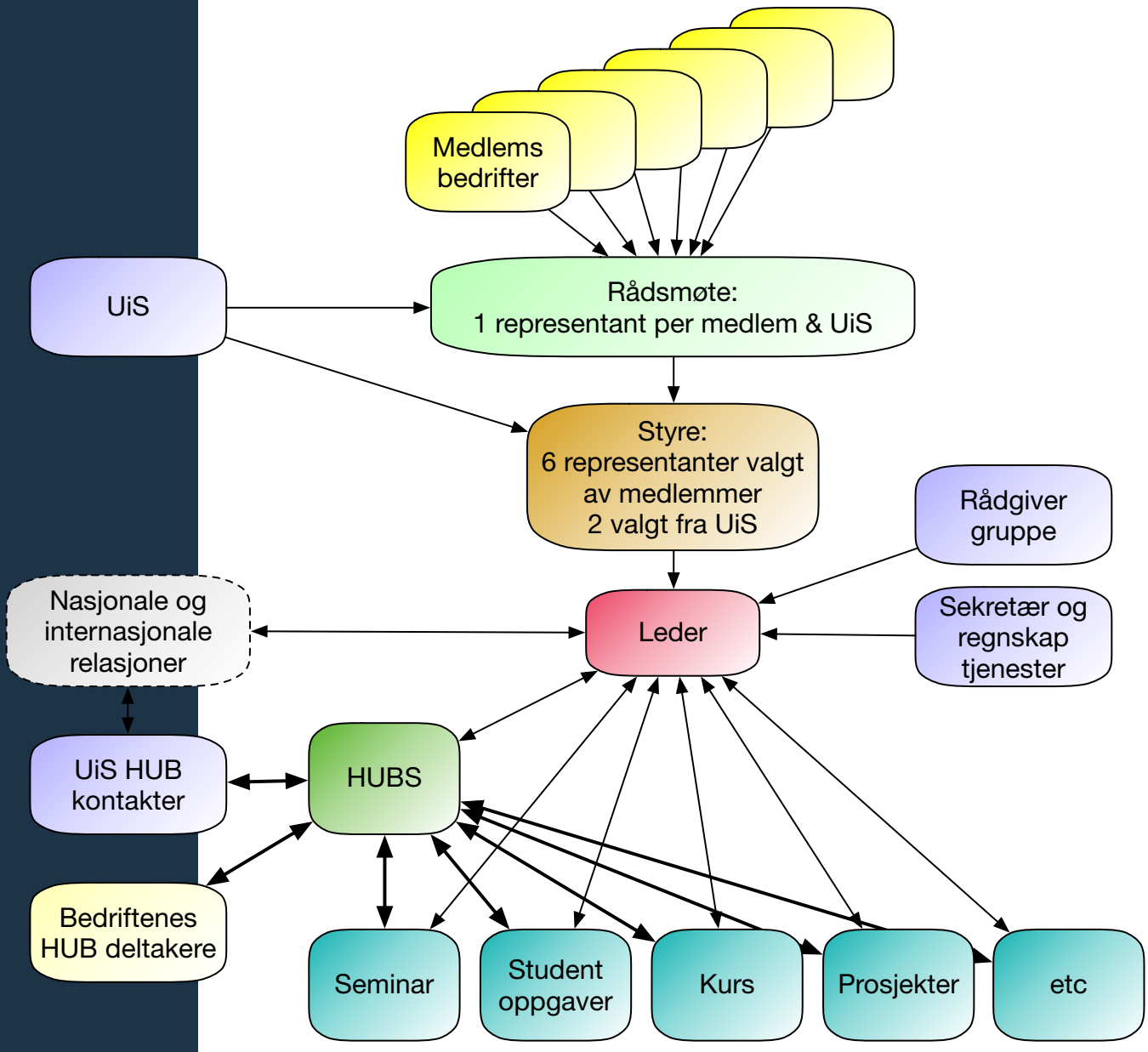
Cluster for Industrial Asset Management

CIAM Structure 2018/2019



CIAM has developed since it started 20 years ago as Senter for Drift og Vedlikehold. The basic structure with a council where all members are represented, an elected board, and a manager, have been in place since it started. In the early years a conference was a main issue. That came back in 2018 as CIAM organized the WCEAM 2018 international conference.

In the later years the HUBs have been a major part of the CIAM activities. The intention for a HUB is to be a meeting place between members and University. In 2018 the HUBS created White Papers about their activities. It is a goal of CIAM to have the HUBs as innovation spaces that generate other common activities.

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Board 2018

Thom Fosselie
CIAM - Chairman of the Board
Project manager, Inspection Management
DNV GL Oil & Gas

Jan Ketil Moberg
CIAM - Deputy Chair of the Board
Head of section logistics and emergency preparedness -
Norwegian Petroleum Safety Authority

Øystein Lund Bø,
Dean UiS

Ola Trætteberg

Adviser, Asset Management
Gassco

Øyvind Rudolf Lea

Leading Eng Ops TE MAM MA
Equinor

Jan Frick,
Professor UiS

Erik Fiskaa

Director GEA Infrastructure SImplification Engineering &
Asset Integrity - ConocoPhillips Skandinavia AS

Kristian Bay Ness

Asset Operation Manager
Aker BP

Advisory Board

Kristin Reitan Husebø
Administrative Director
Greater Stavanger

Anne Cathrin Østebø
CEO
Validé AS

Harald Minge
Administrative Director
Stavanger Chamber of Commerce

Troels Gyde Jakobsen
Research Director
University of Stavanger

Cluster for Industrial Asset Management

Management & Staff of CIAM 2018

Professor Jaynata Presanna Liyanage,
CIAM Chair until October 31st.

Member companies 31/12-2018

APPLY SONGO
ConocoPhillips
DNV·GL
OCEANEERING
equinor
GASSCO
AkerBP
University of Stavanger
DRAGA
Petrolink
kverneland group
ORS

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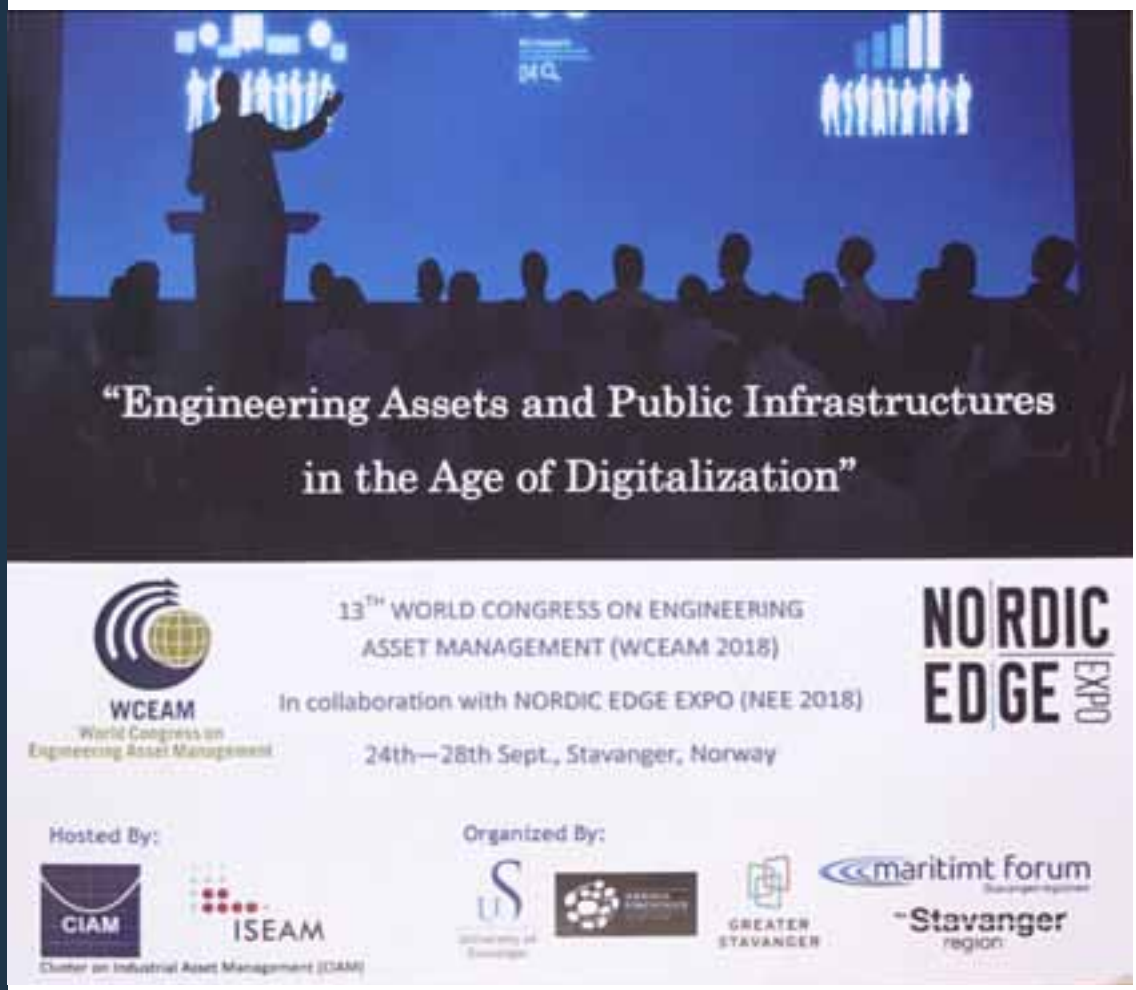
WCEAM 2018



WCEAM took place during 2 days with conference dinner and a 20 year anniversary dinner for CIAM. WCEAM is a yearly conference that moves around the world.

WCEAM-2018 had 10 Keynote speakers, 25 parallel Technical sessions, 160+ participants and 106 Research and Industrial presentations from 20+ countries, 4 Technical safaris to selected Engineering sites in the Region, 3 On-site operational demonstrations.

Manager of CIAM, Professor Jaynata Presanne Liyanage, chaired at the conference and organized it with the staff of CIAM. This included UIS Master-students as conference support. These students came from the Master degree in Offshore Technology study program.

The WCEAM conference was scheduled so participants could continue with the Nordic Edge Expo. The main part of WCEAM was lectures 24th to 25th of September with company visits on the 26th. Next page shows the KeyNotes and the session topics. It were 4-5 lectures with discussion in each session.

There is a book planned in 2019 on Springer Verlag AG that will include many of the papers presented at WCEAM 2018.

First evening was the conference dinner, and second ev ening was 20th year anniversary for CIAM. The cluster has developed a lot since the small start in 1998 as Senter for Drift og vedlikehold. At that time the main activity was the yearly conferences, and a collaborative effort was to establish Operation and Maintenance as core issuers in the Master degree in Offshore Technology.

Emeritus Professor Ivar Langen told the anniversary celebration about the start and early activities that developed into the CIAM of today.

Professor Liyanage got much deserved praise for his work in chairing CIAM through more that a decade and attracting the WCEAM conference to Stavanger.

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WCEAM program

Keynote Speech: "Digitalization towards Field of the Future" Line Heldal Bakkevig, Vice President & Program manager, Field of the Future, Equinor, Norway

Keynote Speech: "Digital Transformation and Leveraging the Digital Twin through the Asset Lifecycle" Adrian Park, Vice President, Information Management (Process, Power, Marine), Hexagon PPM, USA

Keynote Speech: "Innovative Health infrastructure and Medical service solutions in the Digital age'' Michael Campbell, Senior Director Facilities Management, Children's Health Queensland Hospital and Health Service, Australia

Keynote speech: "Towards a New Maritime Adventure with Autonomous shipping and Ferry services'' Tom Eystø, CEO, Massterly, Norway

Keynote Speech: "Don't forget human psychology in asset management decisions – it's not all about data and analytics'' John Woodhouse, Managing Director, Woodhouse Partnerships, UK

Keynote Speech: "Digital Threats and Security Measures" Berit Svendsen, Executive Vice President Telenor Group & CEO, Telenor, Norway

Keynote Speech: "Workforce of the future – And the Global future of HR" Anne-Lene Festervoll, Director & Leader, People and Organization practice, PriceWaterhouseCoopers, Norway

Keynote Speech: "Global Energy transition outlook for Engineering assets and Public infrastructures" Sverre Alvik, Director, Energy Transition program, DNV GL, Norway

Sessions:

- Asset management in Industry 4.0: Standards and models
- Sustainable assets and processes: New models
- Special session, Innovation Strategy and Entrepreneurship
- Asset Economics: Decision analysis
- Smart and safer assets
- Special session, Asset management for Hydro power sector
- Performance measurements and management
- Co-value creation: new prespectives
- Special session, Tunnel safety
- Critical asset processes: Models
- Special session, Nuclear Power Plant Monitoring and Long-Term Asset Management
- Dynamic Modelling, Simulations, and Visualizations
- Special session, Applied data science
- Special session, Advances in equipment condition monitoring- 1
- Human capital and organization management
- Special session, Regulations and Audits for Late life of Engineering assets
- Modern digital applications
- Maintenance planning and optimization
- Special session, Macro ergonomics and Organizational issues for Human performance and Workplace safety
- Co-value creation: new models
- Service innovation in Maintenance through Industry 4.0
- Special session, Advances in equipment condition monitoring-2

CIAM

Cluster for Industrial Asset Management

Master in Technology and Operations Management

Autumn 2018

MTO/Human factors - 10 ECTS
Supply Chain and Lean Management - 10 ECTS

Spring 2019

Technology based services and innovation - 10 ECTS
In dustrial decisions and performance management - 10 ECTS

Autumn 2019

Engineering asset management and Risk governance - 10 ECTS
Maintenance engineering and management - 10 ECTS

Spring 2020

Engineering economics - 10 ECTS

The experience-based Master's degree in Technology and Operations Management (MTOM) is one of a kind in Norway. It combines technical and managerial topics, and is perfect for engineers who want more responsibility and a higher position. The programme is tailor made to be combined with your full-time job.
Taking the step into middle-management or management requires competence and insight into leadership and management theory. The programme consists of courses that together will provide different perspectives relevant to a modern-day engineer with professional ambitions.

This Master's programme is unique in its kind in Norway by offering management and leadership competence to technical specialists with experience from engineering systems and facilities.
The programme is highly relevant for both the private and the public sector. It is aimed at engineers with activities related to engineering systems, industrial production, process, or design, operation and maintenance, risk management and cost engineering.

A principal admission requirement is work experience. It is ideal for those who wish to upgrade their education to a master's degree, and those who have technical education before and would like to have different qualifications for other career opportunities.

The Master holds an international standard and all the lectures are held in English.

The programme consists of 90 study points (90 ECTS) and is divided into three parts:

Obligatory courses

Industrial decisions and performance management - 10 ECTS
Engineering asset management and Risk governance - 10 ECTS
Maintenance engineering and management - 10 ECTS
Engineering economics - 10 ECTS

Elective courses

Supply Chain and Lean Management - 10 ECTS
Technology based services and innovation - 10 ECTS
MTO/Human factors - 10 ECTS

Master's thesis

When you have completed and passed the four obligatory and two of the elective courses, you are ready to proceed to the Master's thesis.

The thesis demonstrates your capability to complete individual work, and is an expression of your ability to combine relevant work experience with academic knowledge, systematic thinking and in-depth assessment.

Study supervisors and other contact persons are available to assist you through this section, and help with the writing can be found at the The study workshop. The library's employees are also very valuable to contribute, both in terms of finding material, but also as guides to the writing itself.

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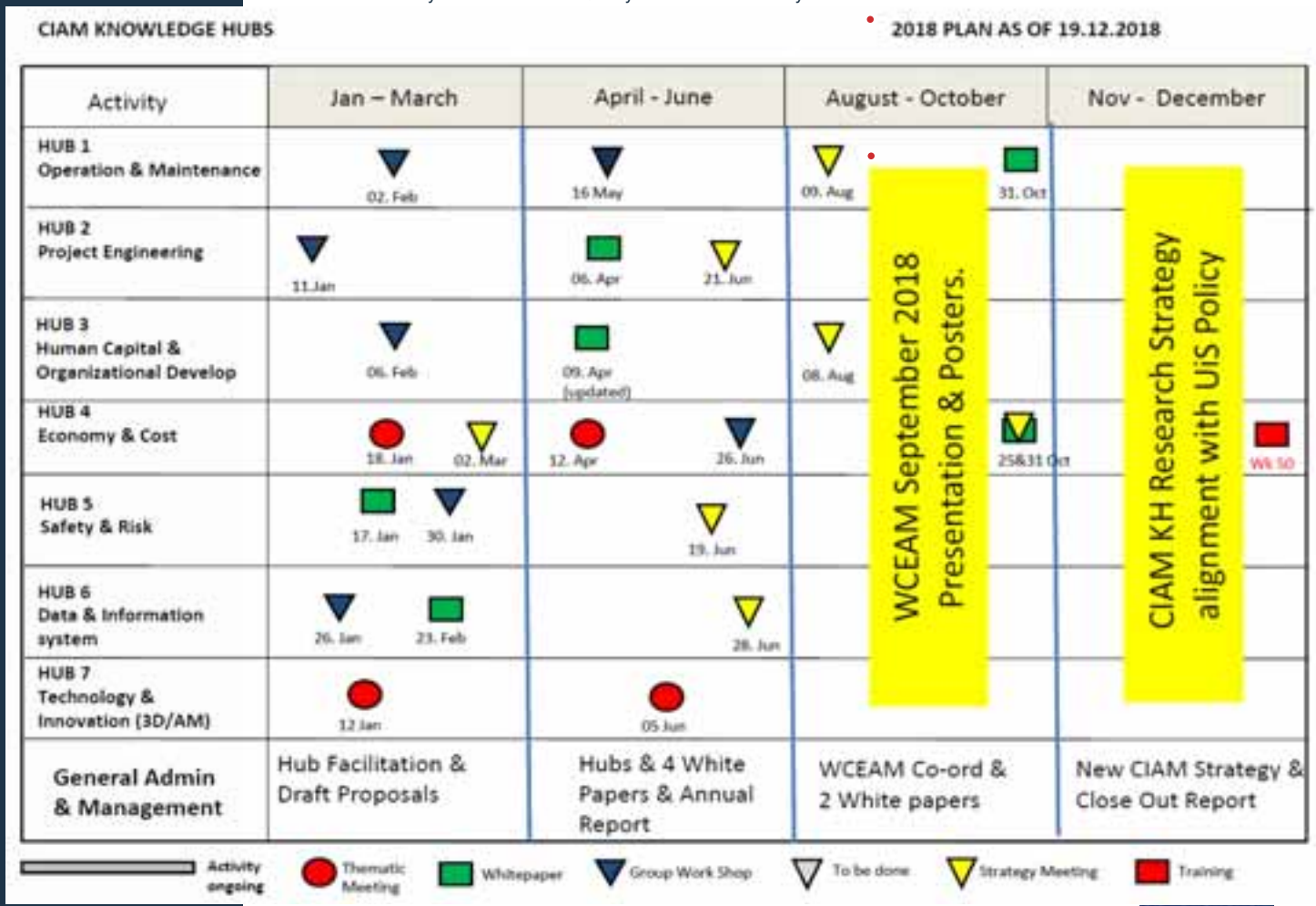
Knowledge HUBs 2018

CIAM knowledge HUBs was a main part of activity in 2018. Below is an overview of the HUB activities in 2018. In 2018 the HUBs and the production of White papers was organized by Andrew Kilmartin

All knowledge HUBs produced 6 white papers available to CIAM partners and contributors with relevant themes which was a culmination of over a years of Knowledge HUB sessions in collaboration with the Industry and Academia. These white papers can be a basis for a special projects, master thesis, JIPs, NFR or EU projects.

1. Safety & Risk HUB – "Digital Risk in Smart Engineering Systems"
2. Project Engineering & Management HUB – "Cross Functional Excellence in Project Lifecycle: A Template for effective development and assessment"
3. Data Management HUB – "Best practice for Asset Digitalization: Based on Smart Data and Intelligent Decisions"
4. Human Capital HUB - "Read the future: Proactive and Systematic Human capital model for Business decisions"
5. Operations and Maintenance HUB – "Next Generation Maintenance Management"
6. Asset Economy HUB - "Decision Quality and Economic Analysis"



Cluster for Industrial Asset Management

HUB1: OPERATIONS AND MAINTENANCE

HUB project:

"NextGen Maintenance framework based on ISO55000, Lessons learnt, and Changing Industrial conditions."

- Industry Lead: Geir Hoff (Gassco)
- Academic Lead: Professor Mohsen Assadi (UiS)

White Paper Sections:

- Maintenance Management by ConocoPhillips, Hans Reidar Sandvik, DNV GL
- Standards and Standardization in Equinor, Nils Martin Rugsveen, Equinor
- Implementation of Standardization, Øyvind Rudolf Lea, Statoil
- What was done and Lessons learnt' in Statnett/ Asset Life Cycle Information Management' efforts by Verico, Kjerstin Bakke / Vidar Bolmvik, Statnett / Verico
- Other Chapters follow Project steps

The CIAM maintenance hub members represent a wide range of industries. What does the oil and gas industry, agriculture industry, consulting companies and regulator in common? The denominator is that they create value for the industry and the organization. The management of these values can be governed by the same principles.

Efforts to optimize operations & maintenance both in the offshore and land-based industries over the last few years have increased significantly due to recurrent, emerging challenges. The main focus has been on cost management, technology implementation, and operational improvements for improved production, higher safety and environment conscious. While assets ageing, the risk for incidents and accidents such as gas leaks on the NCF and unexpected down-time of systems occurs more rapidly. These are just some examples that reveals the shortcomings of current strategies and there is considerable potential for optimization.

This Knowledge HUB aims at bringing diverse expertise, know-how, up-to-date information, and professional challenges to a common interactive Forum. This is a place to explore 'Good to Great' innovative solutions. Our dedication is to create an active environment for professional and personal development involving top experts, experienced practitioners, and leading researchers.

HUB (Active) Participating Companies:

APPLY SØRCO, EY, OCEANEERING, Petrolink, AkerBP, GASSCO, ORS, ELDOR, STINGER, ConocoPhillips, kvernelandgroup, PSA, UiS University of Stavanger, equinor, DNV-GL, MRC Global, VISAM, CIAM

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HUB2: PROJECT ENGINEERING AND MANAGEMENT

HUB Project:

"Cross-Functional Excellence in Project Life-cycle Management: Template for a Lean and Efficient Practice"

Industry lead: Oddvar Tjåland (Kverneland Group) Academic Lead: Professor Jan Frick (UiS)

White Paper: Editor : Professor Jan Frick

Sections

- Lessons learnt in Project engineering and management practice: Issues and challenges
- Project life cycle definition
- Principal attributes of Success / Failure
- Template' for a 'Lean and efficient' Project lifecycle management
- Chapters follow Project steps

Diverse challenges in the modern business environment continuously generate dedicated projects targeting improvement. However, current industrial and market conditions are demanding. The project engineering and management process has become an arduous task in many ways. Recent events clearly indicate the complexities and uncertainties associated with novel projects; there is a need for new practices to manage inherent risks. A recent project from the NCS is the oil platform YME. This involves issues ranging from, economical sensitivities and risk awareness, to legal, political, and other commercial matters. As projects engage a multitude of partners with different characteristics, an innovative project engineering and management process can make a significant difference both short and long term.

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HUB (Active) Participating Companies:

Cluster for Industrial Asset Management

HUB3: HUMAN CAPITAL & ORGANIZATIONAL DEVELOPMENT

HUB Project:

"Read the Future: Proactive and Systematic Human capital model for Business decisions"

- Academic Lead:

Professor Emeritus Reidar Mykletun

White Paper Sections:

- Downsizing and Rightsizing – Facing Business Challenges, Endre Løvås, Skanem
- HR Fit for the Future, Anne-Lene Festervoll, PwC
- Other Chapters follow Project steps

The human capital of industrial organizations is the most decisive factor for organizational success and sustainability in the modern knowledge economy. Current and future employees gradually emanate from "Y-Z generations", social networks, and highly computerized societies. The global industry is exposed to challenges related to diversity management, generation conflicts, multicultural environments and mobile knowledge. All sectors in the modern era need new thinking and innovative solutions; for the human capital development, retention strategies, competitive recruitment, incentives, roles and accountabilities amongst others.

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HUB Active Participating Companies:

APPLY SØRCO, GASSCO, OCEANEERING, ConocoPhillips, kvernelandgroup, Petroleum Safety Authority Norway, DNV·GL, NHO, pwc, equinor, EY, Skanem, TEEKAY, CIAM

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HUB4: ASSET ECONOMY & COST ENGINEERING

HUB Project:

"Performance Based Contracts: Decision Analysis and Economic valuation."

- Academic lead:

Professor Reidar Bratvold (UiS)

White Paper Sections:

- Controlling Mega Projects, Stig Are Lauvnes, PwC
- Performance Based Contracts, Lindy Taraldsen, PwC
- Creating Value from uncertainty and flexibility, metrics of value, Reidar Bratvold, UiS
- Other Chapters follow Project steps

Asset economics and cost engineering have major weight on the profitability of an organization. Traditional engineering and cost management practices have been significantly challenged lately, particularly after recent financial recessions. Current business conditions have shown a clear need for new approaches to support financial decision makers in industrial settings. Outdated net present value assessments, activity based costing and beyond budgeting are just a couple examples that respond to that necessity. The tools used for economic decision making are insufficient and there is a lack of knowledge required to understand the real impact. This includes a deeper understanding of the related uncertainties and how to quantify them in decision making. There are clear correlations between uncertainty embracement and performance. Meaning, thorough uncertainty assessments, creates better decisions and results in higher performance.

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HUB Active Participating Companies:

GASSCO, GE Oil & Gas, DNV·GL, University of Stavanger, Petrolink, OCEANEERING, EY, ConocoPhillips, Petroleum Safety Authority Norway, APPLY SØRCO, kverneland group, pwc

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HUB5: SAFETY & RISK

HUB Project:

"Digital Risk in Smart Engineering Systems"

Industry Lead: Gøran Mikaelsson, Oceaneering

Joint Industry Lead: Martin Guy Williams, EY

White Paper Sections:

- Integrated Operations in an Environment influenced by disruptive technology, Ingrid Årstad, PSA
- Cybersecurity in the Oil and Gas Industry, Martin Guy Williams, EY
- Managing Dynamic Operational Risk by functional modelling: Fully Automated?, Bjarne Asheim, Eldor
- Other Chapters follow Project steps

The oil and gas industry has adapted the "zero loss or tolerance" philosophy for risk and safety for some time. Despite undeniable efforts, the oil and gas industry and other industry sectors still have significant health and safety issues and still struggle to define their risk management as a business process. A major challenge is the increasing complexity that follows from digitalization of industrial processes, multiple compliance requirements and globalisation.

The Safety and Risk "Knowledge HUB" aims at bringing diverse expertise, know-how, up-to-date information, and professional challenges to a common interactive Forum. This is the place to effectively explore "Good to Great" innovative solutions. Our dedication is to create an active environment for professional and personal development involving top experts, experienced practitioners, and leading researchers.

HUB Participating Companies:

ConocoPhillips, kvernaland group, equinor, DNV·GL, OCEANEERING, VISAM, ELDOR, ORS, STINGER, EY, TEEKAY, GASSCO, PETROLEUM SAFETY AUTHORITY NORWAY, CIAM

Cluster for Industrial Asset Management

HUB6: DATA MANAGEMENT & INFORMATION SYSTEM

HUB Project:

"Best Practice for Asset Digitalization: Based on Smart Data and Intelligent Decisions"

Industry Lead: Academy Lead:

White Paper Sections:

Data Modelling and Integration for decision support: Lifecycle Asset Information for Process Safety and Asset integrity, Jens Olav/Sasha Antvogel, Intergraph

Smart Asset Management –IoT and Industry 4.0, Børre Heggernes, Amitec

Other Chapters follow Project steps

Developments within the data management and information system landscape have represented some of the more challenging industrial issues in recent years. The emergence of novel data management platforms together with intelligent capabilities has introduced new operational scenarios in almost all business sectors. Data, IT, and the emerging real-time online data are gaining increasing impact on technical and operational decision processes.

Despite years of experiencing this, data and IT innovation continues to introduce new industrial demands. This "Knowledge HUB" aims at bringing diverse expertise, know-how, up-to-date information, and professional challenges to a common interactive Forum. This is the place to effectively explore "Good to Great" innovative solutions. Our dedication is to create an active environment for professional and personal development involving top experts, experienced practitioners, and leading researchers.

HUB Participating Companies:

AkerBP, DRAGA, Jotne, STINGER, AMITEC, NATIONAL OILWELL VARCO, Kvaerner, VISAM, APPLY SØRCO, OCEANEERING, ELDOR, ConocoPhillips, VISCO, INTERGRAPH, DNV·GL, GASSCO, equinor, CIAM

Cluster for Industrial Asset Management

The Additive Manufacturing/3D Printing HUB

A one day course on the 05th of June at Forum Jæren "Høghuset", 18th floor on Additive Manufacturing.

Objective:

To support the industries in understanding the fundamental processes of diverse additive manufacturing technologies, the developments in design processes and optimization techniques so that industries can evaluate the business benefits of the technology when used as an alternative manufacturing method.

Content of the course:

- General introduction about AM and current trends
- Design for AM
- Tools and Approaches of Topology Optimization for AM
- Hybrid AM

UIS contact: Hirpa G. Lemu, Professor

Company contact: Harald Fjogstad, Technology Manager (Jærtek AS)

The workgroup also maintained a regional competence map on additive manufacturing/ 3D Printing.

CIAM