



中国石油大学(北京)



Norwegian University of
Science and Technology

Lecture 1

Status on Research Projects and Programs in the Norwegian Oil and Gas Industry: Some Selected Examples

Norwegian University of Science and Technology: Department of Mechanical and
Industrial Engineering
挪威科技大学: 机械与工业工程系



主讲人: Mary Ann Lundteigen, Professor

主持人:

邀请单位: 中国石油大学(北京) 安全与海洋工程学院

讲座时间: 2019年6月10日下午 15:00~16:30

讲座地点: 四教 301 室

主讲人简介:

Professor Lundteigen has a master in Technical Cybernetics (1993) and a PhD in RAMS (2009) from NTNU. She is employed as full time professor from January 1 2014 in the department of Mechanical and Industrial Engineering. In the period from 2014- 2016, she has headed the RAMS group, and she is now the co-director in the research driven Centre for innovation in subsea production and processing (SUBPRO) as the co-director ([see www.ntnu.edu/subpro](http://www.ntnu.edu/subpro)). From June 2019, she starts as a full professor in the department of Engineering Cybernetics.

Her main research interests and topics cover: Functional and failure analysis, functional safety, reliability analysis, safe design principles with main application area with safety-instrumented systems (electrical/electronic/programmable electronic safety-related systems), and the follow-up of safety-instrumented systems in the operational phase. Industry sectors focused are oil and gas sector, process sector, and to some extent railway (signaling). She is also interested in other application areas, like aviation, automotive and maritime sector, as a basis to get inspiration for transfer of knowledge and methods between different industry sectors and industry traditions.

See also: <https://www.ntnu.edu/employees/mary.a.lundteigen>

Abstract:

The purpose of this lecture is to give an overview of ongoing research in the oil and gas sector, where the Norwegian University of Science and Technology has a key role. The oil market has faced some challenging times since 2013 with the low oil price. Even if the future of the oil and gas sector is heavily debated, the industry will last for many decades to come. This has called for a need for more innovations to support tougher requirements about environmental footprints and lower economical margins.

The lecture will review some of the focus areas of larger research projects, where I have a role, such as:

- Research-based innovation center in subsea production and processing www.ntnu.edu/subpro
- BRU 21: Better resource exploitation (on the Norwegian Continental Shelf) www.ntnu.edu/bru21
- Safety 4.0: On the introduction of new technologies for safety systems <https://www.dnvgl.com/technology-innovation/oil-gas/safety40/index.html>

I will also give an overview of the PDS forum (www.sintef.no/pds), a network gathering industry, research, and authorities, a forum that I have joined actively since early 2000.



中国石油大学(北京)



Norwegian University of
Science and Technology

Lecture 2

Perspectives on design and operation of Safety-Instrumented Systems in the Oil and Gas industry: A review of SIS related standards and practices

Norwegian University of Science and Technology: Department of Mechanical and Industrial Engineering

挪威科技大学：机械与工业工程系



主讲人： Mary Ann Lundteigen, Professor

主持人：

邀请单位： 中国石油大学（北京）安全与海洋工程学院

讲座时间： 2019年6月11日上午 9:00~11:00

讲座地点： 四教 301 室

主讲人简介：

Professor Lundteigen has a master in Technical Cybernetics (1993) and a PhD in RAMS (2009) from NTNU. She is employed as full time professor from January 1 2014 in the department of Mechanical and Industrial Engineering. In the period from 2014- 2016, she has headed the RAMS group, and she is now the co-director in the research driven Centre for innovation in subsea production and processing (SUBPRO) as the co-director (see www.ntnu.edu/subpro). From June 2019, she starts as a full professor in the department of Engineering Cybernetics.

Her main research interests and topics cover: Functional and failure analysis, functional safety, reliability analysis, safe design principles with main application area with safety-instrumented systems (electrical/electronic/programmable electronic safety-related systems), and the follow-up of safety-instrumented systems in the operational phase. Industry sectors focused are oil and gas sector, process sector, and to some extent railway (signaling). She is also interested in other application areas, like aviation, automotive and maritime sector, as a basis to get inspiration for transfer of knowledge and methods between different industry sectors and industry traditions.

See also: <https://www.ntnu.edu/employees/mary.a.lundteigen>

Abstract:

The main purpose of this lecture is to give some perspectives on the design and operation of safety-instrumented systems in the oil and gas industry. The lecture will first introduce what we mean by safety-instrumented systems, and give some examples of their application areas in relation to oil and gas facilities, both topside and subsea. The lecture will then continue with the key standards that are framing the design and operation of such systems. To be mentioned are: IEC 61508, IEC 61511, Guideline 070 (developed by the Norwegian Oil and Gas Association) and NORSOK S-001 . The two latter standards have been developed for facilities on the Norwegian continental shelf, but they are sometimes used outside Norway. Some examples of analyses that are specified in the standards are mentioned, but without going into a too detailed level. The concept of safety-integrity level (SIL) is explained, including how it links the risk analysis to reliability requirements and hardware structure. In this context, the role of the PDS method and the associated PDS data handbook, is explained.



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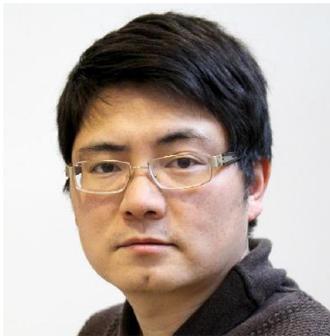
Norwegian University of
Science and Technology

Lecture 3

Performance assessment of safety-critical system under complex environment

Norwegian University of Science and Technology: Department of Mechanical and
Industrial Engineering

挪威科技大学: 机械与工业工程系



主讲人: Yiliu Liu, Associate Professor

主持人:

邀请单位: 中国石油大学(北京) 安全与海洋工程学院

讲座时间: 2019年6月14日上午 10:00~11:30

讲座地点: 四教 301 室

主讲人简介:

Professor Liu has started his permanent position from 2013, in the RAMS group, Department of Mechanical Engineering, NTNU. His main research interests are in barrier analysis, design and assessment of safety-critical systems and product reliability engineering. Dr Liu is an active researcher in the relevant fields, with publishing more than 90 peer - reviewed papers, most of which in the recent 5 years. He is also serving the academics as the reviewer for more than 20 international journals and the technical committee member for many international conferences.

He has sophisticated experiences in running international collaborations projects. Since 2013, he has been the manager of several research and education projects with China, Japan, South Korea, Vietnam, Israel, and Algeria. He is also deeply participating in the collaborations between Norway and Brazil, Tanzania, Australia, and USA. In addition, he is the director of international master program of RAMS in NTNU.

Abstract:

The lecture will be the follow-up of that of Professor Lundteigen, for performance analysis of safety-critical systems. The main performance measures and their adaptability will be discussed. Common modeling approaches and algorithms will be introduced in a brief way. In addition, the lecture will give some information about the analysis for safety-critical systems under more complex environment. The complexity can come from dynamics of systems themselves, varied operational and maintenance strategies, and interactions with other systems.

访问日程 Visiting Schedule

VISIT TO CUPB FROM NTNU ON 8th-15th JUNE 2019

Professor: Mary Ann Lundteigen//Associate Professor: Yiliu Liu

Schedule:

时间 Time	上午 Morning (9:00-11:30)	下午 Afternoon (15:00-17:30)	备注 Remark
2019/06/08 星期六 Saturday	出发, 6月9日上午到达北京 Arrive at Beijing from Norway, picked up by Shengnan Wu		
2019/06/10 星期一 Monday	(10:00-11:00) 见面会 双方相互介绍及参观实验室 Start-up meeting/ Visit lab (1. Brief introduction for both research group 2. Exchange 3. Photos)	讲座 1 Lecture 1: Professor Lundteigen Topic 1: Status on Research Projects and Programs in the Norwegian Oil and Gas Industry: Some Selected Examples	
2019/06/11 星期二 Tuesday	讲座 2 Lecture 2: Professor Lundteigen Topic 2: Perspectives on design and operation of Safety-Instrumented Systems in the Oil and Gas industry: A review of SIS related standards and practices	参观实验室 学术交流 Visit lab/ Academic discussion	
2019/06/12 星期三 Wednesday	参观长城 Visit Great wall	学术交流 Academic discussion	
2019/06/13 星期四 Thursday	文化交流活动 Chinese Culture activities		
2019/06/14 星期五 Friday	讲座 3 Lecture 3: Professor Liu Topic 3: Performance of safety-critical system under complex environment	参观十三陵 Visit the Ming Tombs	
2019/06/15 星期六 Saturday	返回挪威 Return Norway, see off by Shengnan Wu		

