



EFCA
FUTURE LEADER OF THE YEAR
2021

Personal details / Entry Form

Full name: Tor Martin Lystad

Nationality: Norwegian

Birthday: 24.02.1987

Age as of 31/03/2021: 34

Company: Norconsult AS

Location: Sandvika, Norway

Member Association: RIF (Consulting Engineers' Association, Norway)

Contact details

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Instructions for completing this form



Note to candidates

Each section and sub-section may be expanded as required. The completed entry form should be no longer than **16 pages in total**. Section A is to be completed by your employer, and Section C by the client.

All entries should be submitted in English. Any annexes in other languages should be accompanied by an English translation or will not be taken into account.

The form should be returned to your national association. They will forward it to the EFCA Secretariat.

You will be informed of the results of the competition at end of April 2021.

Good luck!

For those participating in the FIDIC FL competition

The requirements stipulated in the respective EFCA and FIDIC FL competitions coincide largely for 75%. The following three FIDIC competition requirements are entirely covered in the EFCA application:

- Technical achievements (see Section B in this template) (50%)
What is 30% for EFCA
- Leadership achievements (see Section C in this template) (15%)
What is 40% for EFCA
- Social and community contributions (see Section B in this template) (10%)
What is 30% for EFCA

However, EFCA FLs interested in submitting an application for the FIDIC FL competition should complement their EFCA application with the following two extra requirements.

Applicants should demonstrate:

- Contributions to consulting engineering industry (15%)
- Contribution to consulting engineering associations (10%)

Section A. EMPLOYER'S RECOMMENDATION

Introduction

Tor Martin Lystad is a 34-year-old engineer from a small village called Blaker outside of Oslo, Norway. He took his bachelor's degree at Oslo University College (now named Oslo Metropolitan University) in 2011 before graduating from his master's degree in structural engineering at the Norwegian University of Science and Technology in 2013. During the summer of 2011 and 2012 he had a summer job at Norconsult, and the engagement continued part time during his graduating year as a master student. He eventually started working full time for the bridge department at Norconsult's main office in Sandvika, Norway, after graduating in 2013.

Before studying for his bachelor's degree, Lystad worked as a carpenter, taking his certificate of apprenticeship in 2007.

In the fall of 2016, he started an industrial PhD project in a collaboration between Norconsult and the Norwegian University of Science and Technology.

Special expertise

During his time as an engineer at the bridge department in Norconsult, Lystad has rapidly developed into a senior figure in the field of long-span bridges. He has become a key resource for the company's devoted ambition in contributing to the realization of a Ferry Free Coastal Highway Route E39 (Further described in section B). Lystad has also developed an impressive experience with suspension bridges, through projects such as the detail design of the Leirfjord Bridge (suspension bridge with main span of 800 m), the full recalculation of the Høga Kusten Bridge (Suspension bridge with main span of 1210 m), the bid design of the New Sotra Bridge (Suspension bridge with main span of 600 m) and design of climb safe railings at the Askøy Bridge (Suspension bridge with main span of 850 m). Not to mention his PhD research consisting of thorough investigations of the Hardanger bridge (Norway's longest suspension bridge with main span of 1310 m).

Lystad's eagerness to learn, and his ability to quickly understand complex topics has made him able to take on and handle demanding tasks. He is an efficient engineer, delivering high quality work. Due to these qualities, Norconsult has trusted him with demanding and central roles in some of the most challenging bridge projects in Norway.

Strong contributor to the company development

Lystad is a driving force in several strategically important parts of Norconsult's business. He is enthusiastic and eager in his contributions to develop Norconsult's digital work processes and he has been an important contributor to formalizing the focus on the market for long-span bridges.

Digitalization is one of Norconsult's main strategical pillars, and Lystad has contributed heavily in developing the strategy regarding digitalization in his division for Buildings and Constructions (approximately 280 employees). Through Norconsult's projects and his PhD research, Lystad has become a skilled programmer, which has innovated his working

methods to become more efficient and flexible. He has a passion for automatized solutions, and he has developed many efficient tools for parametric structural analyses, design checks etc., in addition to developing more complete software for implementations not available in commercial software. Over several years, Lystad has encouraged his co-workers to utilize programming in their day-to-day tasks, to improve the efficiency of the work processes. He has held courses in the Python programming language for his co-workers in several formats, to ease the transition into a more automatized work methodology.

The Bridge Department in Norconsult have established themselves as one of the strongest Bridge Engineering departments in Norway. Norway is a country with many bridges, and over the years, Norconsult has built special knowledge and experience with many kinds of major bridges. In recent years, Lystad has been key in formalizing the strategy for the major bridges market, which is an important segment for Norconsult. Lystad took the initiative to formalize a strategy specific for this special marked segment, and he is now the assisting leader of the group responsible for the major bridges market.

Academic achievements

When graduating from Oslo University College, Lystad won the prize for the best graduate student in the class of 2011 among all engineering disciplines, some 700 students, with a perfect grade card of straight A's.

Lystad has completed his PhD work in due time, resulting in a total of 8 publications (4 journal papers and 4 conference papers) where he is the first author. His research has addressed some important aspects to ensure the structural safety when the field of Bridge Engineering is trending towards increasingly longer bridges, and he has received encouraging feedback on the work and the results from his research peers.

In Norway, the duration of a PhD program is normally 3 years for research and PhD courses. As an industrial-PhD, Lystad had a four-year plan of which one year would be contributions in Norconsult projects. Due to his passion for the bridge engineering field, he could not limit himself to only one year of project work, so his contribution in important projects for his company has significantly exceeded the planned one year. Nevertheless, he has fulfilled his commitment both to the research and the company and delivered his thesis in due time. The combination of research and company projects has also given an important synergy, enriching both the company projects and the PhD research.

In addition to his own research, Lystad has supervised six master students at the Norwegian University of Science and Technology.

As a testament to his academic abilities, Lystad has been offered a role as an Associate Professor II at the Norwegian University of Science and Technology.

Communication and marketing

Lystad has been an important contributor to the marketing of Norconsult's bridge department, through conference presentations and committee participation. He has held oral presentations in the large Norwegian conferences, "Brukonferansen 2018" (approximately 250 participants, plenary session) and "Teknologidagene 2019" (approximately 1000 participants, parallel sessions), as well as presenting his PhD work at several international conferences. He is also a committee member of the Bridge group in the Nordic Road

Association (NVF) where the main topics of the current period is 1) Climate, 2) Digitalization and 3) Asset management.

Personal skills

Tor Martin Lystad is an honest, empathic and passionate engineer. He is a social person and cares greatly for the people around him, and his family, friends and colleges are of great importance to him on a personal level.

As an engineer, he is efficient and innovative in his work methods, and has a special ability to quickly understand complex problems. He is confident in his abilities, which has enabled him to step into challenging roles and delivering excellent results.

Lystad is enthusiastic and has a drive for improving both his own abilities as well as the team around him. Lystad's personality strongly reflects the core values of Norconsult: Honest, Competent, Inclusive and Engaged.

Name: Asbjørn Gjerding-Smith

Job title: Head of the Bridge Department, Norconsult

Managerial relationship to candidate: Immediate Manager

Section B. THE PROJECT

B.1 Project description:

The Norwegian government is planning to build a Ferry Free Coastal Highway Route E39 along the west coast of Norway, reducing the traveling time between the two cities of Trondheim and Kristiansand from 21 hours to an impressive 11 hours. This part of Norway is a key economic region, so an efficient infrastructure is important to ensure economic growth and enable the transition away from oil production dependency in Norway.

The nature along the west coast of Norway consists of high mountains and deep fjords, so the current E39 is hampered by old rock tunnels and ferry crossings. The “Fjord-crossing” project is part of the Ferry Free Coastal Highway Route E39. In this project, extreme bridge concepts are being planned to cross the wide and deep fjords along the highway route. This is done in a coordinated effort managed by the Norwegian Public Roads Administration (NPRA), consisting of development projects performed by engineering consultant companies and extensive research activity.

Fjords as wide as 5 km and as deep as up to 1300 m needs to be crossed, and bridge concepts such as ultra-long suspension bridges, submerged floating tunnels, floating bridges and suspension bridges with towers supported by tension leg platforms (TLP) are under consideration.



Figure 1: Long-span bridge concepts under consideration in the Fjord crossing project. (Illustration courtesy of 1) Kristian Berntsen/Norwegian Public Roads Administration/Google, 2) and 3) Vianova/Baezeni)

The crossing of the Bjørnafjord is one of the major fjord crossings that has been prioritized in the Fjord-crossing project. This is the widest fjord of all considered bridge crossings along the Coastal Highway Route E39. The fjord is approximately 5 km wide and the fjord depth is approximately 500 m. Concepts such as a submerged floating tunnel, a TLP suspension bridge and floating bridges has been considered as possibilities for the crossing of the Bjørnafjord. After several development phases between 2013 and 2019, the recommended concept is a curved, side anchored, pontoon supported, floating bridge. The construction of the Bjørnafjord crossing is currently planned for the period 2024-2029 pending Government decision.

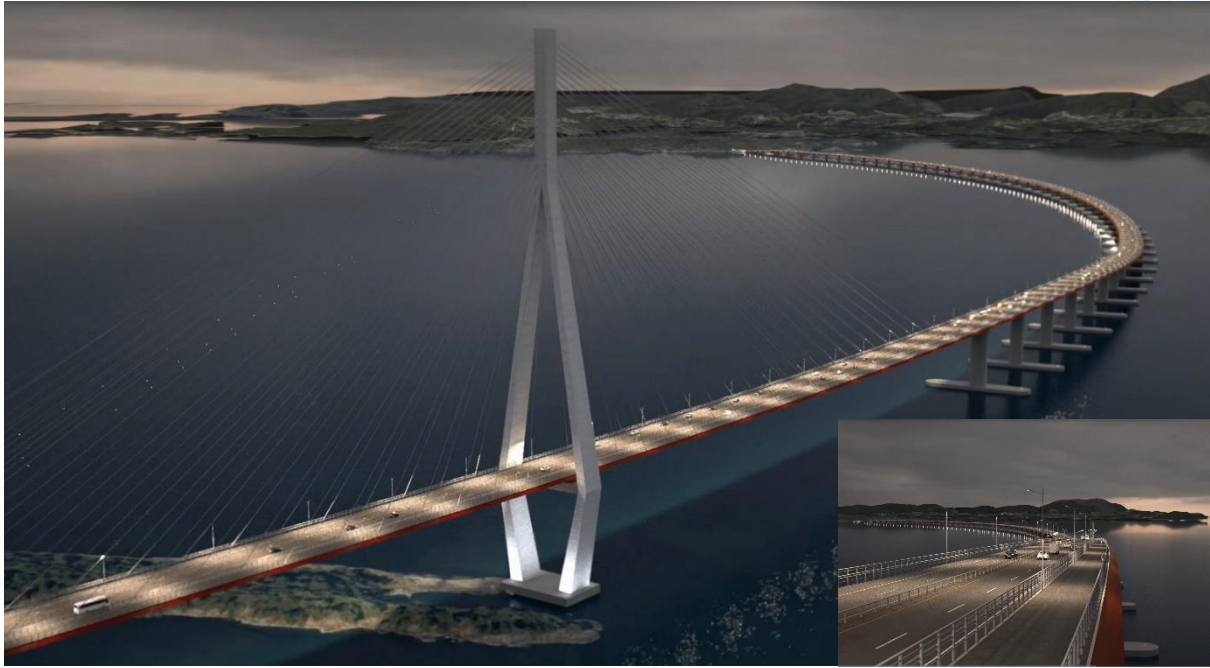


Figure 2: End-anchored floating bridge concept for the Bjørnafjord crossing (Illustration courtesy of Vianova/Baezeni)

B.2 Innovative characteristics of the project:

Several bridge concepts that has never been built before is considered and developed in the Fjord-crossing project. The wide and deep fjords cannot be crossed with conventional technology, so either known technological concepts are used in a new application, or entirely new structural concepts are needed. During the Fjord-crossing project, the technology of these new concepts has been matured and developed, which will enable the crossing of Norwegian fjords, but also enable applications for similar crossings around the world.

A general challenge for all the considered bridges is that the span length will be incredibly long, and for several fjords, much longer than what has been built before. The bridges become extremely slender, presenting special challenges in terms of dynamic behavior. For these bridges, the design will be governed by dynamic environmental loads such as wind and waves. Uncertainties connected to these loads needs to be properly addressed to ensure a safe and reliable design. Unique measurement programs for wind and waves are deployed and new methodology for addressing the extreme structural response has been developed for this purpose.

In addition to known structural behavior, new dynamic phenomena have been identified for these extremely slender bridges. An example of such a phenomenon is parametric resonance of a curved floating bridge, which is a complex nonlinear dynamic behavior that can excite unstable-like structural response for such a bridge. The theoretical problem, which is referred to as a Mathieu instability, is known from other dynamic systems, but not for long-span bridges.

The realization of these bridges will be a massive engineering achievement, and the Fjord-crossing project have already been extremely important for the development of specialized expertise in the Norwegian consultants. In addition to this, the project has boosted the research activity in several of the countries in the Northern part of Europe.

B.3 The FL's role in, and specific contribution to, the project:

Several contributions to the Fjord-crossing project has made out a large part of Lystad's young engineering carrier, as he has contributed to both the engineering consultant side and the research side of the project. Norconsult has been a substantial contributor to the concept development of several of the bridge concepts in the Fjord-crossing project. Lystad has been involved in all development phases of the Bjørnafjord crossing, working with submerged floating tunnels and different floating bridge concepts. He has also contributed in the work to cross other fjords along the E39, such as the Sulafjord, the Vartdalsfjord and the Halsafjord.

With new bridge concepts subjected to both wind and wave loads, many commercial softwares had limitations for the specific applications needed for the engineering of the extreme fjord crossings. Lystad has developed a new software for analyzing the dynamic response to stochastic loads from wind and waves. The software was tailored to the project specific challenges and has been used for dynamic response calculations in all phases of the Bjørnafjord crossing. The software has also been used in many other long-span bridge projects carried out by Norconsult.

Lystad was leading the work for the challenging investigations of parametric resonance for the curved floating bridge concepts considered for the Bjørnafjord crossing. The dynamic phenomenon was a critical issue for the feasibility of the bridge concept. In an extremely theoretically challenging topic, with no earlier applications and limited research basis, Lystad and his team found a way to describe the problem as a self-stabilizing response phenomenon through utilization of quadratic viscous damping from pontoon motions. This approach reduced the problem from being a strictly unstable behavior to become manageable from a design point of view.

During the last four years, in parallel with extensive project participation, Lystad has completed his PhD work, with his thesis currently submitted for review. Lystad's PhD work has been a part of the research activity organized under the Fjord-crossing project, with focus on structural response of long-span bridges subjected to dynamic wind loading. In the current widely used design methodology for long-span bridges, the wind loads and the structural extreme response is estimated in a manner that has proven to be too simple to predict the uncertain response seen in full-scale monitoring of such bridges. When the dynamic behavior start to dominate the design loads of a structure, which is the case for many of the bridges considered in the Fjord-crossing project, the current design methods are not calibrated to ensure the achieved structural safety needed. Lystad's research has focused on reducing the limitations in the current methods, and provide insight needed to recalibrate the reliability calculations.

B.4 Communication with the client/end user:

Throughout the development phases of the Bjørnafjorden crossing, the client (NPRA) and the consultant group that Norconsult has been part of, was situated in the same office space. This enabled close communication between the consultants and the client, both formal meeting activity and informal coffee machine chatting. Both communication platforms have been of great importance for the project, forming a good creative cooperation environment.

Lystad's pedagogical communication skills has been essential in communicating theoretically challenging topics, such as the process of investigating parametric resonance of the curved

floating bridge concept suggested for the Bjørnafjord crossing. In such work, it is incredibly important that all parties understand the essence of the development, and the challenges that arise, to create an environment for good decision making. Lystad presented the developments of the work in frequent meetings with the client, with the result of good progress and detailed insight in the process for all parties. In one meeting, the client was so happy with the breakthrough progress of the investigations with parametric resonance that a spontaneous applause broke out.

Lystad has also presented his PhD research for the client on several occasions. He gave an online lecture on his research, organized by the client, and he was also invited to give a Pecha Kutcha presentation of his work on the client's annual technological conference. He has received warm compliments on his oral presentation abilities. Lystad has also participated in several events, where all PhD-students connected to the Fjord-crossing project and the whole Ferry Free E39 project has been invited. In these events, socializing, networking, and research communication has been the focus.

Lystad also presented his PhD research related to the Fjord-crossing project in multiple international conferences, such as the major wind engineering conferences EACWE 2017, In-Vento 2018 and ICWE 2019.

B.5 Describe the project end results and the benefits to the client/end user:

During one of the floating bridge development phases, the consultant group where Lystad has been a central figure, enabled cost savings of an incredible 30% and a substantial reduction of the climate footprint of the floating bridge concepts. This was critical for the Bjørnafjord crossing, which at that point was in danger of becoming too costly to proceed.

In Lystad's PhD research, he has developed methodology that is suitable for practical design purposes and can significantly reduce the uncertainty connected to dynamic response calculations for long-span bridges subjected to wind loading. For the bridges considered in the Fjord-crossing project, this will be very important to achieve the target safety and reliability of these groundbreaking structures.

Section C. CLIENT'S APPRECIATION OF THE CANDIDATE

Tor Martin performed excellent during the concept development phase of the Bjørnafjord Floating Bridge Project, with a strong ability to execute and deliver on the tasks he was assigned. The project had strong traits of R&D, and thus required a high level of technical expertise and innovative problem solving for everyone involved. During the project, the candidate performed complex structural dynamic analysis of a 5km long floating bridge exposed to wind, wave and current.

Tor Martins technical deliveries had an outstanding quality throughout the project, and the candidate provided ample updates to the client through excellent presentations. He is very good at communicating and relaying complex technical information on complicated problems in a way that makes it understandable, also for someone who don't have the same technical expertise as himself.

As to the candidate's personality, he is humble but manages to create excitement among the people he cooperates with, both in his own company as well as with the client and other partners. This was very evident in the way he handled meetings where some of the participants had strong personalities. This shows strong people skills as well as management skills, something that indicates that Tor Martin also can become a good leader candidate in the future.

Stavanger 10.03.2021

Name: Mathias Egeland Eidem

Job title: Project manager, Fjord Crossing Project

Company: Norwegian Public Roads Administration

Section D. CV OF THE CANDIDATE



Curriculum Vitae



Personal information

First name(s) / Family name(s) **Tor Martin Lystad**
Business Address Vestfjordgaten 4, 1338 Sandvika
Phone number(s) +47 91838540 Cell: +47 91838540
E-mail address tor.martin.lystad@norconsult.com
Nationality Norwegian
Date of birth 1987-02-24

Work experience

Dates	2013-Current
Occupation or position held	Civil engineer Bridge department
Main activities and responsibilities	Design of bridges in the materials; steel, concrete and wood Analyses and design calculation of long-span bridges Project management PhD-research Strategic planning and company development
Name and address of employer	Norconsult AS
Type of business or sector	Multidisciplinary consultancy
Dates	2011-2013
Occupation or position held	Summer jobs and part time engineer, industrial structures
Main activities and responsibilities	Design of structures in industry projects Design calculations Technical drawings in 2D and 3D
Name and address of employer	Norconsult AS
Type of business or sector	Multidisciplinary consultancy
Dates	2010-2011
Occupation or position held	Business owner, Carpenter
Main activities and responsibilities	Part time carpenter working with new houses, garages etc. Economic management Accounting
Name and address of employer	Lystad Byggservice
Type of business or sector	Carpenter
Dates	2005-2007



Occupation or position held
Main activities and responsibilities
Name and address of employer
Type of business or sector

Carpenter apprentice
New wooden houses
Restoration of old houses
Building garages and minor buildings
Carpenter Odd Arne Skårerverket
Carpenter

Education and training

Dates
Title of qualification awarded
Principal subjects/occupational skills covered
Name and type of organisation providing education and training
Level in national or international classification

2016-Current
Philosophiae Doctor (pending)
Wind engineering
Stochastic dynamics
Statistics of extremes
Structural reliability
The Norwegian University of Science and Technology (NTNU)
Level 8 (Norwegian Standard Classification of Education)

Dates
Title of qualification awarded
Principal subjects/occupational skills covered
Name and type of organisation providing education and training
Level in national or international classification

2011-2013
Master of Science
Stochastic dynamics
Finite element analyses (linear and nonlinear)
Mechanics of materials
Structural dynamics
Advanced steel design
Advanced concrete design
The Norwegian University of Science and Technology (NTNU)
Level 7 (Norwegian Standard Classification of Education)

Dates
Title of qualification awarded
Principal subjects/occupational skills covered
Name and type of organisation providing education and training
Level in national or international classification

2008-2011
Bachelor
Structural Mechanics
Steel design
Concrete design
Wood design
The Norwegian University of Science and Technology (NTNU)
Level 6 (Norwegian Standard Classification of Education)

Personal skills and competences

Mother tongue(s) **Norwegian**

Other language(s) **English, German**

Self-assessment

European level (*)

English

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C2	Proficient user	C2	Proficient user	C1	Proficient user	C1	Proficient user	C2	Proficient user

German

A2	Basic User	A2	Basic User	A1	Basic User	A1	Basic User	A1	Basic User
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Social skills and competences	Dedicated, curious and compassionate.
Organisational skills and competences	Very structured and have the ability to learn quickly and understand complex problems.
Technical skills and competences	Programming, mathematics, aerodynamics, structural dynamics, advanced finite element analyses, bridge design
Computer skills and competences	Programming in the Python, Matlab and FORTRAN languages. Skilled in conventional computer programs such as Microsoft Office programs, etc.
Other skills and competences	Pedagogical. During his studies, Lystad often gave lectures to his fellow student in challenging topics.
Hobbies and activities	Football, Snowboarding, Surfing, Road cycling, Traveling (often in combination with other hobbies)
Papers published	<p>Lystad TM, Fenerci A, Øiseth O. "Full long-term extreme structural response with sequantial Gaussian process surrogate modelling" Submitted to Structural Safety for journal publication 2021</p> <p>Lystad TM, Fenerci A, Øiseth O. Long-term extreme buffeting response of long-span bridges considering uncertain turbulence parameters. IABSE Congress Ghent 2021, Submitted</p> <p>Lystad TM, Fenerci A, Øiseth O. "Long-term extreme buffeting response of cable-supported bridges with uncertain turbulence parameters", Engineering Structures 2021;</p> <p>Lystad TM, Fenerci A, Øiseth O. "Buffeting response of long-span bridges considering uncertain turbulence parameters using the environmental contour method", Engineering Structures 2020;213:110575</p> <p>Lystad TM, Fenerci A, Øiseth O. Turbulence variability effects on the buffeting response of a long-span suspension bridge. The 15th International Conference on Wind Engineering (ICWE 19), Beijing, China, 2019</p> <p>Lystad TM, Fenerci A, Øiseth O. "Aerodynamic Effect of Non-uniform Wind Profiles for Long-Span Bridges", Proceedings of the XV Conference of the Italian Association for Wind Engineering. IN VENTO 2018. Lecture Notes in Civil Engineering vol. 27. 2019</p> <p>Lystad TM, Fenerci A, Øiseth O. "Evaluation of mast measurements and wind tunnel terrain models to describe spatially variable wind field characteristics for long-span bridge design", Journal of Wind Engineering and Industrial Aerodynamics 2018;179:558–73</p> <p>Lystad TM, Fenerci A, Øiseth O. Wind field characteristics at the Hardanger Bridge site: comparison of wind tunnel terrain model tests with full-scale measurements. 7th Eur. African Conf. Wind Eng. (EACWE 2017), Liege, Belgium, 2017</p>

Public speaking experience

International conferences:

- European and African conference on wind engineering 2017, Liege, Oral presentation
- Conference of the Italian Association for wind engineering 2018, Naples, Oral presentation
- International conference on wind engineering 2019, Beijing, created oral presentation presented by the co-author (could not attend the conference in person due to the birth of my first daughter)

National conferences:

- The bridge conference 2018 (Brukonferansen, Norway's largest bridge conference arranged by the NPRA), Oral presentation
- The technology conference (Teknologidagene, Norway's largest road infrastructure conference arranged by the NPRA), Oral Petcha Kutcha presentation

Other public speaking experiences:

- Online lecture on my PhD research in a lecture series arranged by the NPRA
- Presentations in different formats in PhD-candidate gatherings in connection with the Ferry Free E39 project
- Several presentations for colleagues in Norconsult in internal conferences, larger meetings/gatherings, and programming courses held for colleagues.

Membership of professional organisations

Nordic Road Association, NVF (Member of working group for bridges)