Poster #9

EXAMPLES OF UPCOMING HIGH CONTAINMENT ANIMAL FACILITIES IN SCANDINAVIA

How are they different and how are they alike?

Henriette Schubert/Karin Hedebo Wassard, NNE Pharmaplan A/S, Denmark

nne pharmaplan®

INTRODUCTION

This purpose of this poster is to illustrate and give an insight into the challenges related to building high containment animal facilities in a region with very few high containment animal facility references and a spillover effect of limited local experience with biocontainment engineering and biorisk.

All these projects have a lot in common. They are all dealing with the complexities of all high containment projects, but also have some additional challenges. All the projects have programs including unknown high risk biological agents. Also, the projects are all characterized by their project setups based on traditional project execution by local Architectural and Engineering firms, where only few of them have experience in this field.
The user groups connected to the projects are not all used to work in facility design project groups and the biorisk knowledge in this group is limited to very few people.

The additional challenges are mainly related to:

- Addressing high containment animal facility projects, when the majority of relevant biological agents are unknown
- Limited local biocontainment and biorisk design experience.
- Making the best and most efficient use of the local biorisk knowledge among consultants and user groups.
- Creating consciousness and awareness of biorisk as main design driver in this type of project groups among less experienced stakeholders.

PROJECTS:

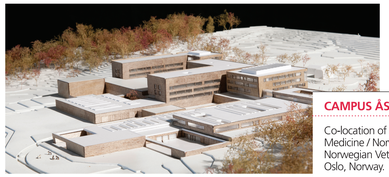
The current projects for high containment animal facilities in Scandinavia have a lot in common and yet they have major differences.

How are they different?

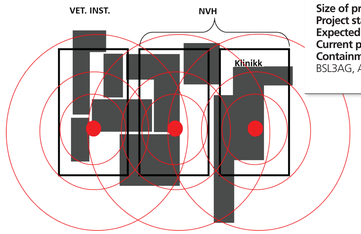
- The projects are quite different in sizes (m2) and context – one of them a 300 m2 BSL3/ABSL3/GMO3 lab in a city environment, and the other project a 63 000 m2 facility grouping of a range from BSL2 laboratories up to BSL3AG facilities in context with animal hospital clinics in a countryside environment
- The approach to biorisk and biocontainment engineering is different in the projects. Only one of the projects have so far included a designated biocontainment engineering / biorisk role in the consultancy group from the start of the project, while the other project approach is to use traditional project consultant roles and rely on biorisk experience from user groups.
- Only one of the projects have so far included the use of biorisk assessment reviews involving external / International biosafety professionals .

How are they alike?

- All the projects a mainly state funded and thereby have to follow specific procurement rules and regulations.
- All the project group setups are based on local or inter-Scandinavian Architectural / Engineering consultants, mainly with limited experience with high containment facilities and biorisk. Both projects have dedicated user groups including relevant stakeholders, such as researchers and maintenance representatives etc.



Model photo, illustrating the extents, volume and size of the new facilities for the Veterinary Institute and the Veterinary Medical School, situated in an existing characteristic sloped terrain.

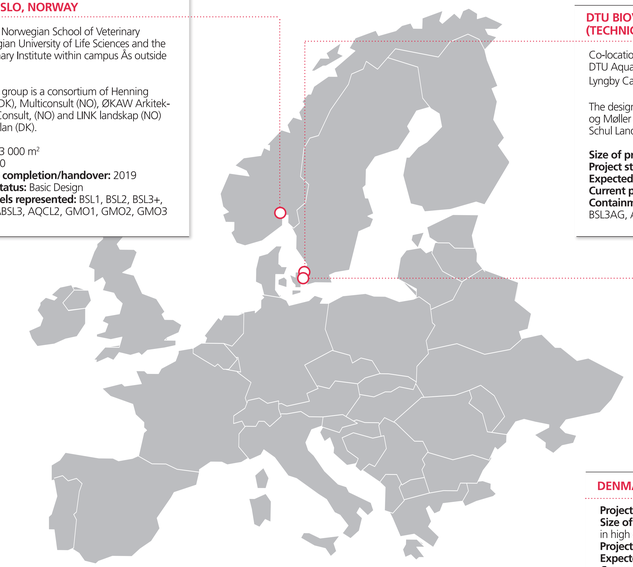


CAMPUS ÅS, OSLO, NORWAY

Co-location of the Norwegian School of Veterinary Medicine / Norwegian University of Life Sciences and the Norwegian Veterinary Institute within campus Ås outside Oslo, Norway.

The project design group is a consortium of Henning Larsen Architects (DK), Multiconsult (NO), ØKAW Arkitekter (NO), Hjellnes Consult, (NO) and LINK landskap (NO) and NNE Pharmaplan (DK).

Size of project: 63 000 m²
Project start: 2010
Expected project completion/handover: 2019
Current project status: Basic Design
Containment levels represented: BSL1, BSL2, BSL3+, BSL3AG, ABSL2, ABSL3, AQCL2, GMO1, GMO2, GMO3



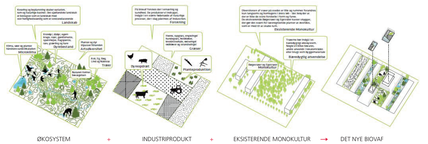
Pictures from project proposal by NNE Pharmaplan, Orbicon, Henning Larsen Architects and SLA.

DTU BIOVAF (TECHNICAL UNIVERSITY OF DENMARK)

Co-location (BIOVAF) of the Danish Veterinary Institute, DTU Aqua and DTU National Food Institute at DTU Lyngby Campus, North of Copenhagen.

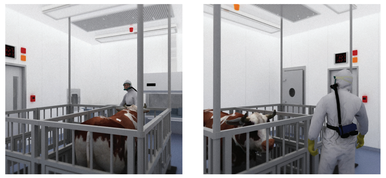
The design group is a consortium of COWI, Rørbæk og Møller Arkitekter, Christensen & CO Arkitekter, Schul Landscape Architects, Wessberg Engineers.

Size of project: 40 000 m²
Project start: 2012
Expected completion/handover: 2016
Current project status: Pre-Basic Design Phase
Containment levels represented: BSL1, BSL2, BSL3, BSL3AG, ABSL3, GMO1, GMO2, GMO3



DENMARK

Project design group: N/A
Size of project (total): App. 300m² classified area in high containment
Project start: N/A
Expected project completion/handover: N/A
Current project status: Main project (Detailed design phase)
Containment levels represented: BSL3, ABSL3, GMO3



3D model picture of one of the BSL3AG/ABSL3 rooms for the new facility. The new facilities are designed for multipurpose research and diagnostic activities.

PROJECT APPROACH AND METHODS

The project approaches for the current projects have been quite different and yet they have similarities in how to address the extra project challenges related both to high containment facilities and less experienced project groups.

Project approaches in general relates to the value of regarding high containment animal projects as very different from other types of facility projects.

Already when regarding high containment projects as a different 'creature', it calls for a quite different approach for executing the project. Here it can be identified, that these projects will benefit enormously from 'frontloading' of the projects. Frontloading basically means concentrating the main biorisk design basis in the earliest project / programing phases.
Another approach is to implement extensive use of global

biosafety professional's networks. This could be biosafety professionals used as designated biorisk consultants in relation to interdisciplinary design reviews. Valuable benefits from of this method can be third party opinions and International biorisk review inputs based on hands-on experience.

An additional approach is to use a project method that clearly communicates biorisk design drivers and basis for design to all relevant project stakeholders. This is even more relevant when the design basis includes unknown biological agents.

One of the methods to secure a common basis and to keep perspective on biorisk in groups with limited experience is the use of generic but project specific 'biocontainment typologies'. These supports overview, interdisciplinary and common understanding, defining frames for high biorisk in situations with unknown biological agents. The current experience with the use of 'biocontainment typologies have demonstrated many benefits for the project stakeholders as a whole.

RESULTS/DISCUSSION

Based on the facts of limited number of animal high containment projects in Scandinavia combined with limited biocontainment design and biorisk experience among users and consultants, the two current and largest projects in Scandinavia have offered many of the above mentioned challenges.

Challenges are mainly related to initial project execution methods and project organizations that mainly have been based on 'traditional' project organizations and traditional discipline involvement from 'regular' architectural and engineering firms.

Also, the two projects have had less clear plans for how to benefit the most from available local biorisk expertise among consultants and user groups. This approach has created a number of challenges.

In one of the projects, the biorisk experience and biocontainment project experience and competencies were mainly available from the user group itself. This can create conflicts related to consultancy responsibilities.

When the user/client group may cross the border into doing actual engineering or design work, – it is a challenge to define responsibilities and actual roles in the project.

Other lessons learned from both projects has clearly concluded the necessity for a dedicated and joint project team, cooperating and focusing on biorisk and biocontainment engineering from the earliest programming phases.

One of the projects have already benefitted from frontloading activities related to dedicated work executed on common basis of biorisk and biocontainment engineering.

Also, the use of global biosafety networks have already proven to be essential and planning of continuous third party project reviews and evaluations involving animal biosafety professionals are expected to be main milestones for the final project success.

So far the use of 'biocontainment typologies' have proved to be a useful work method and work tool in these complex containment projects involving project design groups with limited biocontainment experience. This tool has so far been tested in both a large complex veterinary university campus project as well as a smaller animal facility project, spanning biocontainment levels from ABSL2 to BSL3AG.

One of the projects has used the approach of including external / international biorisk expertise, for concept and design review. This has proven very valuable and is expected to be a continuous built-in part of the ongoing design development in the next project phases.

CONCLUSION/FOLLOW-UP

The challenges present when working with high containment animal facilities projects have proven to be multiple. When the local experience with biocontainment and animal facilities is limited, it can be concluded that it adds tremendously to the challenges, on top of the fact, that projects for high containment animal facilities are already packed with complexity.

It is expected that the ongoing high containment projects will continue to be challenging, mainly related to identified project organizational issues and especially challenges where the biorisk project basis has been less frontloaded.

The ongoing Scandinavian high containment animal facility projects will benefit from continued focus on using global biosafety and animal containment networks as well as planning for continuous design reviews involving experienced outsiders for keeping the projects on track.

Also when using the 'biocontainment typologies' they will be continously used and updated throughout the project lifetime for common basis and communication.

KEY TAKE HOME MESSAGES

- Project organizations with limited local experience of high containment projects adds to the project challenges and should plan early for making the most efficient use and benefit out of existing local biorisk experience in combination with a continuous flow of timely design reviews including external biorisk expertise.
- Responsibilities and roles in the interdisciplinary project groups of project design group, consultants and user groups should be clearly defined and detailed from the very beginning of the project. This can also identify potential competency and experience gaps at an early project stage.
- 'Frontloading' of high containment projects have proven efficient and beneficial for cooperation, common project complexity understanding as well as design development progress. The frontloading philosophy is mainly about prioritizing and concentrating the main biorisk design basis in the earliest project / programing phases.
- Development of initial biorisk assessments supports the challenges of translating biorisk into safe and adequate biocontainment engineering solutions
- In high containment animal facility projects with unknown biological agents it has proven very useful to establish 'biocontainment typologies' as common baseline and discussion frame for relevant biosafety levels in the facility design.