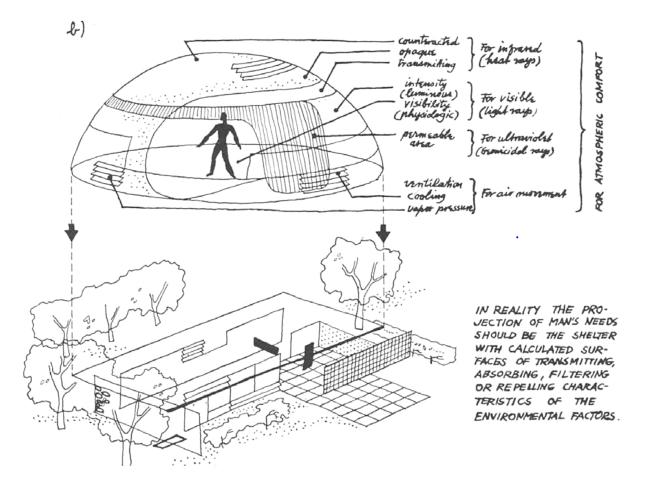
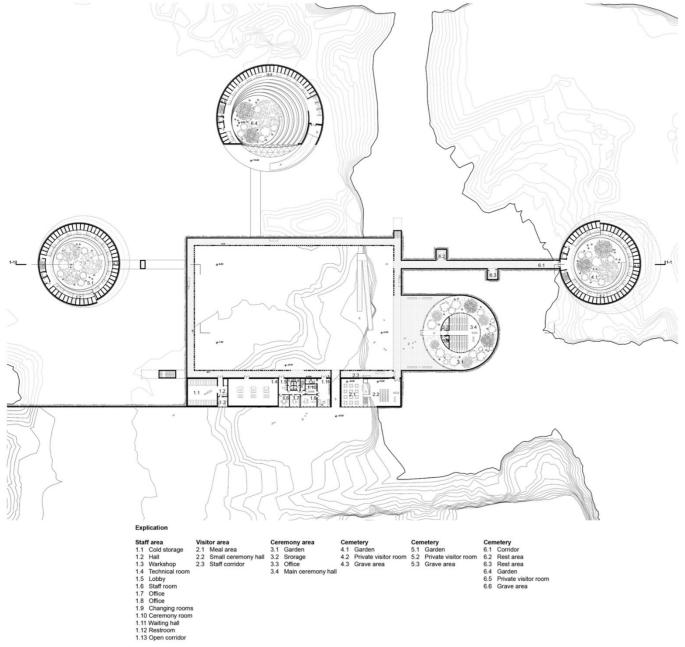


#### **FOCUS >> climate** as a basis for architectural design



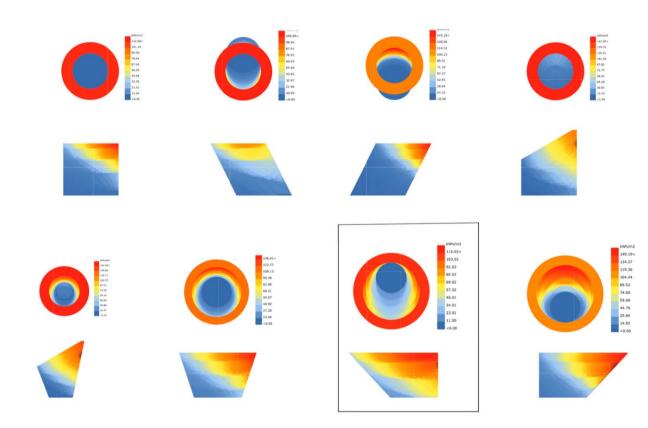


Victor Olgyay \_ Design with Climate





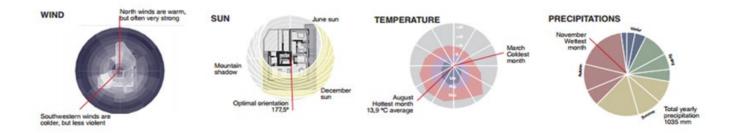
Luca Finocchiaro 🖸 NTNU Det skapende universitet





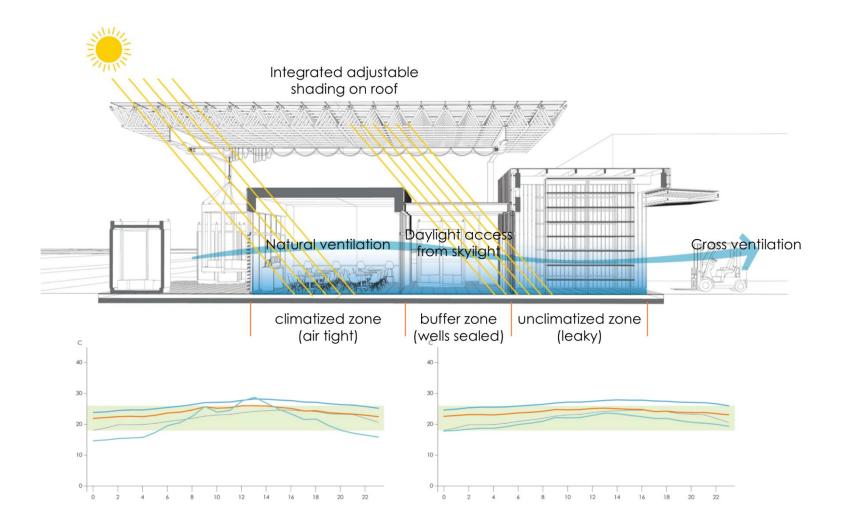
\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?,-2.6,-9.4,59,92774,0,0,229,0,0,0,0,0,0,9999,263,0.3,1,1,9999,99999,9,999999999,5,0.235,0 \*?\*?\*?\*?\*?\*?,-2.7,-9.6,59,92774,0,0,228,0,0,0,0,0,9999,252,0.5,1,1,9999,99999,9,9999999,5,0.235,0 ?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?,-2.9,-9.3,62,92774,0,0,229,0,0,0,0,0,0,0,9999,231,0.3,1,1,9999,9999,9,9,99999999999,5,0.235,0 ,-2.9,-8.3,66,92774,4,1412,233,0,0,0,27,0005,26,9999,237,1.1,1,1,1,9999,99999,9,999999,5 ?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*? , -1.2, -8.0, 60, 92774, 166, 1412, 236, 75, 311, 39, 7688, 15717, 5841, 9999, 169, 0, 7, 1, 1, 9999, 99999, 9?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?,1.3,-7.6,51,92774,383,1412,237,206,483,74,21385,37919,11093,9999,253,3.8,1,1,9999,99999?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?,3.9,-8.4,40,92774,551,1412,235,325,534,116,35109,47411,16587,9999,95,2.6,3,2,9999,9999 \*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?.6.2,-8.7,33,92774,659,1412,235,413,616,126,43469,54891,17828,9999,181,2.6,1,1,9999,99999 \*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*.8.0,-8.6,30,92774,700,1412,237,440,611,137,46284,54568,19240,9999,145,3.4,3,2,9999,99999 -8.7, 27, 92750, 669, 1412, 239, 414, 582, 138, 43283, 50796, 19198, 9999, 58, 4.0, 3, 2, 9999, 999999.1. ?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*? \*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?,9.5,-8.1,28,92726,571,1412,243,339,543,120,36711,48441,17129,9999,100,2.8,3,2,9999,99999 9 -7.6, 30, 92702, 410, 1412, 246, 224, 449, 93, 23845, 36727, 13171, 9999, 131, 5.3, 1, 1, 9999, 99999?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*? -7.8,32 91 ήοr 51,9519,17295 7079,9000 81,2.6,1,1,9990 03999,9,99 ?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*? \*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?.6.0,-6.7,40 ,3.1. ,0007,90,9999 ,9999,99999, 199999999.6 .0 1.-6.5.43.92630,0 251,0,0,0,0 o.0.235,0,4 \*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*? 5 999.97.1.5 399.95 9.9999999 \*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*? .3, -7.1, 43, 92606, 0 248,0,0,0,0 **399,146,1.7** 9.99999 9.6,0.235,0, **)999,9**5 L ?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?.3.4.-7.0.46.92582.0 247,0,0,0,0 99.159.1. ,99,6,0.235,0 0 3. **3999.99**5 **J.999** ?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?,2.5,-7.2,48,92558,0 246,0,0,0,0 0, **79.120.0** 3. 3999,9995 99r ,999,6,0.235,0, .1.7.-7.5.50.92534.0 ?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*? 0,\ 9.220.0 JC J9999,5,0.235,0. 244,0,0,0,0 **3999.99999 ∠,3** ?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?.0.8.-7.2.55.92510.0 1,216 J99999,6,0.235,0, 244,0,0,0,0 0.9 )999.99999 \*?\*?\*?\*?\*?\*?\*?\*?\*?\*?.-0.1,-5.8,65,92486, .249.0.0.0. ,0,5 9,247 .4, ,9999,99999, 99999999,6,0.219,0 ?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*? .-1.0.-5.9.69.92462. ,248,0,0,0, ,0,9 ,22 2.0. 99999999,6,0.219,0 ,9999,99999, ,-2.0,-5.6,76,92438, 3.8,4 ,248,0,0,0, ,0,95 ,11 9999.99999. 99999999.6.0.219.0 ?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*? -2.5, -5.4, 80, 92414, 2.4,4 \*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*? ,249,0,0,0, .0.99 6 **)**999,99999,9 9999999,6,0.219,0, ?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?,-3.0,-5.5,83,92390, ,248,0,0,0, ,0,999 ,3.4,4 **)**999.99999.9 9999999,6,0.219,0, -3.4.-6.0.82,92366, 1.9.4 ?\*?\*?\*?\*?\*?\*?\*?\*? ,246,0,0,0, .0.999 **)**999.99999.9 9999999.6.0.219.0. \*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?,-3.7,-5.5,87,92342,v,v,248,0,0,0,v,v,0,9999,y/,2.4,4,2,y999,9999,9,9y999999999996,0,0219,0 ?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?,-3.8,-5.7,86,92318,4,1412,248,0,0,0,24,0005,24,9999,74,0.6,4,3,9999,99999,9,9999999,6 . . - 5.7.81.92294.165.1412,249.52.79,43.5760,5326,5135,9999,174,0.9,5,5,9999,99999,9,99 \*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?.-2. ,-0.9,-5.2,73,92270,383,1412,245,190,384,86,20303,29755,12227,9999,136,0.8,5,4,9999,9999 \*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*? \*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?.1.1,-4.4,66,92246,552,1412,248,304,374,157,32659,35462,18792,9999,147,1.2,6,5,9999,99999 ?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?,0.6,-5.6,63,92222,661,1412,265,77,0,77,9429,0,9429,9999,166,0.5,10,9,9999,99999,9,999999 ,1.1,-5.9,59,92198,701,1412,254,216,33,200,23920,2449,22703,9999,221,1.7,10,9,9999,9999 ?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*? ?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?,1.1,-6.6,57,92223,671,1412,257,137,0,137,16011,0,16011,9999,151,2.0,10,9,9999,99999,9,99 ?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?.2.0,-7.7,48,92248,573,1412,234,347,378,193,36817,35365,22456,9999,105,0.8,6,5,9999,99999 (?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?\*?,1.9,-8.3,47,92273,413,1412,242,161,140,120,17680,12477,14028,9999,157,1.7,9,8,9999,99999)





#### Translating data into diagrams informing the design process





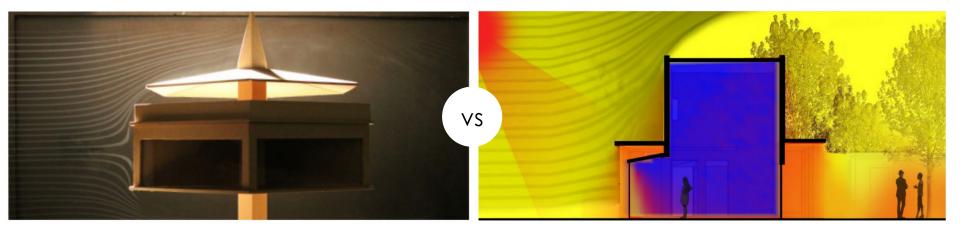


# Learning outcome Main focus of the course is the environmental performance of climate adaptive buildings and their ability to passively create comfortable internal conditions. Thus energy.





#### Tools

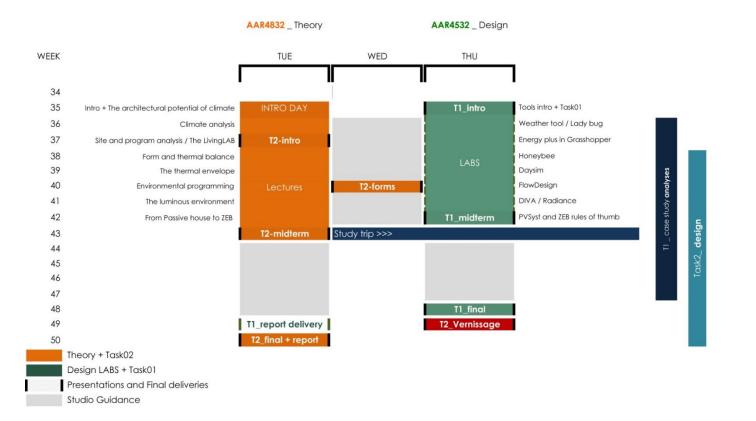


analogue

digital



#### AAR4832+AAR4532 Detailed program





## AAR4832+AAR4532 Detailed program

- U.1 \_ The architectural potential of climate
- U.2 \_ The bioclimatic approach
- U.3 \_ FORM and thermal balance
- U.4 \_ **HEAT** Passive solar heating systems
- U.6 \_ AIR Natural ventilation strategies
- U.7 \_ LIGHT The luminous environment

#### Task 1 > Task 2

Analysis > Application

scope <u>learning</u> principles and tools for sustainable architecture while

developing competences scope \_ defining a meaningfull **design process** based on the understanding of the external environment

#### CASE STUDY ANALYSES >> ARCHITECTURAL DESIGN



### Task 2: studio >> climate adaption

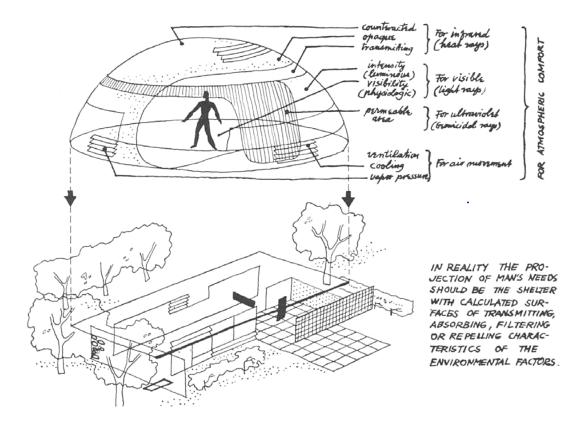


### TASK 2 \_ The bioclimatic shelter

Experimental design of Shelters for Post-Disaster Recovery and Development

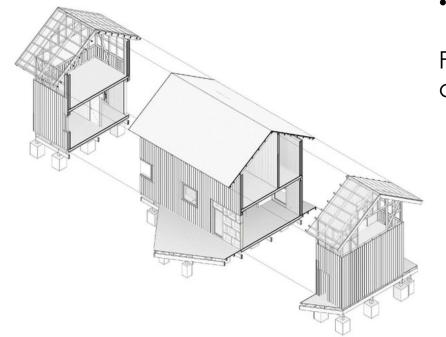






1963 \_ Any building, as a bioclimatic shelter, should "be able to absorb or repel climatic factors in relation to their beneficial or adverse role for human comfort" Victor Olgyay





#### Program

- Prefabricated
- Fast-built
- Climate adapted shelters

For post-disaster recovery and development

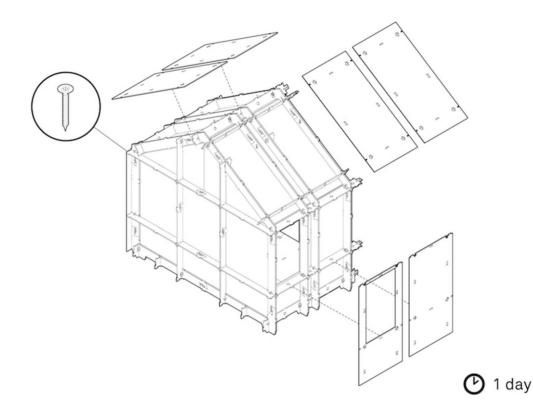


Source: <u>https://www.archdaily.com/965657/architecture-with-sip-panels-fast-build-high-performance-prefabricated-homes</u>



### TASK 2 \_ challenges

- Detailing for production (open source construction drawing)
- Quantitative + qualitative dimension of environmental design
- Design in four climatic contexts



Source: Wikihouse's Alastair Parvin on how to build your own house Luca Finocchiaro



### TASK 2 \_ Learning outcomes

environmental performance + environmental imagination

Understanding of climate as a source for making architecture on a quantitative and qualitative basis

Ability to implement correct climate adaptive measures for ensuring indoor comfort while increasing buildings' energy efficiency

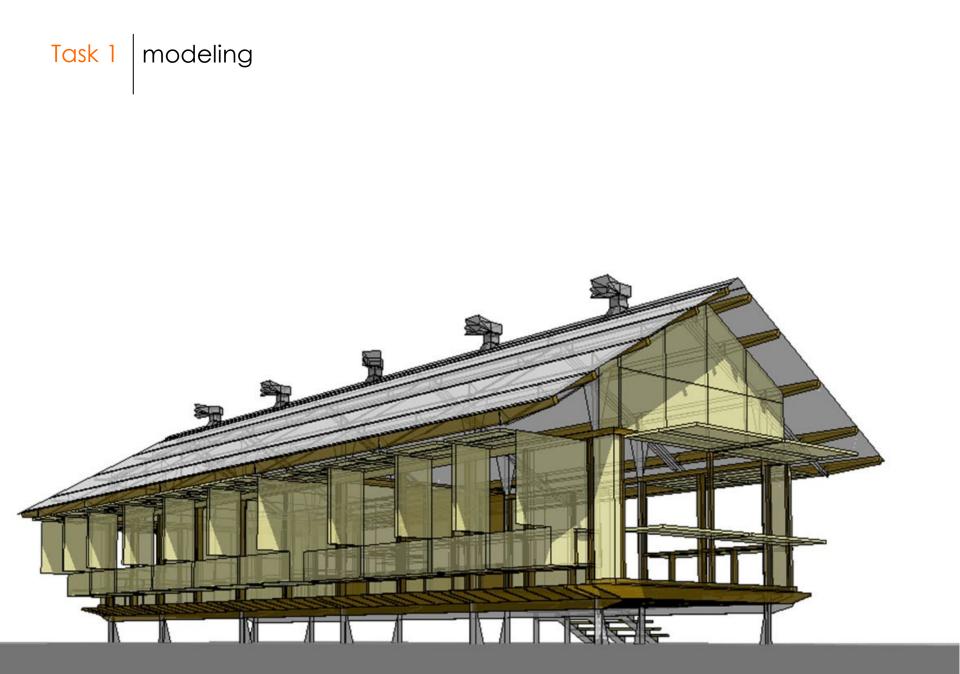


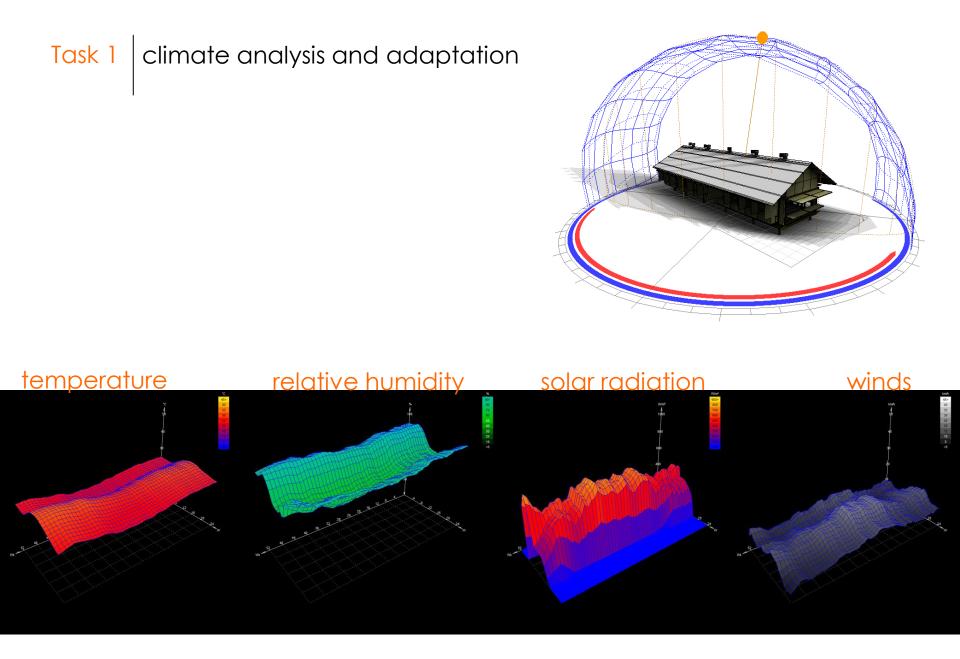
#### Task 1ANALYSES Know-how > application DESIGNTask 2



Task 1extracting principles and strategies for bioclimatic designfrom the analysis of relevant case studies



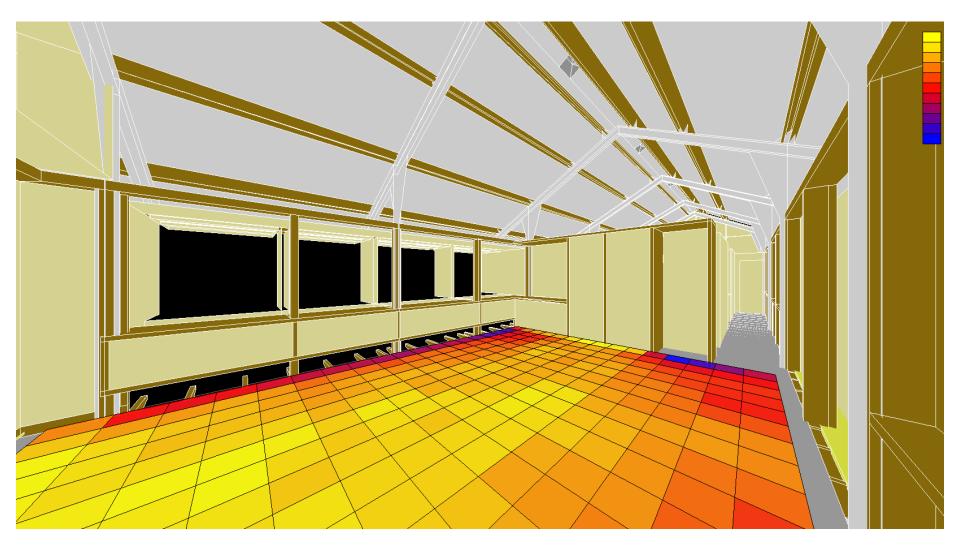




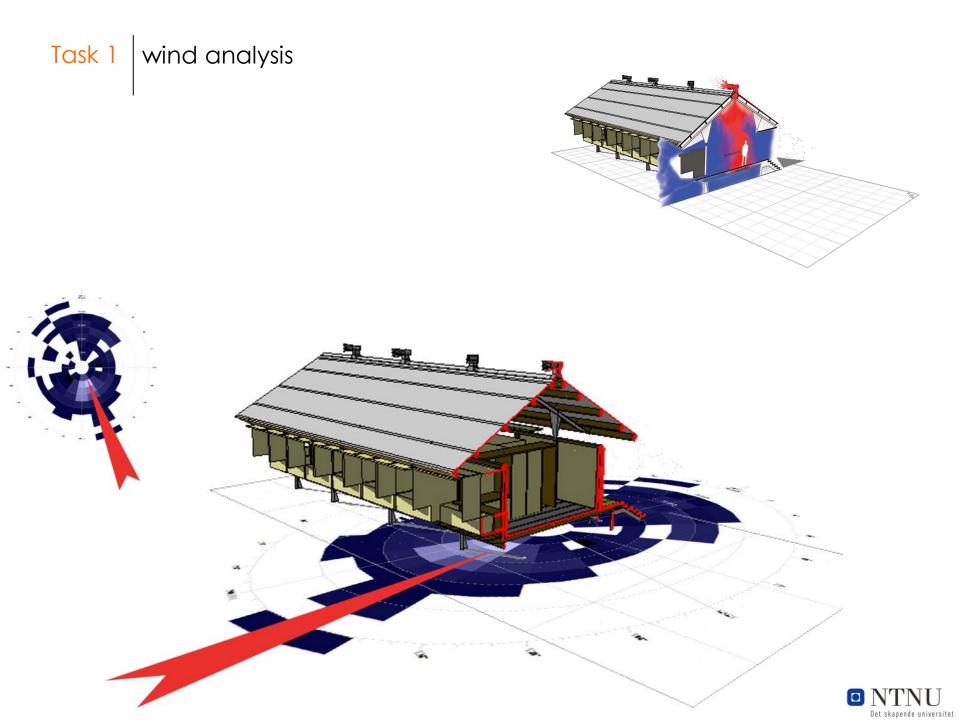


#### Task 1Internal daylight analyses









# AAR4832+AAR4532 Course logistics

Max number of students \_ 20 MSc SustArch + 8 Architecture students

#### Teaching team:

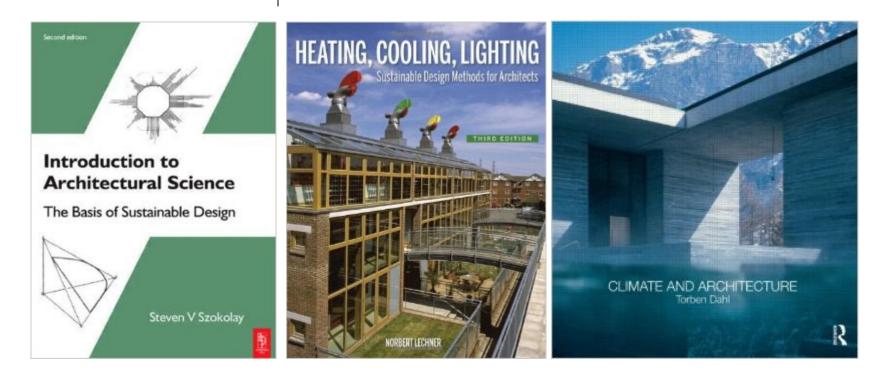
Luca Finocchiaro Anshuman Mishra Ole Jørgen Bryn Bunji Izumi + 2 Student assistants

Language: English

Course Start: 28. August



#### AAR4832+AAR4532 Pensum



- Steven Szokolay, The basis of sustainable design, Architectural press, USA 2008
- o Norbert Lechner, Heating Cooling and Lighting, John Wiley and Sons Inc., USA 2008
- Torben Dahl, Climate and Architecture, Routledge ED.
- Victor Olgyay, Design with Climate, Princeton University Press, New Jersey 1963

+ articles and material on itslearning