TOPIC SCHEDULE

LECTURE			PRACTICAL
week	**Date**	**Topics**	**Topics**
3.		Environmental conditions surrounding buildings. Effects on building constructions and subsequent requirements	

Today's Lecture:

1. Basic purpose of buildings for human habitat:
   As explained in the first lecture, first and foremost, buildings for human occupancy (architectural structures) must satisfy criteria that make them a suitable, comfortable, workable environment. Thus buildings must protect from the environment, must keep heat/coolness inside, must let natural light in and/or provide artificial lighting, must protect us from intrusion, provide privacy and more. Only after this (often forgotten by colleauges of our time) does satisfactory functionality and aesthetitcs play a role. Let us investigate the environmental (external) and other (internal) effects that influence building conditions.

2. Environmental conditions surrounding buildings:
   Let us suppose that we want to keep an everyday livingroom at a comfortable humidity, temperature, ventillation, lighting, noise and vibration level (generally speaking: comfort zone parameters). What must we do? We must keep the environment *to a certain degree* out and the interior *to a certain degree in*.

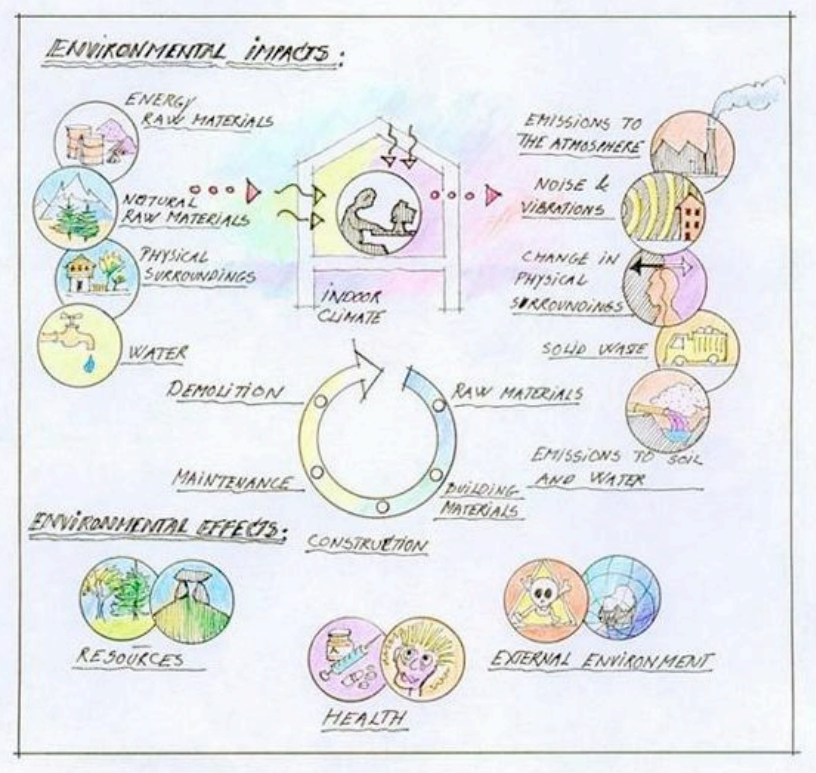
What we want to keep in	**What we want to keep out**
heat (in cold)	heat (in hot summer)
humidity (in dryness)	rain (humidity) or percipitation
private conversation (privacy)	noise (traffic noise, factory)
excessive, blinding light (in daytime)	darkness (artificial light)
…	…

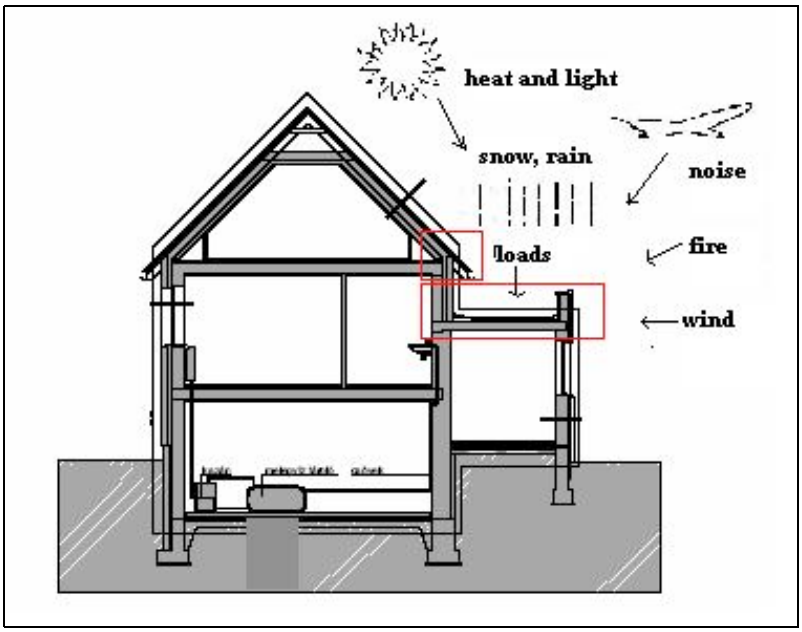
3. Effects on building constructions and subsequent requirements:

   As explained, some effects come from the outside (weather), some from the inside (heat) and some in between (noise between flats). Thus, construction elements (walls, slabs, roofs, doors, windows, etc.) must retain conditions in / out / apart (latter the case between different functions). Furthermore some elements must also satisfy other requirements such as function (doors, windos must also open), aesthetics (finishes) and must retain these through time and interaction with other elements of the construction.

4. Must learnead most important effects and building components as associated solutions:

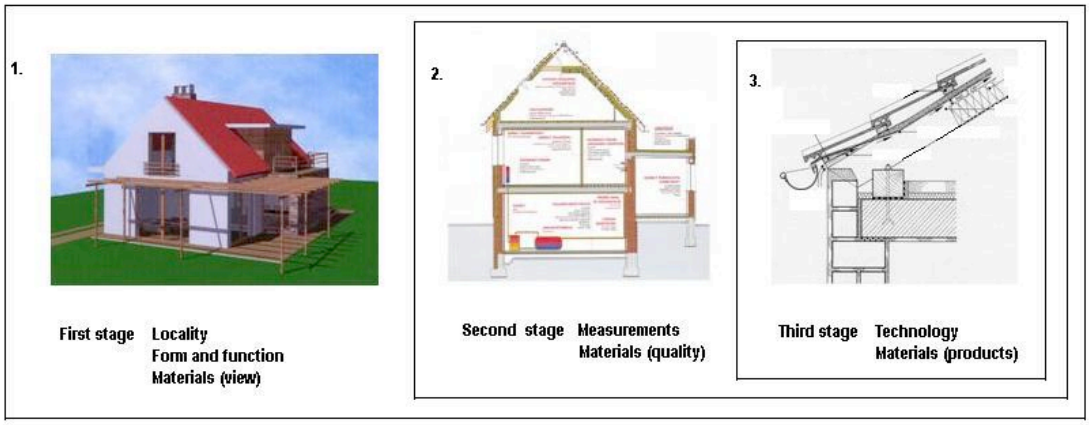
   - physical loads (useful and not) → structural components
   - temperature (hot and cold) → thermal insulation
   - noise (air, transmitted) → noise insulation
   - percipitation (rain, snow etc.) → external water insulation
   - usage water (bathrooms etc.) → internal water insulation
   - excess light → shading
   - internal vapour loads → vapour barriers and outlets
   - groundwater and moisture→ insulation against ground water
   - safety, security→ burglar resistant components
   - fire protection→ fireproof materials





effects	→	requirement	→	CONSTRUCTION	←	performance
1.		2.		4.		3.

STRUCTURAL DECISIONS DURING THE DESIGN PROCESS

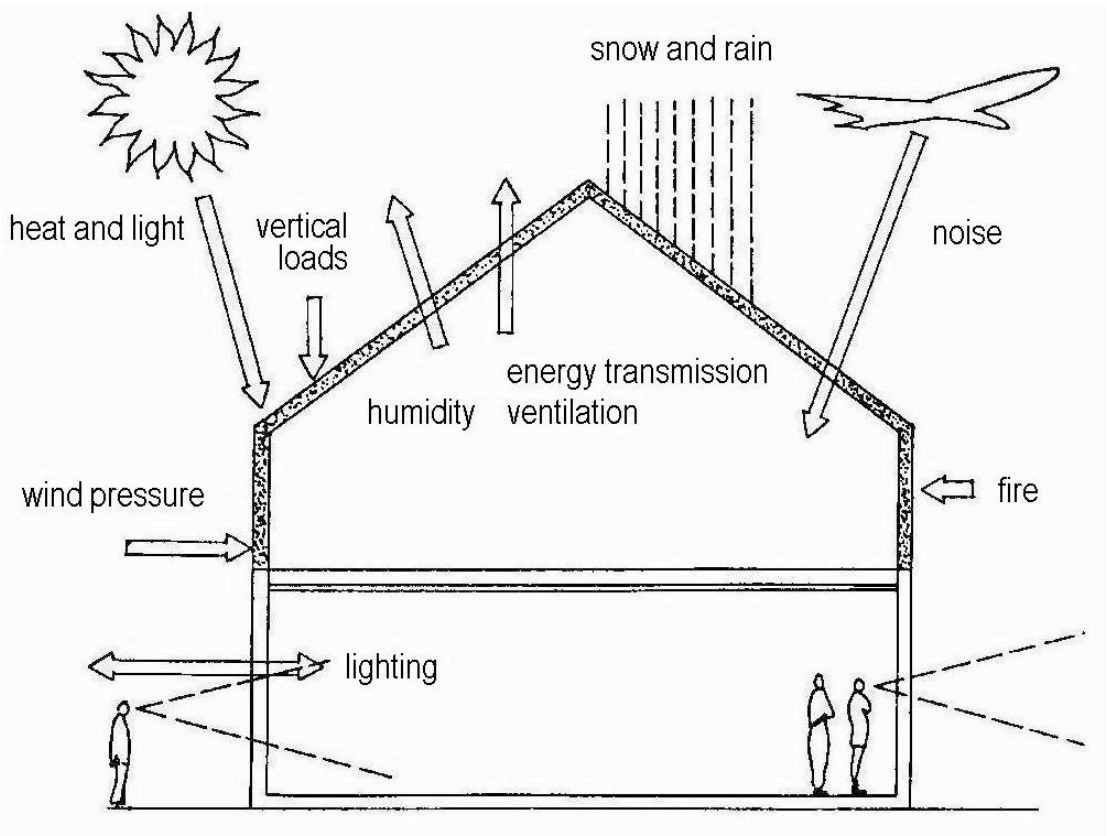


First stage Basic decisions on architectural form (dimensions and shape), appearance (colours, surfaces) need to be made in this stage. The virtual computer model of the building is yet nothing but a sculpture, without consideration for structural behaviours. The accurate calculation and simulation methods can not be used in this stage, since at a scale of 1:200 we do not yet know the exact dimensions and elements of the building construction. The evaluation of structural possibilities can be based only on very basic performances of the materials and the structural requirements derived from external and internal influences on the building. However, without this awareness the later computation and testing could result with the need to fully change the primary architectural decisions, alternatively the building could become too expensive or uncomfortable.

Second stage The shape and dimension of the building is already set at the beginning of this stage. The experts will accurately calculate, control and test through analytical computation techniques of structural performance, energy-, air- and fluid dynamics, within and around a building as well as dynamic behaviours of other fluids such as smoke, water etc. based on the exact data of the structural properties and requirements derived from the requirements of human activities and natural influences. The use of 3D and 4D software models will produce all necessary qualitative and quantitative dimensional information for the design, analysis, fabrication and construction, assembly and sequencing.

If the architectural decisions made in the first design stage were consistent with real data, the building could correspond with the first stage view and fulfil all structural and human demands.

Third stage The aim of this stage is to choose building industry products based on the previous design stage results. This can only be successful, if we have all the necessary information on and properties of structures and materials that may be purchased at the time. Sometimes this data is not enough or comparable. To clarify the properties of each product is very important, as a lot of structural mistakes are retraced to problems with faulty material selections.



EFFECTS AND REQUIREMENTS