BIM DOMANDE

Differences between CAD and BIM systems
BIM: technology where you can integrate multiple informations about every project phases, 3D model, one unique workspace and 3D model where you can export many different, representations
CAD
limited to the design of simple graphic elements (lines, poly lines, circle), 2 different parts of workspace: model space and layout space, you have to draw every single representation

Advantages for using BIM
univocal management of different project representation
interference verification
different level of detail and scale
not only drawings: informations, schedule, metric computation
different project visualization
parametric components (families)
material database
volumes management and mass modeling
4D: dimension of the time. Different project phases: new and existing building parts, construction phases
save time and money and possibility to co-operate and sharing informations with other actors

Sharing project information
interoperability between different actors, updating one unique 3D model and easily splitting tasks between a work team. Simulating the construction and designing

Horizontal and vertical interoperability
vertical: sharing and exchanging informations between complementary programs like AutoCAD and structural and energetic calculating softwares; digital technologies are not linked and the sharing of data with standard file formats.
horizontal: sharing and exchanging all the informations between similar programs like Revit and ArchiCAD or Lumion

The IFC standard
standard file format used for the data exchange in the construction industry, which allows to reduce the loss of data between different softwares; saved as .ifc file; ifc files are classified as a 3D image file which contains technical informations and are compatible with all the BIM softwares.

Application of the Fourth Dimension
referred to the time; it allows to manage the building during its life-cycle, from the decisional phase to the maintenance phase; during the designing phase you can manage changes: relation between actual phase and project; useful in the construction phase for deciding the amount of material and also during the life-cycle of the building for maintenance expectation.

Managing phases and design options. Definitions and suggested applications
in BIM you can add different project phases and expect possible options: in BIM programs there are 3 different default stages (actual stage, project stage and temporary phase). In the properties of every single view you can define the right phase-filter to use: new elements, existing elements, demolished or temporary elements.

Template customization
you can create a personalized model defining invariables elements to better improve your personal workflow, save time and make an easier workflow between different actors (units, layer, text style, sheet format etc.); a template gives you a point where to start for a new project having a set of preset tools.

Different application of conceptual modeling
masses have two main uses: volumetric one, for the conceptual study of volumes and buildings; tracking of other objects like facade, roofs, walls etc.; masses can be created in specific families and uploaded in the project; thanks to the conceptual modeling we can study and analyze the volumes for the realization of buildings and complex forms.

BIM and Facility Management: different possibilities to manage existing buildings
the utilization of BIM-oriented processes in Facility Management field allows the visualization, the knowledge of the localization and the relation between construction systems and components, with their possible interferences between activities and spaces; it is really important and useful for the maintenance of the building during its life.

Managing the relation between scale and contents
in contrast to CAD, where you have to draw every single representations, in BIM you can switch to different scale and level of detail in according to what you need; LoD low, medium or high; for example, 1:200 scale is liked to a low level of detail, 1:100 medium and 1:20 high; the relation between scale and contents is operated through visibility and graphics command.

Element classification in Revit environment
elements in Revit are divided in 3 different categories: 1) model elements are all the architectural components and are divided into 'host' (walls, floors…) and model components such as stairs, windows etc; 2) reference elements to support designers (levels, grids, reference plans); 3) specific elements of views like annotation elements, labels, symbols or detail lines.
All the parametric elements are structured into: a) families (groups of geometries with same geometric properties, like doors). These can be system families (default on Revit), loadable families or specific families (annotations); b) types (ex: doors type 1 dimension x or type 2 dimension y); instances are single elements that can be modified singularly.

BIM and database
the database is a real shared components archive, useful for the management phases of a building since its birth until its demolition. If we would use a metaphor to better understand in what the database consists, the software is the architectural model interface and the database is the soul. Database allows the interoperability between different actors, creating a technological interface useable to all the expertises of the designing phase.
BIM has an inner database which contains many different families, materials, components.

Multiplicity and diversity of model views: infographic paper, thematic sheet, schedule information
Thanks to a unique model we can extract different views: plans, sections, elevations, 3D views. After selecting the views, they can be inserted in different format sheets. Moreover, it's possibile to export different schedules and abacus with informations about the components o the building.

Digital drawing evolution: from CAD to BIM
Birth of the CAD around 1962 (bidimensionale elements), BIM around '80 (parametric elements)

From static model to dynamic model

The numerous meanings of the term parametric
The meaning of parametric is linked to the geometric and relational control between the constituents parts of the digital model. The basis for parametric drawing are the object geometry and constraints, that are divided in 2 types: geometric constraints that control the position of the objects; dimensional constraints that control distance, length, angles.
The meaning of parametric consists of the designing of rules instead of forms.

Differences and similarities between system and loadable families

Explain the McLeamy diagram
The diagram shows the differences in terms of time of work and the amount of energy between CAD traditional process and BIM process. The first one considers a large and increasing amount

of energy from the preliminary phase to the final one, instead of the second one that shows a great amount of energy in the first part, but then it goes down close to the final project and construction.

Meanings and interpretations of the sentence: "We should never draw the same thing twice"
CAD against BIM

BIM and free form modeling
Free-form modeling is the solution to realize complex forms an 3D objects with a really high level of detail on the surface. Rhino is well-know for its unique capacity to work with NURBS geometries. NURBS can represent any type of geometries in a really specific way like circles, ellipse, sphere or free-form geometries. Files are lighter with NURBS.

Simplified energy simulations in the conceptual design phase
The possibility to make energetic simulations should support, already from the beginning, the conceptual design phase. When an energetic model is used at the late stage of the project, this could be not so useful as at the early stage. Energetic modeling could be used at every stage in the process of the design phase. 1) conceptual design (energetic modeling could be really important, simplified building model analyzing some parameters; 2) schematic design (engineers could propose different solutions in order to improve the energy study of the project and reduce the energy consumption); 3) development of design (at this stage the energetic model should be finalized). Improve the use of renewable energy and then optimize the construction project in terms of energy efficiency. Interoperability between Revit and Vasari.

BIM and team work organization
BIM executive plan tasks for all the actors. Every team is linked to a manager. It will be defined LOD, subdivision of the model, and the documentation of graphic works and administrative ones.

BIM applied to survey: differences and similarities respect to new design buildings
Use of points of cloud for creating parametric modeling as-built. The possibility to have informations about the geometry of the tracking thanks to 3D laser scanning technology.

Parametric modeling/parametric design
Alphanumeric informations, A model is an important tool for the design. It consists of architectural elements designed in 3D, possibility to export different view. Parametric modeling: create a 3D model by using parametric objects that can modify form and measure. Parametric design: when you design by using parameters.

What does collaborative work mean?
BIM executive plan tasks for all the actors. Every team is linked to a manager. Define goals of the BIM project, team higher competence in Revit, exchanging data and informations about the project. It will be defined LOD, subdivision of the model, and the documentation of graphic works and administrative ones. Clash detection and work-set. Work-sharing: central model with copies for each actors.

BIM and quality of the construction process
All-in-one database and model (views, schedule, analysis). Updates in real time while working on the model. Decrease of the errors and 4D.

List of several ways to represent a building component
All the views etc.

LoD definition. Samples
A perfect exchange of informations and data between actors must follow this criteria: right representation of the project, the possibility to all the actors to use the informations, level of reliability and finality must be linked to the using. LOD level of development linked to the informative content of a BIM model. Differences between level of detail and development, the second one is referred to the reliability of informations. LoD 100: the more generic one, simplified

project, even without scale. LoD 200: the project presents a generic and conceptual representation, related to informations (also textual). LoD 300: high level graphic representation, almost the definitive one and final metric computation. LoD 400: such as the executive detail drawing according to Italian Codice degli Appalti, with all the informations necessary for the installation and creation. LoD 500: it is considered as an investigation like an as-built model, with managing and maintenance plan.

Grade definition. Samples
Model grade of definition related to the graphic aspect: 1) G0 (schematic) out of scale; 2) G1 (concept) first version 3D model, no material component linked; 3) G2 (final) 3D model, good level of detail; 4) G3 (render) final graphic aspect, similar to a photorealistic image.

LOD, LOI, LOG: definitions and samples
Level of development of objects. LOD = related to digital. LOI = related to informations. LOG = geometric. LOD scale from A (symbolic) to G (updated).

Details and construction drawings: procedures and best practices

Explain an interoperable workflow
Case study: underground parking Cittadella del Politecnico. Use of the Revit platform to improve the quality process of the project and data analysis, renders, model used for the control of the design process and the final phase of construction.
Case study 2: Ristorante Ferrari Maranello

Main references, standards and guidelines regarding the standardization of BIM processes
Different study for the development of the application of the BIM in large scale. Scandinavian region and UK are the most active in the BIM application field. Guide lines for the collaboration and interoperability between different actors.

Interoperable models: international examples
June 2005, Oslo has been shown an important example for the IFC workflow. Seelvaag Group used interoperability in the case of Enso Guitzen building of Alvar Aalto between Revit and other software for economic, energy and structural aspects.

What does 4D construction site mean? Data organization and recording in the building site
It means the association of a variable time to the construction site process. 4D model can improve the logistic aspects of the project and set up the whole process in the design phase, actually before the construction starts. Simulation of transport and resources.

Graphic solution to represent the same building component according to different Grade levels
G1: building component wall, family, 1:200. G2: 1:100. G3: 1:50-10. Linked to the level of detail and scale.

The integrated representation: clash detection and workset procedures

Workflow coordinated by the Common Data Environment
1) Work in progress: different actors work in a independent way. 2) Shared.m 3) Validated project. 4) archiving project story.

Scheme of complex work procedures including different subjects and disciplines
Work-set, BIM manager, Politecnico Lingotto case study BIM application

Proposed classification / organization of the project browser for complex projects
Work phases and 4D application, Revit helps us setting the workflow.

Building Site Management: workflow and tools

Building Site Management: methodological aspects

Building Site Management: the description of a case study

The integrated process: benefits and workflows

Differences and similarities between BIM and H-BIM
HBIM applied to historical architecture, contexts and archeology. 4D process, BIM as a database full of informations from different fields. HBIM is more specific in order to better understand the history and geometry of the historical site, model aimed to planning maintenance operations.
BIM: 3D architectural components following a series of rules, informations, parametric model.

What does "the rigorous BIM" mean?
It refers to HBIM points of cloud method (?)

From Point Cloud to BIM elements: problems and solutions
Photogrammetric survey with a laser scanner. There are some negative points: Revit direct elaboration difficulties, we must use different softwares, high level performance computers. Positive points related to the the precision of the survey.

Available workflow used to obtain a parametric component by the Structure from Motion procedure

BIM and HBIM definitions

What are the main fields of study and experimentation within HBIM?

Differences between parametric and pure modeling
Pure modeling: NURBS, Rhino, complexity of shapes and surfaces. It consists also in video-games, cinema, representation is 3D model.
Parametric model: components and informations, rigid tools.
Interoperability Rhino-Revit.

HBIM for cultural heritage: the description of a case study
Basilica di Collemaggio, L'Aquila: a) photogrammetry, laser scanning and pure modeling integration to BIM; b) survey transformed into BIM (structural analysis, economic and life cycle analysis); c) Point cloud, NURBS and 3D models transformed into BIM; d) From BIM to design of the transetto; d) modeling of different elements and connections.