Features	Autodesk Revit 2008	Graphisoft ArchiCAD 11	Bentley Microstation
Overview	Revit is built upon the Modeling strategy of full integration in one place, allowing you to simply choose what portion of that information you wish to view. Fully "parametric;" a single change updates all corresponding views/schedules within the model itself. Element creation allows for custom job-specific or company wide standards. Massing allows for fast concept building, convertible to working drawings. One way extraction for estimates. *"An Architect's tool that allows easy extraction for building information"*	The Virtual Building™ works better with versions of other 2D software for more complex models. It enables control on the balance between 3D and 2D work Construction documents and files can be derived without any additional software, sections and elevations update automatically as you work. Logical links between elements and stories. Schedules and bills of materials always reflect the current state of the building model; easily generated (Bi-lateral). Interactive two-way communication between schedules and the model, allows changes to the model from the Interactive Element Schedule. "An architect's tool, the most intuitive"	Bentley was designed on a code that allows easy access to older file formats of dgn and dwg, unlike the others. It utilizes similar BIM features, capable of forming construction documents from model. It does well on large, more complex projects with easier integration of other engineering programs, like RAM Steel for analysis and HVAC duct sizing and runs interference checks with out third party software via Navigator. In our tests, the real differentiator is when the project has many elements, it loads faster and is easier to use, (less boggy and uses less CPU resources) and is widely deployed on government projects, for these reasons. Excellent rendering engine. "An Engineer's ultimate model tool"
File extension	*.rvt	*.pln	*.dgn
Import/Export Capabilities	Export/archive files in DXF/DWG (Autodesk product) Supports the following file formats: DGN (Bentley), DWG, DWF, DXF, IFC, SAT, SKP (sketchup), AVI (video), ODBC, gbXML, BMP, JPG, TGA, and TIF. In addition to transferring standard lines, arcs, and circles, Revit exports to 3DS, VIZ for photorealistic renderings Produce concept massing studies by Importing from Form-Z, Rhino, Sketchup and AutoCAD, or other ACIS® or NURBS (non uniform rational B-spline) based applications. Turn models into mass objects, then select faces to design walls, roofs, floors, and curtain systems. You can even use tools to extract important information such as gross area per floor.	IFC industry-wide information sharing commitment. Improved export/archive files in DXF/DWG. Able to save a project with libraries to one PLA file. ArchiCAD's DXF/DWG translator supports up to AutoCAD® 2007 and accurately maps layers, pen colors, fonts and blocks. ArchiCAD can write out DXF/DWG data that contains both Paper Space and Model Space information in the same file. Additionally, ArchiCAD imports and exports AutoCAD's vectorial DWF format and MicroStation's DGN. ArchiCAD can also transfer complex 3D model geometry for use in programs such as Artlantis R/Studio, Maxon Cinema, AutoCAD, Autodesk VIZ or Autodesk 3ds Max software, etc. Intergrates with SketchUp and Google Earth Connection, which can be used as add-ons to simple massing and contect studies. Automatic imports into Google 3D Warehouse, direct access thru appl.	Fully integrates numerous file types along with their .dgn file format. Includes: DGN, DWG, DXF, PDF, STEP, IGES, STL, CEL, DGNLIB, S, H, RDL(RAM), 3DS (Wire frame), OBJ, SKP (sketchup) Image types supported include: CAL, IMG (P/A), CIT, COT, RGB, RLE, JPG (JFIF), PCX, PCT, PNG, EPS, RS, TGA, TIF, BMP, WPG. It has an internal rendering engine without the requirement of using 3DS or VIZ to do photorealistic rendering. You can Publish Bentley Architecture models to the Google Earth environment similar to competitiors, perform screen grabs of fly in video using snagit.
Market integrity	Higher market integrity of the product (structural, MEP) Higher probability to produce a complete virtual building with BIM engineering documentation: - Revit Architecture - Revit MEP - Revit Structure This is a huge selling point.	Lower market integrity of the product (structural, MEP) Lower probability to produce a complete virtual building with BIM engineering documentaion: - Virtual Building: ArchiCAD integrated with MEP - Ductworks - Virtual Coordination: bi-directional I/O capabilities via IFC or native file format, the architect and the structural engineer can use the same model.Stress analysis as well reflecting automatic changes by the designer or other parties.	Extremely versatile integrity between disciplines and platforms. RAM integrated to provide total structural analysis. -Bentley Architecture -Bentley Structural (RAM) -Bentley Building Electrical Systems -Bentley Building Mechanical Systems -Bentley Piping (AutoPIPE) Plus many other project engineering specific solutions. bi-directional I/O capabilities via IFC or native file format, team can use the same model or specialized options for each engineering discipline.

Interface/ Ease of use	Programmer like interface, eg. when you want to change the parameters of a door or window poor graphics	Friendlier graphic interface and properties accessibility. Flexibility developed through over 20 years of architects' wishes and feedback	Technical interface, while user-friendly, still will require extensive training before advanced features can be fully understood.
2D Presentation	Course, Medium, and Fine display options can vary the level of detail over many views and is view-specific. Linework can be manually adjusted if desired, however all general components of a drawing can be individually set and globally changed based on "plotted" line weight and "displayed" line weight. "What you see is what you get" when you print	Improved gradient fills, line work & fill consolidation. It Efficiently handles the process of cleaning up and fixing drawings, including an optimization process for 2D drawings from consultants. Refresh or non-refresh work in elevation/plan/section/etc. views simultaneously.	Displays are colorful and representative through the interface, can separate many views of the model and is possible to work in elevation/plan/section/etc. views simultaneously. Creation of coordinated floor plans, sections, and elevations. Automatic coordination of architectural design and construction documentation.
3D Presentation	Able to raytrace and render on the fly, however best displayed when exported to Autodesk 3D Studio Max and edited with additional software.	Improved internal renderer, improved material selection as it is more mature. High quality must be exported to 3DS and Maya	Advanced ray tracing and modeling. Support of 3D drawings within Adobe PDF. The best render images of the three without the use of other software.
Engine	faster kernel graphical engine, fasteer shadow processing, lacks radiosity	Slower graphical engine, eg. Slower shadow casting and radiosity	Quick kernel graphic engine, able to handle larger drawings with ease.
Modelling	Fully-parametric solid modeler, "in place families", can include geometry from Revit or other solid modelers. Ability to import that which it cannot be modeled in Revit, and turn it into a Revit objects. The object can only be edited outside of Revit, but the Revit geometry behaves like a wall or roof or whatever you assign it to be. Separate package needed to extract quantities.	More modeling freedom. New double slanted walls, curved complex walls and highly accurate quantity takeoffs. Organic forms can be modeled in Maxxon Form - a separate modeler launched from ArchiCAD, and integrated directly into ArchiCAD through add-ons. This allows integrated organic modeling similar to Catia. Ore popular in EU than the US.	High-end integrated rendering and animation tools, includes radiosity and particle tracing. Export to STL to support rapid model making and prototyping with 3D printers, laser cutters, and stereo lithography machines. Support of 3D Web formats, such as VRML, Quickvision, and panoramas. Enforcement of national project standards. Automatice re-symbolization of 3D objects to 2D symbols. Material dependent hatching/patterning, annotation, and dimensioning
Libraries	The Most catalogs of information by far. Autodesk marketing engine is assisting and has more participation of building product manufacturers.	A strong base of objects, but less real market products in libraries than the competition.	Some companies provide Bentley library items, but still somewhat limited to user-creation.
Parametric Components	Parametric Components, also known as families, are the basis for all building components designed. They offer an open, graphical system for design thinking and form making as well as detailed design intent at increasingly detailed levels. Use of Parametric Components for the more elaborate assemblies, such as cabinetry and equipment, as well as for the more elementary building parts, such as walls and columns. No special programming language or coding is required for manufacturers. Revit models can be scale sensitive if modeled in GDL (see below) or not (as with paper space).	Objects are scale-sensitive, easily modified (text, dimension lines, etc.), when the plan scale is changed. Changing the scale is as easy. Tools identify labels rooms, groups of rooms or any areas that you would like to manage and track. Walls are automatically identified as Zone boundaries, but columns, slabs, beams, roofs, lines, arcs and splines can also define the space. Zone space automatically fits to slanted and profiled walls, and the 3D zone space can be involved in solid operations for precise volume calculations. Creation of more complicated GDL Objects (GDL=Geometric Description Language) requires knowledge of script. Which scares away all but the brave.	Parametric Cell Studio (*PC Studio*) is a modeling technology known as dimension-driven, feature-based, parametric modeling. It allows users to define and create parameters, associative building components and assemblies such as doors, windows, stairs, casework, roofs, trusses, curtain walls, handrails, fixtures, equipment, and others. User-definable labels of objects and spaces. The DataGroup system , when placed into the model, associates definable attributes with PC Studio components, and drives their parametric dimensions and variables, which allows unlimited variations. Most of the dataset content delivered (doors, windows, curtain walls, handrails, and so on) has been created with PC Studio.
Material Takefoffs	Material Takeoff tool checks material quantities in cost estimates, Takeoff simplifies the tracking of material quantities. As your project evolves, the parametric change engine helps to	The Element ID manager can identify and group elements according to a specified criteria, a great resource for automatic labeling and schedules. A database tracks area, volume, price,	Room and component schedules, quantity and cost calculation, specifications. Compatibility with office automation

		QTY of pieces, automatic listing, take-offs and interactive schedules.	tools for further processing and formatting.
	ensure that the material takeoffs are always up-to-date and accurate.		
Workgroup capability	Local file (on the workstation) and central file (on the server) concept.

Revit is multiuser, you can use linked files just like in ACAD. The problem with this is that Revit users aren't comfortable with this idea because they like to be able to edit these modules more readily.

Revit does not have a special appl. to monitor interactions when users save changes to the central file; and when a large number of changes happen, it can struggle with reconciling the two files. So having a large number of users working on a model can be problematic. Saves can be cumbersome when working with groups (8 minutes on average). There were also problems with server's that RAID hard drives causing corruption to the central file. | ArchiCAD TeamWork is a multi-user environment. ArchiCAD uses a local file (on the workstation) and central file (on the server) concept, which allows a better integration and analysis capabilities of large projects. Module is also a very nice function for big projects. With modules it is possible to put one storey just as you put one chair in plan (small file system with link function). Multistory Hotlinked Modules easily allow to divide multistory buildings into smaller parts. Entire multistory buildings can be hotlinked to site plan.

Only supervisors can edit modules, making it easier to control. | Can be run as a multi-user license from Bentley's server, or as standalone at the company's office.

Bentley Architecture tightly integrates with Bentley ProjectWise, a collaboration server that manages access to project information across a LAN, WAN, VPN, or through the Internet, and publishes and synchronizes shared information, manages change, protects intellectual property rights, and more. Share and synchronize project information securely with project partners. Projectwise costs additional, but allows Manage change effectively Protect your intellectual property |
| **Interference Check** | Use interference checking to scan your model for collisions between elements. (Autodesk owns Navisworks and integrates this) | 3rd party tool Navis Works shows where the models "clash" with each other. Different file formats can be imported into Navis Works and reviewed as one model. | Interference detection across multiple files and disciplines in conjunction with Bentley Interference Manager: Navigator, without 3rd party software. |
| **Organization:** | No layers, all views are specific to the task at hand, instead of layers Revit utilizes "visibility/graphics" which is a type of element-display option. Viewable items are sorted by type. | Clear Layer Control & Xref Layer Separation. Better control and management of Xref files and easier layer navigation. | Typical layer controls, with ability to filter layers. Able to wrap dgn and dwg layer files that are compatable. |
| **Bidirectional Associativity** | Revit links to the ACAD File, all model information is stored in one place (the model) and it exports to 2D CAD. It is not bi-diredctional. Once the model is updated, downstream the engineers working in a 2D CAD environment must adjust. It is therefore pertinent to decide how far Revit will go, before switching to 2D CAD for engineering. And once this happens, Revit can be continually used for adjusting background changes or the switch can be made to 2D and process Construction drawings in a more traditional manner. This can cause additional effort downstream by engineers if numerous model changes are made. This is true for all modeling programs. Revit does not integrate with RAM and STAD, like Bentley does. | B-directional connections for working drawings but requires updating views as you work on it (rebuild) which allows control on what gets updated. ArchiCAD has both automatic and associative in connection within the Building Model. This pertains to sections/elevations. Moving and resizing elements directly on sections/elevations, and any changes are reflected in the other views, including dimensioning. Interiors, exteriors or an entire building can be dimensioned at once, in one step. Labels can attach text or symbols to easily identify parts of your design. Automatic texts and smart detail and section markers are always up-to date across all the model views and documentation layouts. Drawing Markers provide navigation in project documents and more efficient reference mechanisms. | Work in plan, elevation, isometric, or perspective view. Utilize the AccuDraw function to make clear and precise polar edits. Same toolset applies to both 2D and 3D plans. 2D changes can be tied to update models in a bi-directional manner suing a variety of 2D software by the various team members.

Views can be managed to display floors or workspaces and also be filtered by level, symbology, attribute, selection set, etc. |

Item Schedules **(Doors, windows)**	Schedules are just another view of the Revit Architecture model. Work in any appropriate view of the building, including schedules. Functionality includes associative split-schedule sections and selectable design elements via schedule views, formulas, and filtering.	Interactive provides tools to provide quantities of individual elements & components by calculations, works well with complex projects.	Create coordinated construction documents. Automatic schedule updates that are parametric similar to competition, but you can Capture the knowledge for reuse on subsequent projects which is different.
Detailing	Take advantage of the extensive detail library and detailing tools provided with Revit Architecture. Presorted to align with the CSI format, detail libraries can be tailored to accommodate your office standards. Create, manage, and share your own detail library.	The Detail tool features directly links to dedicated workspaces with parametric detail markers that can meet the local standards as well as your specified documentation style. Details are also tightly integrated into the model, even by using multiple customizable markers linked to the same detail. Detailing in ArchiCAD is faster than with any AutoCAD, but lacks ties to manufacturers..	Ability to utilize MicroStation for custom user-made elements. Software is more precise and more accurate than competition for large, complex, projects.
Review Control	**Autodesk 2D and 3D DWF Integration** Supports complete round-tripping of markups with Review software. It combines navigation and revision management capabilities, tracking changes is easy. There's no need to reenter information. It supports publishing a model to 2D or 3D DWF format. This capability provides high-impact, dynamic communication of design information in a lightweight format. It's great for including non-technical participants in the project review process.	Project review and organization are managed in Project Navigator, which enables faster navigation and better control over project documentation by separating all new view types. No open review tool such as Autodesk Design Review software.	ProjectWise Navigator is used for immersive project review and analysis to support design and construction management processes and to manage assets in real time. Allows for reviewing of 2D drawings and 3D models concurrently. Attach PDF files as a reference to the model. Follow links between data files and components. Fly through very large models interactively with ease. Examine design change using Design History tools.
Printing Management	Sheet layout integrated, You can form sheets by "drag and drop" of views, making it very easy as sheets automatically numerate. Title Bl,ocks revision controls have user defined editable blocks. Very user friendly with print engines: auto generates dwf (small), pdfs even 3D pdfs are surprisingly small as are dwf format. Downstream users can edit easily and markup using dwf and adobe reader viewers. Note both are free downloads.	Layout Book is based on the different views of the model. It is easy to create view sets, and place them as drawings on layouts. This process can be automated, so that the final drawings are created as the building is being modeled. Master layouts allow to set size, orientation, grid, and automatic numbering system; add parametric title blocks and autotexts as well as any drawing elements. The Layout Book can also include drawings hotlinked to external files - views from other Archicad projects, DWG files, dxf translator works well as well as PDF documents. Pen sets can be controlled with separate and flexible Pen Set control for each view. Smooth PDF creation process with PDF Net. Can produce DWF in latest version.	Full scalability options, sheet layout control, and exportation options via Adobe PDF, etc. Ability to override weight printing, borders, etc. and ability to print in color and batch print. Can print to dxf and most file formats. Bentley does not support DWF format.
Sustainability	*See add on software by IES, numerous vendors offer add on programs to be discussed next month.*	Energy analysis - new tools exist for architects to deliver daylighting and energy analysis services and designs.	Add on products under research and not determined a the time of this article. Bentley Mechanical does Thermal loss.
Digital Manufacturing capability	Export the model to .dxf and then to CAM software & to CNC (computer numerical control) table.	Export the model to .dxf and then to CAM software & to CNC (computer numerical control) table.	Export to STL to support rapid model making and prototyping with 3D printers, laser cutters, and stereo lithography machines

Hardware Requirements	Sluggish on large projects/high memory requirements	Seems to run smoother with larger projects (TeamWork)	Much smoother with larger projects (Pentagon-Hansell)
Support	Far better support. There are just way more Autodesk resellers, and that fact just makes it so much easier if you need help.	Weaker representation/support	"SELECT" subscribers receive great support, also online Live Chat and knowledgebase.
Price:	$4995 Subscription $ 695	ArchiCAD 11 $4250 Subscription $ 695	V8 TriForma $4,795 Architecture for Microstation $1,995