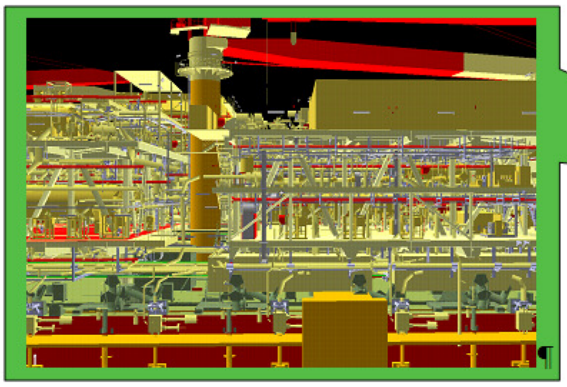
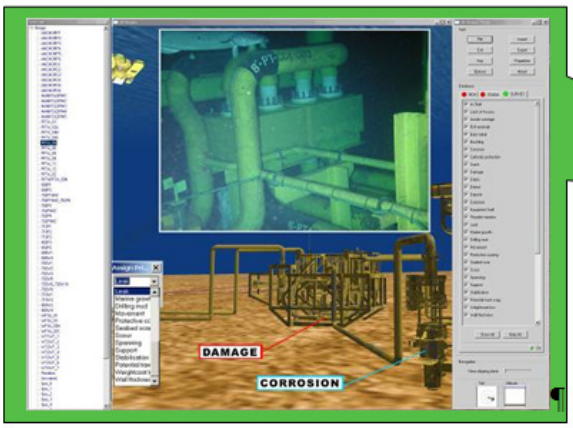
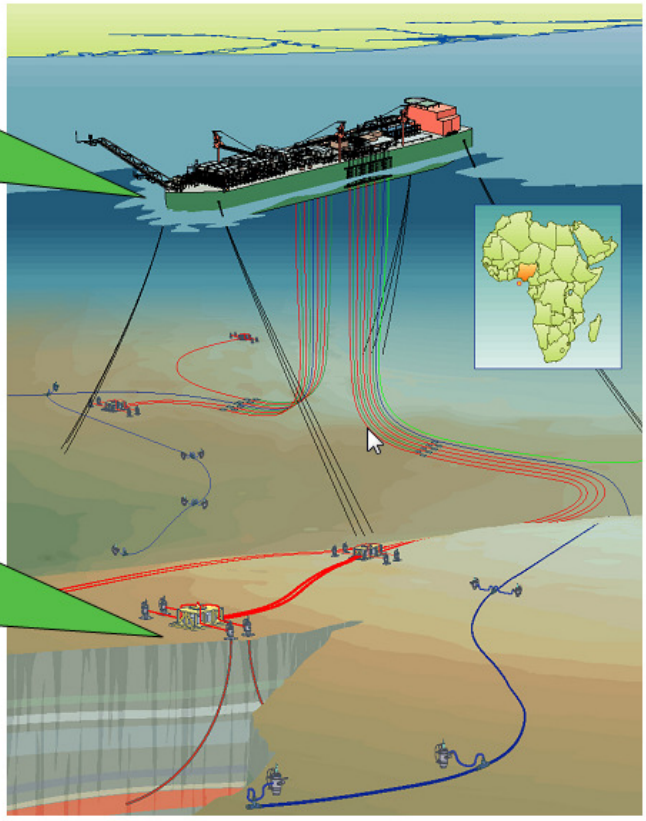
VRcontext

PERVASIVE IMPLEMENTATION
OF VIRTUAL REALITY APPLICATIONS
IN THE ENERGY, OIL & GAS, PROCESS MARKETS







Courtesy of Shell

VRcontext
Walkinside®

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ProcessLife®

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The field of exploration has been getting a lot of attention recently, with the barrel of oil costing over $70, and energy experts discussing the $100 mark as a matter of “when” instead of “if.”
Today, in their search to increase Oil field return, Oil companies are refining their geological surveys, generating terabytes of data which needs to be analyzed in real-time. Three-dimensional advanced visualization techniques compress the tons of data into understandable pictures of the underground reservoirs.

Thanks to visualization programs, oil fields returns are now showing yield of 65% or better, an incredible improvement over past performance. Being able to see the underground deposits in 3D and in color is opening better ways of operating.

Visualization techniques are fully recognized as a technology helping executives to take better and faster decision.

Visualization tools, such as **Walkinside®**, are now fully considered by oil companies to recreate realistic 3D representations of the entire field, extending from the seabed to the equipments—including flow lines, pumps and manifolds, together with colors and textures—allowing them to navigate through the entire production area.

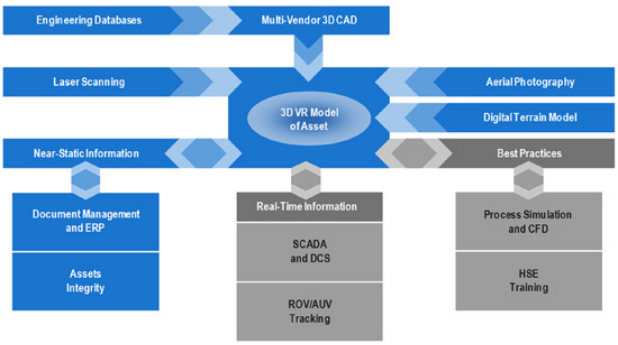
VRcontext: a Leading Provider of Real-Time Visualization and Simulation

VRcontext is a leading provider of real-time visualization and simulation solutions used around the globe in the Energy, Oil & Gas, Process, and Homeland Security markets.

Walkinside: a 3D Real-Time Collision Detection and Gravity Simulation Solution

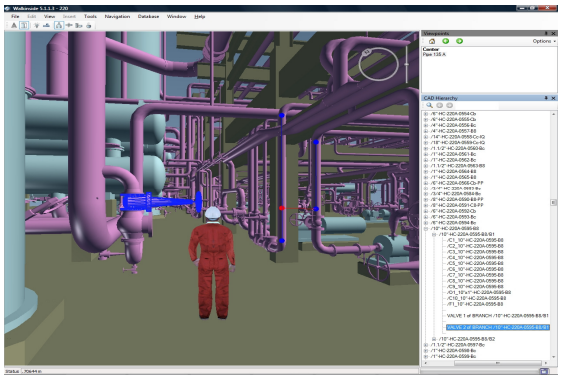
Walkinside is a 3D visualization and simulation software able to instantly render very large, complex, computer generated models. The technology developed by VRcontext can handle “massive” models of up to one billion polygons.
The models can be imported from multiple sources such as CAD or Laser Scanning, to mention a few. Other features supported by Walkinside include the integration of Digital Terrain Modeling (DTM), Subsea Field Modeling and draping of aerial photography.

Walkinside’s patented Real-Time Collision Detection and Gravity Simulation technology allows users to immediately and effortlessly explore the virtual 3D model through the eyes of a virtual human character which emulates real life experience (obstacle awareness, obstruction interaction, ground and gravity restrictions) in contrast with other visualization applications which only offer a complicated, non-intuitive walkthrough.



Virtual Reality in Project Reviews

Today, companies are looking for innovative technologies which allow employees, suppliers and contractors to participate in regular project re-views by accessing and visualizing the 3D model of their projects in real-time, allowing for high resolution dynamic navigation, regardless of model size and complexity.



The pervasive implementation of Virtual Reality applications facilitates business as it reduces the gap between theoretical and practical knowledge.

The spread of Walkinside will offer EPC’s clients:

- faster planning cycle—through better scheduling and cost control;
- more informed decision-making capability;
- testing before construction;
- optimization of capital expenditures;
- HSE compliance.

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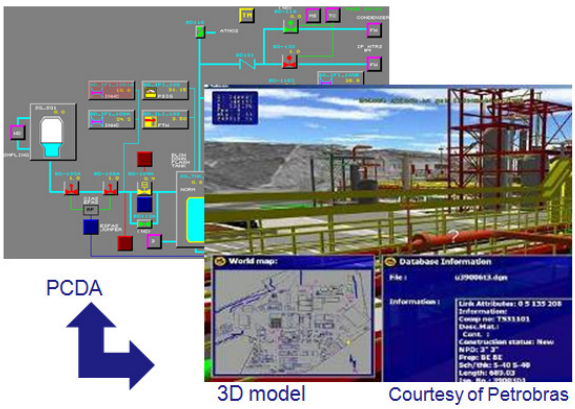
Walkinside extends the life of a 3D model from the design phase to the operation phase through “Decision Support Applications” by means of “smart links” to near-static databases (production, scheduling, maintenance, document management, etc.) using the Virtual 3D Model as “intuitive” 3D Portal.

ProcessLife: a Real-Time 3D Decision Environment

Through **ProcessLife®**, VRcontext delivers “Real-Time 3D Decision Environment” by means of real-time access to monitoring systems and direct links to existing databases, using an “intuitive” graphical interface to the Virtual 3D Model. VRcontext also provides the suited environment to develop “Best Practices” in the areas of maintenance, process simulation, safety and security, as any sequences of events and/or incidents can be realistically simulated and evaluated. Skills Development Programs are then delivered in the context of the Virtual 3D Model. ProcessLife uses the virtual 3D model as an integration interface to all existing multidisciplinary real-time data needed by different competence centers such as Engineering, Industrial Maintenance, HSE and Operations.

Process and Operations Control

ProcessLife links information provided by DCS (Distributed Control Systems) and/or SCADA (Supervisory Control And Data Acquisition) to the related equipment in the virtual 3D model of the plant. The complete model is then made available to the relevant specialists thanks to a user friendly and powerful visualization software. Ease of use enables non-IT specialists to painlessly access the information, while the power of the system allows for real-time interactions with DCS or SCADA events or requests.



When triggered by a major alarm, ProcessLife reacts instantly and displays in second the incriminated equipment or area. The displayed view jumps to each sensor location or to a more general area when several sensors from a given area originated the messages. The system allows for an easier management of thousands of captors and provides faster and more intuitive understanding of events.

All types of sensors could be supported in real-time—capturing ambient atmospheric data (temperature, pollution, toxic gases, radiation, and chemical clouds), sensing people presence (through video camera or sensors), measuring pressure in vessels (manometers), or temperature, pressure and flow rate in piping systems. More sophisticated dry captors—like vessel level, valve position or intrusion detection—can also be sup-ported.

Wireless Sensors

Monitoring of aged or dangerous installations was a difficult task in the past, as the cost of a wired network was making such an installation prohibitive. Through the emergence of low-cost wireless sensors, it is now possible to address this issue. The reliability of such a network has been a concern for a while, but based on a technology from Intel—TinyOS—it is now possible to operate such a network as a web application, i.e. it can reconfigure itself in case of malfunction or destruction of one or more of the network’s nodes. The compact size of the new sensors (2 cm^3) allows for longer autonomy when operated by batteries and placement in locations difficult to access.

Some Successful Virtual Reality Applications

Plant maintenance

Plant maintenance planning, operations and training are also covered by ProcessLife. Live connections between plant maintenance modules from ERP applications such as SAP and Maximo connect maintenance information to virtual objects (pumps, valves, manifolds, …). In short, maintenance engineers have access to more information making planning easier, taking less assumptions, improving communication on future tasks leading to shorter production stops, and improved economic production cycles.

Real Time Fumes or Gas Dispersion

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HAZOP (Hazard and Operability) incidents can be simulated using an approximated method to compute—in real-time—the propagation of particles of "smoke and gas". Safety Managers can develop training sessions to familiarize personnel with possible escape routes and improve the safety of the plant.
In this application, fumes or gas dispersions are simulated in real-time within the 3D model allowing for interactive analysis of the results. The visualization toolbox includes various atmospheric schemas with fumes or gas appearance linked to their properties and the climatic conditions.

Sometimes advanced simulations are being performed on the whole installation using a well recognized Computational Fluid Dynamics (CFD) application for the O&G market. One of the common features expected by people responsible for Hazard simulation is the ability to visualize those results embedded in the complete virtual 3D model.

The results of hooking ProcessLife into the safety processes and procedures are increased environment conscious behavior and proactive response, reduced insurance premiums and less production shut downs due to governmental safety violations.

Asset Integrity Survey

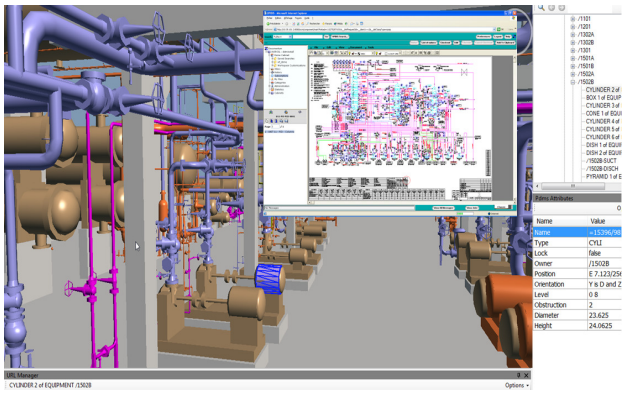
Regular surveys of an installation site provide owners and operators with valuable information on the integrity of their physical assets. This application includes:

- monitoring the corrosion state of equipments, leading to a better understanding of corrosion factors or causes;
- displaying corrosion index variations as a function of time.

Documentation

Each object appearing in a contractual document, a value table, a web page, a PDF document, a database record, a diagram (P&ID, P&FD, isometrics, drawings, etc.), is linked to its functional representation in the virtual 3D model.

The virtual model becomes therefore a very easy and intuitive mean for accessing this related information. By using a simple functional flag, all documents are indexed and linked to the 3D objects, using dynamic URL links.



Courtesy of Artesys

The main benefits of this application domain are:

- live connection between equipment information stored in a Document Management application—such as Documentum—and the virtual objects;
- substantial time saving for all operations requiring direct access to all related technical documents.

Process Simulation and Training

Fast and better Process Simulation is achieved thanks to the visual 3D model of the site. Operator's trainings are gaining in productivity and performance thanks to the virtual "Walkthrough" in the installation site, on one hand, and the better understanding of the geographical relationship between components, on the other hand. There is a growing need to train new operators, as there are too few experienced ones today. ProcessLife links each simulation diagram symbol to its representation in the 3D model.

In order to address the challenging need of large corporations, in solving their Enterprise Wide Business Processes, VRcontext implemented its software architecture embedding recent technologies such as Streaming and Services Oriented Architecture (SOA).

To request more information, visit VRcontext web site at www.vrcontext.com or send an e-mail to info@vrcontext.com.

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