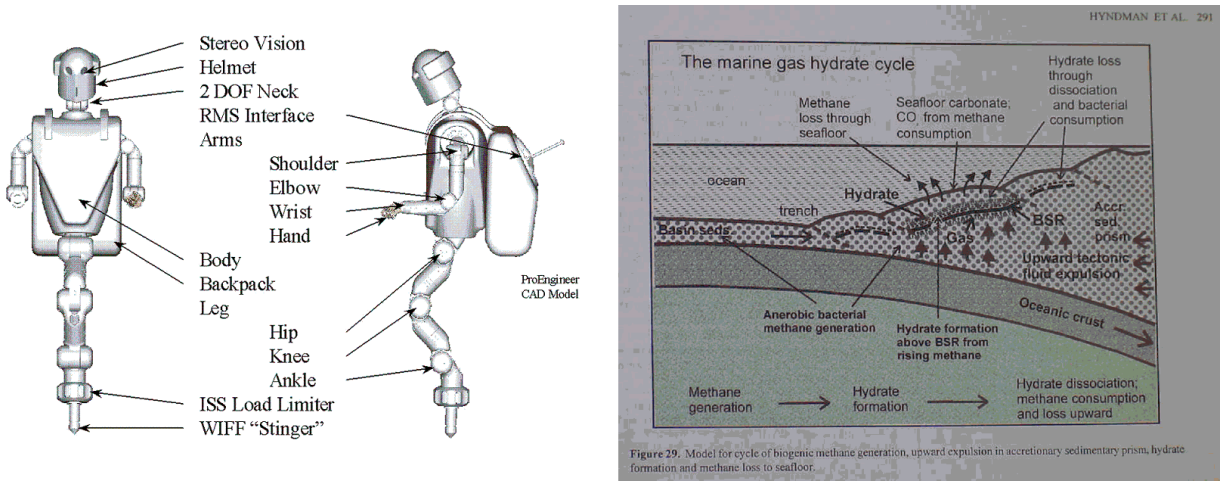

Figure 1: Robonaut Components (Left) and Gas Hydrate Cycle (Right)

AquaRobonaut^{SM} to Mine Thermogenic Gas Hydrates

Robonaut (see Figure 1) represents a mature telepresence robotic technology, which NASA has been developing for decades to support various NASA missions. The approach is to have a robot which mimics the actions of a human operator. The robot is the eyes and arms of the operator. The operator sees through the robot's cameras, and feels through sensors on the robots hands and arms. This allows the human to remotely work in harsh environments, like at the sea floor supporting deep sea oil and gas drilling and production operations. There are numerous patents held by NASA and by contractors who helped develop Robonaut. Walden 3-D negotiated exclusive licensing of these patents from NASA for non-military subsea applications of Robonaut technologies, renaming it AquaRobonaut^{SM}(see http://www.walden3d.com/Robonaut). Although this project has languished because of a lack of investment capital, it can be revived. To proceed, NASA requires the technology be controlled by a U.S. company.

Gas hydrates are frozen methane molecules surrounded by a lattice water molecules and form in permafrost and water depths deeper than 600 feet. Gas hydrates deposits are extensive and worldwide. The gas hydrate cycle is shown in Figure 1. There are biogenic and thermogenic gas hydrates. DRC has identified a 3 TCF thermogenic gas hydrate plug (at \$4/MCF this deposit is worth \$12 billion). This deposit is close to a platform about to be abandoned, and could be mined and put into the existing pipeline to the platform using AquaRobonaut^{SM}and other basic and proven technologies. This package of technologies is TMI-16.

DRC proposes a \$40 million investment to form a company around AquaRobonaut^{SM}, to execute the exclusive license agreement with NASA, to model the project and the economics, to expand and detail the existing plan, to build and prototype the robot, to license the mineral rights to the thermogenic gas hydrate deposit, to negotiate access to the platform and the pipeline, to build a geodesic dome to capture melted methane, and to put the system into production. Former NASA engineer Lac Nguyen would be lead technical development of AquaRobonaut^{SM} and H. Roice Nelson, Jr. would manage gas hydrate deposit definition and mining. There are multiple uses for AquaRobonaut^{SM}and TMI-017 describes an oil and gas facilities use.

