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DEMOCRATIZING EXPLORATION USING 3D PRINTERS AND NOVEL ISRU

Abstract

Today exploration of the far reaches of the Earth is carried out by well-funded specialized teams of researchers, often including military or other Government supported specialists. This is in stark contrast to the pioneering and exploratory spirit that each and every human had to exhibit just to survive in prehistoric times where life had not yet been softened by the affordances of the cities and nations that we all rely on today.

This paper argues for a new paradigm in physical exploration as made possible by emerging 3D Printer technologies. A paradigm that has at it's core a democratization of the skills, tools and access required to enable an exploratory venture. Under this new mode of exploration we will witness a renaissance of discoveries as exploration is made accessible to entirely new participants including but not limited to; artists, children, parents, politicians and teachers.

In support of this new exploratory paradigm we also describe a novel 3D Printer capable of creating artifacts out of ice using only water, brine and freezing temperatures. All of these materials can be locally-sourced within the Earth's Arctic Circle, a region with a long history of exploratory ventures. Additionally we describe a number of unique mission scenarios at the Arctic Circle enabled by the affordances of a 3D Printer enabled true ISRU.

Today's model for exploration has parallels to the early days of the Internet where each and every explorer and pioneer of cyberspace was an expert with privileged access. Just as the web browser greatly reduced the barrier to entry for "cybernauts" enabling grandmothers and children to deftly navigate cyberspace with the speed and accuracy of what would have required the hardened skills of a unix guru, so too the 3D printer promises to democratize exploration through the ability to provide mobile, just-in-time, in-situ access to the affordances we have come to rely upon that are typically accessible only in cities or on expeditions that have the funds for heavy provisioning and storage.

By democratizing exploration we will a) increase the number of probes (as embodied by an individual or team of explorers) and b) radically alter the types of missions chosen due to the radically altered motivations under which exploration takes place. It is our belief that this is not only desirable, but rather imperative to the continued advancement of humanity.