FirstRand

A likely successor to the information age

Author: LEO

Can we tell one age from another?

These days, catchphrases and conceptual hype turn any passing fads into megatrends – or attempt to. Real 'Ages' however, are rare. The changes they produce in human civilization are literally world- changing and drastic.

Take whale oil. It used to run the engines of the world – and at the very least the street lights. Entire occupations existed dedicated to transporting and lighting whale oil in the street lamps of the world. All these jobs, and in fact, entire industries, were lost when electric lights came around.

It is very hard to know what comes 'next'. Like the agrarian societies of the feudal world could not have predicted the rise of the steam machines of the Industrial Age, the denizens of the world's smog-filled cities could not have envisioned the internet of the Information Age that followed. But once a megatrend establishes itself – it becomes undeniable and inevitable.

What comes next, and how can we tell? There are several contenders, with the much lauded 'Fourth Industrial Revolution' well in the lead. But the truth is that the Fourth Industrial Revolution is still firmly in the camp of the information age. Attaching a variety of items, gadgets and machines to each other with an IP address is hardly earth shattering or mind-blowing, despite the benefits and economies of scale. In fact, connecting things to the web that weren't before is, well, almost obvious.

In retrospect, new Ages seem inevitable. The signs are few and scattered, until the zeitgeist kicks in and all kinds of disparate events converge in a single, overwhelming tide. Indeed, as the old saying goes, nothing is as powerful as an idea whose time has come. And while predictions are for fools, there is enough activity in one particular field to suggest that a new Age may well be upon us: and that is the age of Low Earth Orbit Industrialisation.

The Signs Of A New Era

It's easy to make any futuristic claim – but realistic futurism requires evidence. Perhaps the best evidence that low earth orbit commercialisation is in our future, is to look for evidence that self-interested parties are getting in on the action. Nation states are certainly gearing up for low earth orbit industry and commercialisation: The US, Europe, India, Russia, China and Israel are all developing new technologies and engaging in new missions. A small group of very wealthy individuals are also working to bring about a new age of space utilisation: Elon Musk's SpaceX, Richard Branson's Virgin Galactic, and Jeff Bezos' Blue Origin are all directly involved in commercialising space – as are dozens of smaller and lesser known companies, including Techshot, Made In Space and others. Popular scientist Neil de Grasse Tyson also recently declared that 'the first trillionaires will be those who mine asteroids'.

But the signs that we are on the cusp of commercialising space is evident in more than the long term strategic plans of governments and billionaires. Over 200 objects have already been manufactured on the International Space Station. Companies ranging from Goodyear, Adidas and KFC have already been involved in researching manufacturing and production in space – and research into manufacturing in microgravity and vacuum environments have been running since the 1980s.

The big game changer, bringing the era closer, is the reusable rockets of SpaceX. Reusable rockets not only lowers the cost of travelling to and from space, but makes permanent settlements and outposts viable – for the first time.

There is no telling what innovations may result from low earth orbit industrialisation… but we can begin by what is already currently in play.

As earth dwellers we are used to our own environment. Low earth orbit presents completely different environmental factors that are simply not available on earth – and there are several initiatives already taking advantage of the opportunities presented by this new environment. The industries currently exploring the possibilities include medicine, optics, power generation, materials design, coatings, robotics and tourism.

Bioprinting - Gravity negatively impacts many of our processes. 3D biomaterial printing is particularly difficult to do on earth – as printing layers of cells often lead the layers collapsing into themselves, creating a mushy mess. But in zero gravity, single layers of cells do not collapse. This enables 3D printers to print layer upon layer efficiently – and this is required to print vascular networks. This makes the printing of complex organic materials possible. While on earth we can print ears or noses – in zero gravity we can print hearts, lungs and even brain tissue. There are currently almost 13,000 people on organ transplant waiting lists.

Fiber Optics – Fiber optic cables enable us to relay signals, transmit data and communicate. Traditionally, we have used Silica fibre optic cables. But gravity limits the capability of our fibre optic cables. In zero gravity, some companies are already experimenting with different fibre optic cables known as ZBLAN cables. These cables provide 50 times more bandwidth than traditional cables, with 10 to 100 times less signal loss.

Mining - Mining is not a renewable resource, and at some point, earth's supply will run out. However, there are millions of asteroids around earth – and some of them have very heavy concentrations of valuable minerals. Some of them have even been valued. Davida – one such asteroid, has been valued at $100 trillion. Asteroids are excellent sources of platinum, gold, iron and hydrogen. Hydrogen is a very good fuel source.

Speaking of power, solar power is far more efficient in space than it is on earth. There are no clouds, and very short periods of 'night'- and concentrated solar power can be beamed down to receptors on earth.

The future of earth is in space

A New Age becomes a new age when there is a gold rush. Many people around the world commute 100 km per day on earth – to get to low orbit, the same distance is required. While it currently costs $10,000 to move a single kilogram up to orbit, those costs are diminishing (much like the cost of computers began to drop when the Information Age gold rush got under way). As more and more industries begin to use the benefits of vacuum and microgravity manufacturing, it is entirely possible that infrastructure is built to make this commute fast as well as cheap.

Once there is sufficient infrastructure in low earth orbit, and at the Lagrange points, there will be more than enough opportunities for the low gravity industry to truly shift the technology, resource and manufacturing paradigms of humanity.