CENS INSIGHT

A Review of Global Open Source Intelligence

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The Centre of Excellence for National Security is a constituent unit of IDSS. Its mission is to develop intellectual capital on selected national security issues, providing useful perspectives for policy makers and the wider national security community. As part of this mission, CENS produces a weekly report (OUTLOOK) on a wide range of national security issues, with a particular focus on finding faint signals from potentially high impact issues that are not on the "radar screen" of most other agencies and institutions. CENS also produces INSIGHT on an occasional basis to bring focus and clarity to possible low probability but high impact events.

Emergent Trends: A Tale of Fishes, Mobile Phones and Micro-Engines

In today's complex environment, it is not enough to rely on past patterns and established models to understand change in the world. A "linear" approach to anticipate change is inadequate. What is required is a "broad based, anticipatory approach"—scanning the horizon—which goes beyond the familiar to identify new or emerging trends that may have potential implications for the future.

That said, it must be emphasized that horizon scanning is not just about the discernment of new or rising threats. It should be understood that horizon scanning is also about *detecting new or nascent opportunities*—which if exploited early, may allow a state (or an organization) to gain a competitive edge.

The technological domain, in particular, is rich in emergent trends that that should be picked up. While there have been a number of technological innovations in recent times, this article highlights three interesting developments that are particularly intriguing: an intelligent aquatic bio-monitoring system, mobile phone "psy-ops" and the micro-engine.

Something Fishy in the Water? Use Fish to Find Out

The US Army has developed an innovative and low cost method to monitor the condition of public water supplies in America. Known as the Intelligent Aquatic Biomonitoring System, the system utilizes not electronics but rather the humble bluegill fish—also called the sunfish or bream— to detect the presence of harmful chemicals in water supplies. The system works in a fairly simple manner. Dechlorinated water from the treatment plants and reservoirs are pumped into tanks containing eight bluegills, and then electrodes are installed to observe the respiratory behaviour of the fishes. A computer then studies the behaviour of the fishes, taking into account tank conditions such as temperature, acidity and oxygen levels. If at least six of the bluegills manifest anomalous behaviour, indicating possible water toxification, an alarm will immediately alert the scientist on site.

According to *National Geographic*, the advantage of the bluegills lies in the extent of their detection capabilities. Unlike traditional electronic sensing systems that can really only detect what they have been previously pre-programmed to look out for, highly sensitive bluegill fishes can respond to a "wide range of chemicals, including cyanide, organic solvents and

pesticides". In fact, a CNN report estimates that bluegill fish can detect up to at least 30 different types of toxins—an impressive figure by any measure.

Currently, the system is actually being used in major American cities such as New York City, San Francisco, California and Washington while more than a dozen other US cities have plans to incorporate it. In the case of New York City, the bluegills have already distinguished themselves: the fishes spotted a diesel spill at least two hours before any other conventional detectors did so. In an age where a terrorist attack on public water supplies is no longer an unimaginable prospect, bluegill "technology" represents a cheap, viable and perhaps unorthodox tool that may help safeguard the integrity of public water supplies.

"Mobile Phone" Psywar

In another development, it was revealed that Israel had engaged in "mobile phone" psychological warfare during the recent Lebanon war. During the campaign, Israel inundated the mobile phones of residents and officials of Southern Lebanon with a barrage of SMS (short messaging service) text messages and recorded voicemail that sought to influence the mindsets of the Lebanese populace. The *Guardian*, for instance, reported that Lebanese mobile phone users regularly received text messages—cloaked in the guise of "news updates"—that "discredited" Hezbollah and its leader, Hassan Nasrallah. Likewise, *Time* Magazine observed that Lebanese officials had received Israeli SMS messages beseeching them to "move to the north" and avoid an imminent attack. Meanwhile, the Middle Eastern news channel Al-Arabiya TV disclosed that Israeli-originated voicemail had been left on the mobile phones of many Lebanese. Not only did the voicemail insist that the Lebanese government "is responsible for the abduction of the Israeli soldiers", it also urged the Lebanese people to "set the soldiers free".

The targeting of SMS mobile phones for war-time propaganda is certainly unique. In the past, psychological operations usually involved conventional tactics such as radio and television broadcasts or air-dropped leaflets. Although SMS and voicemail technologies are not new per se; the employment of these tools for psychological warfare represents a creative application of an old concept. With hand-phones becoming increasingly ubiquitous in large parts of the world, text and voice messaging may well feature prominently in future psychological operations.

Micro-Engines: The End of Batteries?

Lastly, we focus on the emerging technology of the so-called "Engine on a Chip". Massachusetts Institute of Technology (MIT) researchers recently announced that they are on the verge of building a miniscule gas-turbine engine *inside* a silicon chip. Also known simply as the "micro-engine", it is envisaged that this emergent technology would offer "ten times" the power of a conventional battery source of similar dimensions. As MIT's principal researcher, Professor Alan Epstein notes by way of comparison, "a laptop that will run for 3 hours on battery charge will run for *15 to 20 years* using the micro-engine".

So how does one construct such an engine, a prospect thought impossible not too long ago? According to the MIT researchers, the trick is to turn to etched silicon wafers. Given that traditional "welding and riveting" methods are technically unrealistic, the scientists employed advanced etching techniques to meticulously replicate the essential components of an engine: a compressor, a combustion unit, the rotating turbine and the likes—all miniaturized onto a silicon wafer. Once the individual wafer parts are produced, the resultant engine would be formed by "stacking up the wafers like pancakes and bonding them together".

So far, test results have indicated that all the individual components work well. The challenge now is to amalgamate the parts into a functional whole. Based on Professor Epstein's estimation, his team is only six months away from a successful prototype. Professor Epstein also envisaged a commercially viable version to be available in "three to five years time."

The implications of a workable micro-engine are potentially huge. For a start, if the technology achieves the promise that MIT researchers believe it can, batteries may well become a thing of the past. At the same time, there will be technological spin-offs and applications. Not surprisingly, the US Army is particularly interested in the project (they are already the main sponsors). The reason is easy to discern. Any National Serviceman, for instance, who has had to man-pack heavy radio sets up mountain slopes would enthusiastically welcome a powerful but compact radio set powered by a light and long-lasting micro-engine.

Conclusion
This article has shed some light on three under-studied but potentially significant technological developments h highlighted. As with any other nascent developments, a race will soon develop to see who can more successfully exploit these new ideas and technologies. One must keep up in order not to be left behind. This is why a "horizon scanning" mentality is not such a bad thing.