Technology Work Session for the South African Army; Hosted by the CSIR

Keynote Address

The Impact of Technology on Military Affairs: Trends and consequences for the SANDF

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Outline of presentation

- Introduction
- Selected macro technology trends with major future impact on national defence and security
- Consequences and likely high-impact technologies for defence and the SA Army
- Conclusion

Introduction

Considering future trends is not a journey into science fiction or gazing into a crystal ball.

This is a glimpse over the horizon - to help us engage, plan, be pro-active, be prepared.

Ready for 2030.

Introduction

- Technology has become the modern ‘wealth of nations’
- It drives world economy, improves quality of life, influences outcomes of conflicts, one of 3 pillars of the power of the state
- Technology abundance -
  - impacts on society in non-linear and unexpected ways
  - internet, cell phones, social media for example led to new applications, new user communities, absorption beyond expectation, changing society
  - in defence realm, under-equipped adversaries gained new agility, evasiveness simply through access to technology, innovative IEDs
  - In turn led to advances in surveillance and unmanned systems
- Consumer demands drive R&D investment - not the military; How can we benefit also from optimising our use of commercial technology ?

Macro technology trends with major future impact on national defence and security

New context and approach for managing (defence) technology

- Avalanche of new technologies, devices and data
- At higher systems levels increased connectivity, integration, open standards, enhanced technologies for design and simulation
- Now security focus expanded from land, sea, air to cyber
- Impossible to fully control technology use and supply
- He who has the most information wins (…but only if it means the ability to respond and act)
- Only way is to engage with these trends and embrace technology changes

Bits and bytes – not bullets and bombs

Macro technology trends with major future impact on national defence and security

Technology becoming more easily accessible and available than ever

- Major consequence of the democratisation of technology
- Staggering array of choices - e.g. components, devices, subsystems
- Challenge now is not availability of technology but understanding how to best combine, integrate, to develop the right solution – and one that outlives generations of new technology

Macro technology trends with major future impact on national defence and security

Power to the people (on the net)

- By 2010, estimated 2 billion people were using the internet; Expected to grow by 5 billion by 2020.
- Connected societies benefit – knowledge, education, new markets, spreading democracy, empowerment, improved quality of life.
- Arab spring
- Person + Cell + phone = source of info, sensor, processor
- Demand for improved functionality, improved bandwidth, lower cost

Macro technology trends with major future impact on national defence and security

We truly live in a global village

- Globalisation of technology affects us all
- A tsunami in Japan, a flood in Thailand
- A country's role in global development, production and consumption influences competitive positions, a new world order
- Interdependencies increase – so do vulnerabilities…

Macro technology trends with major future impact on national defence and security

Ubiquitous manufacturing

- 3D printing, additive marketing already used in industry
- Active electronic and electro-optic devices
- Download your new cell phone and print it?
- Research done on printing living cells and organs. Living entities manufactured to specification – not just organs but whole organisms.

Macro technology trends with major future impact on national defence and security

From the internet of things to smart dust

- In 2008, the number of devices connected to the internet surpassed the number of human beings (between 25 and 100 billion ‘things’ estimated to be connected by 2020).
- Also, items sized at tens of microns will be connected.
- Users increasingly expect data about most things, control of many things.
- Need for physical presence to engage with people and the environment becoming optional, even unnecessary.
- Option to tap into cloud and get data and information about what you want where you want

Macro technology trends with major future impact on national defence and security

Man-Machine convergence

- Internationally, defence labs are tracking advances in biotechnology, nanotechnology, robotics, machine intelligence. (Convergence of these even more powerful and disruptive)
- Robots make our lives easier, safer and reduce cost. Consider the possibilities of human augmentation?
- Consider interacting with the internet via thought… Will that make humans prone to cyber attacks?
- And if all of this can converge into nanobots, what are the possibilities – problems?

Consequences and likely high-impact technologies for defence and the SA Army

our future through science

Consequences and likely high-impact technologies for defence and the SA Army

How well do we know the threat?

- Number & scope of unconventional threats are and will keep escalating – ref MOD speech
- Adversaries have the benefit of surprise, first mover advantage
- Operate among civilians, access to ICT, explosives, weapons
- Understanding this will help us adapt doctrine, use existing platforms, systems and technologies in new ways

Consequences and likely high-impact technologies for defence and the SA Army

How ready are we ?

- Military planners and logistics managers have new technologies to have the answers ready at strategic, operational, tactical levels.
- Ubiquitous use of sensors and networking, simulation means identifying, integrating, evaluating and improving what we have – to get most from the budgets we have

Consequences and likely high-impact technologies for defence and the SA Army

Are we investing in the right things? Do we try before we buy?

- Modelling, simulation help evaluate effectiveness of systems, enhancements before acquisition.
- Evaluate best configuration and integration with legacy systems.

Are we properly, securely connected?

- User systems and platforms, communication capabilities all securely networked, allow commanders best use of all assets, major leverage, enhanced capabilities – with minor investment.
- Consider the value of having border troops, trained and equipped with the right hardware, as elements of this network, having real-time information, providing full operating pictures to commanders at different and all levels, supported by machine-based decision support, integrated with unmanned vehicles.
- Achieve cybersecurity via smart technologies – not cumbersome procedures.

Consequences and likely high-impact technologies for defence and the SA Army

Send in the robots

- Unmanned vehicles that fly, crawl, walk and ride are increasingly doing the dirty, difficult and dangerous duties at the frontline.
- Armed, unarmed, equipped with surveillance tools, small as a hummingbird, used as a soldier's personal lookout – opportunities abound.

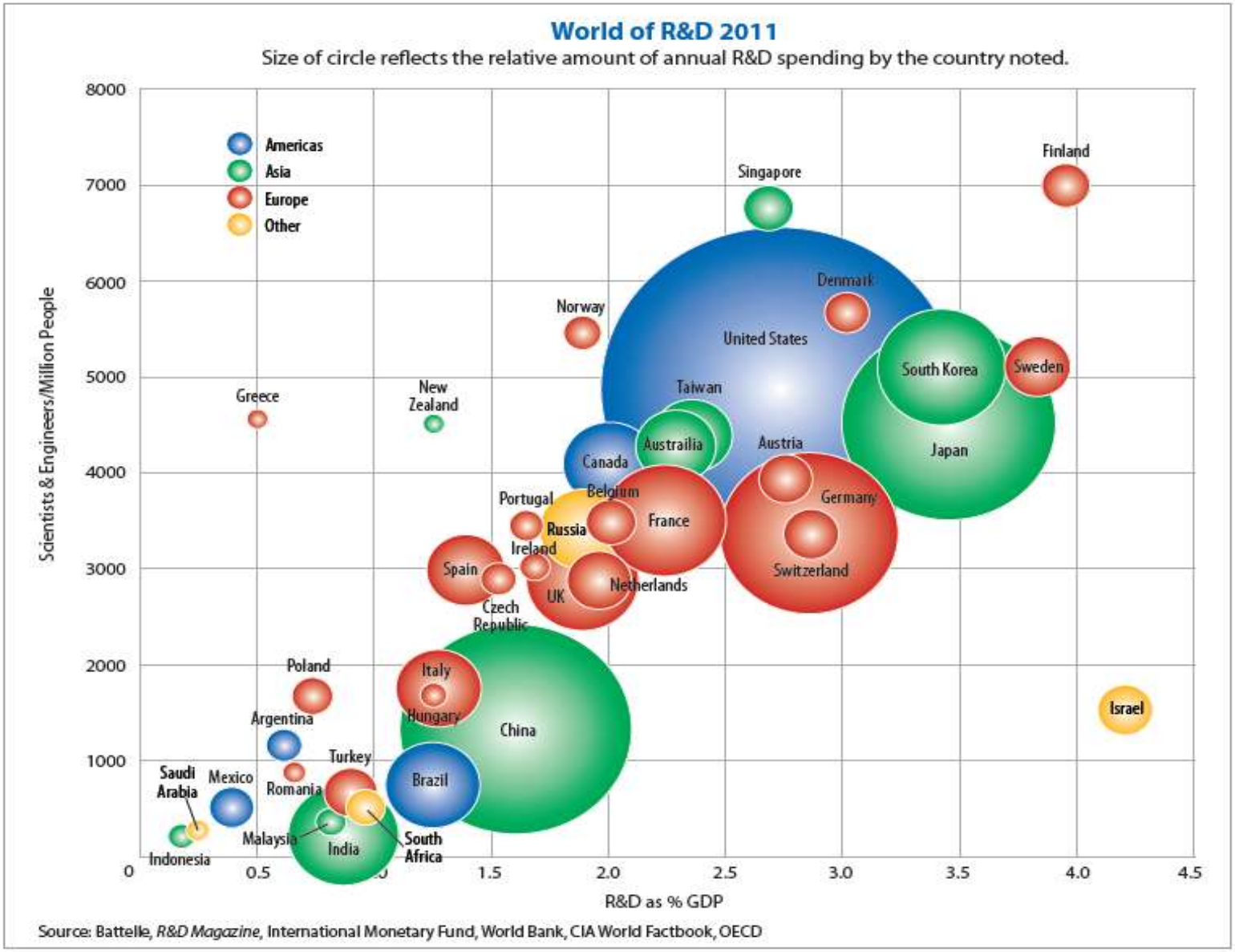
Why situation awareness is a game changer

- Picture this : Our commanders having early warning of potential threats, can recognise enemies from amongst civilians, have accurate pictures of where own forces are relative to adversaries and can intercept their communications.
- This is possible with a ‘System-of-Systems’ view to situation awareness – comprising sensor data, plus other intelligence, computer algorithms designed to do intent estimation, etc – distributing information (real and non-real time) down to the lowest level.
- This picture is rapidly becoming possible…

We don’t have to go it alone

- Limited budgets to deal with unlimited demands is not unique to RSA
- Outside of better connecting, integrating existing assets, see what other clusters, departments or sectors are developing that can be adapted to defence use – e.g. universities, science institutes and others in the National System of Innovation, international partnerships, etc.
- National expenditure on R&D projected to increase from 0.9% of GDP to 1.5% by 2020.

The world of R&D 2011



Conclusion

- Technology development and adoption are growing at extreme rates;
- The threat, the battle space is constantly changing – even beyond controllable physical dimensions.
- By engaging, developing insights and formulating a strategic response, the SA Army could make technology their ally, turn it into their own force multiplier with strong impact in conflict and peace, and to
- make a leading contribution to the security and development of South Africa.
- We hope you will discover that technology is not just a tool - but a critical, intrinsic and reliable ally. We hope to show you this over the next few days.

Thank You

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