



The Seven Megatrends of Cambric

Bob Gourley, Partner, Cognitio

May 18, 2016

Bob.gourley@cognitiocorp.com

How we think.

About This Presentation

- What if you could know everything about the future of IT by just remembering one word?
- What would you do today because of what you knew about the future?
- This presentation will help you think through the future and underscore actions we all need to be taking today to ensure we have the best possible tomorrow.

Background

Do you remember this scene from The Graduate?:

Mr. McGuire: I just want to say one word to you. Just one word.

Benjamin: Yes, sir.

Mr. McGuire: Are you listening?

Benjamin: Yes, I am.

Mr. McGuire: Plastics.

Turns out Plastics was pretty hot. Great tip there Mr. McGuire.

What is the word for today? Our research all points to one word. The word is Cambric.

CAMBRIC

CAMBRIC stands for:

Cloud Computing
Artificial Intelligence
Mobility
Big Data
Robotics
Internet of Things
CyberSecurity



Cloud Computing

The Future of Cloud Computing:

- Low cost, highly functional compute and storage available anywhere. Tiers of Clouds (including at home).

Trends To The Future:

- Efficiencies of this architecture are driving compute costs down
- Agility of this model is helping innovators innovate and developers develop
- New forms of Cloud Computing include ultra-small datacenters which can function as internal clouds
- Versatile small form-factor data centers can be bought in containers and put anywhere
- Cloud plus IoT = Fog Computing, an architecture of multiple collaborative end compute devices



Open Questions:

- Will the big cloud providers be monopolies?
- Will the future Internet be “walled gardens”?
- How will nations settle data retention disputes?
- How do we move compute across tiers?

Artificial Intelligence

The Future of Artificial Intelligence:

- Computer software assists people in every function and totally displaces many human jobs, across all industries and disciplines.

Trends To The Future:

- With business models returning profit now, all indications are AI is here to stay
- AI and Machine Learning and Cognitive Computing are being coupled with incredibly low cost cloud computing
- No accepted protocol for security in AI.
- Creators use a “generate and test” approach to creating functionality.
- AI seems easier to deceive than current computer software.



Open Questions:

- Will job displacement be a crisis?
- Will companies use AI for good?
- Will there ever be a widely-accepted security framework for AI?
- Can behavioral analytics enhance security?
- What lessons are in Microsoft Tay's conversion to evil?

Mobility

The Future of Mobility:

- All humans connected anywhere on the planet. Irreversible change to all cultures. Mobile devices enable VR and AR.

Trends To The Future:

- A connected supercomputer
- With 100's of sensors and millions of applications which can fuel and support use cases we have yet to begin to imagine
- User location and its history becomes the ultimate biometric
- Enterprises must serve mobile users and mobile employees, and watch for mobile threats



Open Questions:

- What is the impact on privacy?
- What use cases will dominate?
- How will enterprises shift?
- How will VR change education?
- How will dictatorships react?

Mobile: Virtual Reality

The Future of Virtual Reality:

- Will become rapidly ubiquitous and used for education, training, analysis, collaboration, secure communication.

Trends To The Future:

- Three key commodity devices are fighting for top spot: Oculus, Playstation VR and HTC Vive
- Augmented Reality like Hololens and Meta provide enormous potential
- Very high resolution views, easy to operate, multiple senses
- Potential to improve both decision making and collaboration across vast distances



Open Questions:

- Can VR be made secure?
- What will adversaries do in VR?
- What use cases will dominate?
- How will enterprises shift?
- How will VR change education?

Big Data

The Future of Big Data:

- We will always create more data than we can deal with. Will need to be analyzed everywhere.

Trends To The Future:

- Estimates of 1 Trillion sensors by 2020
- Breakthrough methodologies and new scalable data approaches based around Hadoop hold great promise in sensemaking over large data sets.
- Sensemaking is key to success in most all other technology advancements.
- Ethical considerations around privacy and security over data will only grow.
- How ethical considerations are resolved will depend on culture, politics, other factors.



Open Questions:

- Can there be widely accepted ethical frameworks for data and its use?
- Who will individual citizens trust to analyze their personal, home, auto data?
- Can behavioral analytics enhance service and security?

Robotics

The Future of Robotics:

- We have seen the future, with robotic cars, trucks, boats, subs, workers, companions here now.

Trends To The Future:

- Like AI, Robotics hold great potential to displace large portions of the global workforce.
- Robotic trucks now proven concept. 1.3 Million U.S. Truckers may soon be out of work.
- Robots save lives in hospitals, are taking the place of humans in dangerous jobs, improve our oil exploration and farming, endure the hazards of outer space and now fight our wars. Soon they will make driving safe.
- Robotic factories are already causing a large shift of manufacturing back from China to the US and we expect that trend to continue (but the bad news is that new robotic plants employ far fewer people).



Open Questions:

- Will they ever be an accepted security framework for robotics?
- Who will teach robots ethics?
- How hard will it be to deceive robots? Will that make hacking even easier?
- What is the role of behavioral analytics in detecting normalcy in robots?
- Will job displacement be a crisis?

Internet of Things

The Future of the Internet of Things:

- The benefits of having everything connected and generating and processing data will touch every aspect of our work and lives. But it will also bring criminals into contact with everything dear to us.

Trends To The Future:

- Largely enabled by embedded computing devices and ubiquitous communications
- IoT reaches to vehicles, robots, homes, towns and cities, commerce, manufacturing and every aspect of industry.
- Use cases are expected to include enhancements to education, training, safety, security, healthcare, transportation and optimized manufacturing.



Open Questions:

- Do you believe this will be any more secure than our current systems?
- How can we optimize distributed processors when they are idle?
- What transmission protocols will rule?
- What will normal be? What is role of behavioral analytics?

CyberSecurity

The Future of Cybersecurity:

- Today no organization can defend itself alone. This will remain true in the future.

Trends To The Future:

- Some of humanity's greatest thinkers, business leaders and computer scientists have struggled to enhance cyber security. Their approaches are not working.
- Cybersecurity will have to advance or none of these other technologies will be optimized.
- Cybersecurity is especially important because of the newfound complexity arising in our systems.
- Behavioral analytics is seen as a promising approach to enhancing our response
- All source intelligence analysis is critical



Open Questions:

- Is humanity sleepwalking into a preventable catastrophe?
- Will it be easier to trick future systems?
- Will any organization be able to defend itself without help?
- What is the role of behavioral analytics?

The Impact of These Trends

We use acronym CAMBRIC as a mnemonic to help make these seven technology disciplines easier to think through together. When you think of one of them think of them all, and consider the potential impacts of these technologies when used together.

Cloud Computing | Artificial Intelligence |
Mobility | Big Data | Robotics | Internet of
Things | CyberSecurity

Some Benefits To Look Forward To

- Better enabling mass collaboration on problems to generate solutions
- Interfaces like VR plus mobility and cloud can make the highest quality education a right accessible by all
- Enhancing the ability to leverage data to solve issues of poverty, healthcare, the economy and issues of war and peace
- Enable new business models across every industry
- Improve safety in our everyday lives and in the workforce
- Enable knowledge capture, which will enhance the continued advancement of humanity
- Enhance the ability of law enforcement to fight violent crime
- Improve healthcare and extend meaningful life

Some Risks To Avoid

- Increase risks to individual privacy
- Open up new methods for criminals to steal information from businesses, governments and individuals
- Increase risk of job displacement
- Potentially new national security risks
- Threat of out of control technology?

Recommendations

Organizational leaders should consider the impact of these on operations. Odds are very high that old processes will fail under the pressure of change. Anticipate how you will adjust.

Work in your organization to collectively address questions like:

- How might these technologies impact your business or organizational mission?
- How can you build an agile data management framework that enables you to make use of all data at your disposal, including new formats and sources you have never anticipated?
- How can you mitigate risks to your mission in a world where there will never be perfect security?
- Can you leverage new all source intelligence and behavioral analytics approaches to enhance security?
- Consider ethics and how you approach all these technologies in the most ethical ways

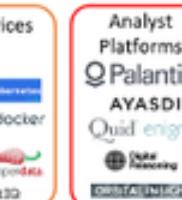
Recommendations (Cont)

And finally, the impossible recommendation:

Track Every Capability From Every Firm on the Following Three Graphics

Big Data Landscape 2016

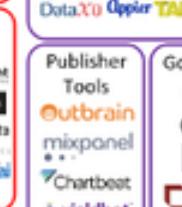
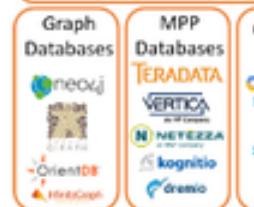
Infrastructure



Analytics



Applications

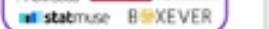


Cross-Infrastructure/Analytics



Publisher Tools

Govt/ Regulation



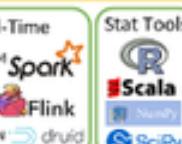
Education/ Learning

Finance



Life Sciences

Industries



MACHINE INTELLIGENCE 2.0

AGENTS

PROFESSIONAL

Handy! @clara
KASIST@ DigitalGenius
OVERLAP.CC meekan
fusemachines PRIMER

PERSONAL

facebook XIAOICE
large nestor
@awesome Magic

OS INTERFACES

Siri VIV
maluuba api.ai
Cognex Google Now

AUTONOMOUS SYSTEMS

AIR

3DR PROJECT LOON Google
VERTICAL DroneDeploy
AIRDOG SKYCATCH
SKYDIO Airware LILY

GROUND

Google UBER
 TESLA CRUISE
 MOBILEYE
 COMMA AdasWorks

SEA

LIQUID ROBOTICS bluefin data
OPENROV BluHaptics

INDUSTRIAL

KIVA Systems fetch
HARVEST AUTOMATION CLEARPATH
AVIBOTS ENERGID
rethink robotics GREY ORANGE
OSARO

ENTERPRISE

SECURITY / FRAUD

Sentinel graphistry
BITSIGHT feedzai AREA1
drawbridge sift science Brighterion
CYCLANCE Brighterion

HR / RECRUITING

textio gild
SpringRole entelo
unitive GIGSTER

SALES

osense infer people pattern
Preact Prism AVISO
Vidora sentient
salespredict Gainsight

MARKETING

LiftIgniter RADIUS brightfunnel
retention SCIENCE AIRPR

CUSTOMER SUPPORT

CLARABRIDGE QUANTIFIND Wiseio
ACTIONIQ FRAMED
DigitalGenius

INTERNAL INTEL

Alation ADATAD
Palantir sapoho lucid
Rainbird SKIPFLAG agolgo
Digital Reasoning Narrative Science

MARKET INTEL

Quid mattermark
DataFox bottlenece
PREMISE enigma
CB INSIGHTS

PLATFORMS

RESEARCH / AGI

OpenAI vicarious
Google DeepMind Numenta
Cycorp nnaïsensse
S SCALED INFERENCE GELOCURIOUS
GEOMETRIC G INTELLIGENCE

FULL STACK

context relevant CognitiveScale
NVIDIA TERADEEP
QUALCOMM nervana SYSTEMS

MACHINE LEARNING

Dato rapidminer
cortical.io AYASDI
amazon web services Azure Machine Learning
naralogics PredictionIO
SKYTREE bigml blueyonder

INDUSTRIAL IOT

ThingWorx UPTAKE
IMUBIT Preferred Networks
Alluvium xively
PLANET OS

AUDIO

Gridspace TalkIQ
nexidia vocaliq
NUANCE Expect Labs
popUP archive

VISION

ORBITAL INSIGHT Descartes Labs DEXTRO
cortica clarifai PLANET LABS
MetaMind

DATA ENRICHMENT

diffbot Paxata
TRIFACTA iDIBON
WorkFusion loop@Labs
CrowdFlower

INDUSTRIES

ADTECH

ADTHEORENT dstillery
BEYONDVERBAL METAMARKETS TAPAD
rocketfuel affectiva

AGRICULTURE

BLUE RIVER tule
TerrAvion mavrx
THE CLIMATE CORPORATION OCERES TECHNOLOGIES
HONEYCOMB

FOR GOOD

Conservation Metrics DataKind thorn BAYES IMPACT

RETAIL FINANCE

inVenture affirm
earnest MIRADOR
Lendo zest finance LendUp

LEGAL

Everlaw RAVEL
LEGAL ROBOT Seal
BEAGLE ROSS
Lex Machina

MATERIALS & MFG

zymergen AUGMATE
GINKGO BIOWORKS SIGHT MACHINE
ITRINE TECHNOLOGIES CALCULARIO
Eigen Innovations

HEALTHCARE

deep genomics 3SCAN
enlitic Calico BUTTERFLY Network, Inc
Atomwise Recombine COLOR
METABIOTA GRAND ROUNDS
Google Life Sciences IBM Watson Health

INDUSTRIES (CONT'D)

EDUCATION

KNEWTON coursera turnitin
gradescope UDACITY
KHANACADEMY

TRANSPORT & LOGISTICS

NAUTO taleris
PRETECKT clearmetal

INVESTMENT FINANCE

Bloomberg Quantopian
Dataminr KENSHO
iSENTIUM NEURENSIC
alphasense

TECH USER TOOLS

DATA SCIENCE

DOMINO kaggle
Sentenai sense
yhat Outlier
ŷhat DataRobot

MACHINE LEARNING

Cortana Analytics AlchemyAPI glowf.ish
IBM Watson Platform Anodot MonkeyLearn
(h [s]) HyperScience fuzzy.io SIGOPT
Oxdata H2O SPARKBEYOND indico

OPEN SOURCE

SKYLINE TensorFlow
seldon Caffe theano
Spark MLlib Microsoft PM spaCy
DL4J SciKit CGT

Information Security IndustryScape

The image is a collage of 17 panels, each containing a grid of logos for different cybersecurity and IT security companies. The panels are arranged in a grid-like structure. The categories represented are: SECURITY MANAGEMENT AND COMPLIANCE (Managed Security Service Providers, SIEM, Governance, Risk and Compliance, Security Training); INFRASTRUCTURE SECURITY (Data Masking, Enterprise Network Firewalls, Intrusion Prevention Systems, Network Access Control, Unified Threat Management, Cyber Security); ENDPOINT SECURITY (Secure Email Gateways, Data Loss Prevention, Endpoint Protection & Anti-virus, Endpoint Threat Detection & Response); APPLICATION SECURITY (Application Security Testing, Web Application Firewalls, Application Control); CLOUD SECURITY; MOBILE SECURITY; and several other panels for IDENTITY AND ACCESS MANAGEMENT, SECURITY PARTNERS, SECURITY ORGANIZATIONS, PROFESSIONAL ASSOCIATIONS & CERTIFICATION, GOVERNMENT, SECURITY CONFERENCES, ANALYST HOUSES, and SECURITY PARTNERS.

Digital Guardian

Cognitio's Role

- Cognitio tracks over 800 venture capital funded technology firms with capabilities to make significant contributions to your mission
- Our leadership includes seasoned intelligence community technologists already under contract to you
- Engage us in market research to find the right technology to meet your needs
- Reach any firm for a proof of concept via our fast turn contracts
- Inform your decisions with studies and assessments on any technology discipline

Concluding Recommendations

Stay Informed and Engaged, Share What You Know And Think.

And Keep In Touch!

Threat Brief
Actionable Intelligence for Business and Government

[LATEST REPORTS](#) [ABOUT](#) [CONTACT US](#) [SUBSCRIBE TO THREAT BRIEF](#) [CYBER THREAT BOOK](#) [TWITTER](#) [THREAT REFERENCES](#)

The brave new world of IoT
Read Melville Hart, Digital Content Specialist/Editor, CFI Software give her views on the brave new world of Internet of Things on CFI Blog. Last year, CFI conducted a survey which it admits to page who their belief were about the Internet of Things. Results ranged from the kind of statements [1] pose we expecting [...]

Companies unprepared for cyber threats
The results of a new survey suggest that the majority of organizations are not following incident response best practices and are not well prepared to face the challenges of emerging cyber threats. RSA, The Security Division of EMC released the results of its global-based research survey that covered 10 countries and compared those [...]

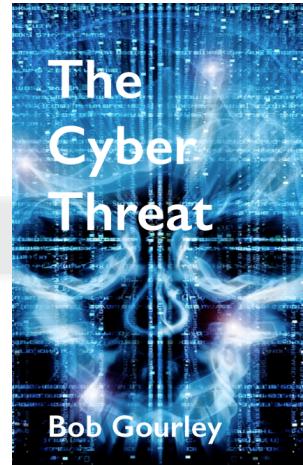
Internet of Things Day: Time to Consider IoT Threats, Say Experts
Today marks the fifth annual Internet of Things Day, but security experts have been using the occasion to warn organizations not to allow the IoT to become the

Share This:
[Facebook](#) [Twitter](#) [LinkedIn](#) [Google](#) [More](#)

Connect With Us
[Facebook](#) [Twitter](#) [LinkedIn](#) [YouTube](#) [RSS](#)

References
[2013 National Economic Perspectives](#)
[Managing Cybersecurity](#)
[National Cybersecurity Summit Will Be Held 30 April in Texas](#)
[2013 Worldwide Threat Assessment from Director of National Intelligence Agency](#)
[Alissa Steier, PhD, Cisco, GigaKno Corp](#)
[Basic Threat Detection, Detection, and Risk Mitigation](#)
[Business Continuity: How to Protect Your Plan](#)
[Cloud Computing: The Future of IT in Business](#)
[CTCIS is a award winning, Internet of Things, and Cloud Computing Community Technology Leader](#)
[Cyber Security and Convergence](#)

April 6, 2013 | Tagged With: [Cyber Security](#), [Internet of Things](#), [Threat Analysis](#)



CTOvision.com
Content for the CTO, CIO, CSO, and COO

[ABOUT](#) [CONTACT US](#) [SUBSCRIBE](#) [JOIN CTOVISION PRO](#) [ENTERPRISE MEMBERSHIP](#) [ASK THE CTO](#) [ABOUT CODINTO](#)

5th Annual FedCyber Summit: By and for practitioners
October 26, 2013 By [Bob Gourley](#) [1 Comment](#)

Ladies and Gentlemen, if you have not signed up for the 5th Annual FedCyberSummit please do so now. The agenda has been finalized and one of the most incredible events we have pulled together. It includes a talk by the only member of Congress who has been a cyber analyst (Will Hurd), sessions on China [...]

Big Data Project Management: Data Must Flow!
October 26, 2013 By [Debra D. McNeill](#) [0 Comment](#)

I currently research big data project management in order to better understand what makes big data projects different than other tech related projects. So far I've interviewed more than a dozen government, private sector, and academic professionals, all of them experienced in managing data intensive projects. What I'm finding is that professionals with experience managing [...]

Top Posts
[Artificial Intelligence: AI in Finance, Insurance, and HR](#)
[Assessing the FERC Cybersecurity Assessment Tool](#)
[The Future of Methods in Medicine, including Machine Learning](#)
[Big Data and the Future of Healthcare](#)
[First Wave Big Data in E-commerce](#)
[Weekend at Stake: Conservation Tool](#)
[When the CIO, CTO, Head of R&D, Head of Product, and Head of Marketing Work Together](#)
[Commercial Use Cases: 3 Companies Using Big Data To Make Money](#)

Quick Guide to CTOvision Pro

ThreatBrief.com

TheCyberThreat.com

CTOvision.com

Contact Us

Bob Gourley

bob.gourley@cognitiocorp.com

Twitter: @bobgourley

Twitter: @CognitioCorp

On-line: ThreatBrief.com

On-line: CTOVision.com



1750 Tysons Blvd, Ste 1500

McLean, VA 22102

(703)738-0068

About Cognitio

Cognitio is a strategic consulting and engineering firm led by a team of former senior technology executives from the U.S. Intelligence Community.

We have a track record of safeguarding some of the nation's greatest secrets, equipping U.S. leadership with actionable intelligence that helps protect lives and driving technology innovation that kept key government agencies generations ahead.

Cognitio leverages that vast knowledge to enable companies across disparate industries to effectively manage technology, maximize technology investments, and reduce overall institutional risk.

We Do Three Things



We provide cyber assessment, awareness, remediation and containment strategies. Our process, the Cyber360 includes best practices from government and industry.



Continued innovation is required for market success. Innovation requires well thought out action plans informed by knowledge of both legacy and new technologies.



We know the “so-what” of data, it is there to enhance your ability to achieve your business objectives. And we know the infrastructure and applications required to let you take advantage of your data.



How we think.