SIGDEV Conference 2012

(U) Making Things Measureable:

Technology Trending Challenges and Approaches

June 2012

Derived from NSA/CSSM 1-52
Dated 20070108
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Overview (U)

- (U) Setting the Stage
  - Strategic Surprise, Priority Needs, Definitions
- (U) Making Things Measurable
  - Emerging Technology Discovery
  - Technology Use Discovery
- (U) Challenges
  - Complexity
  - Getting data is only step 1
  - Visualization
  - Building outreach and engagement

CT Trends Focus Questions (U)

(U) Does NSA CT know what technologies, communications products and applications, and modus operandi *are being used* by terrorists, terrorist groups, or in locations of interest?

(U) Does NSA CT know what emerging technologies, communications products and applications, and modus operandi *are likely to be used* by terrorists, terrorist groups, or in locations of interest?

Prevent Strategic Surprise

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(U) Does NSA CT know what emerging technologies, communications products and applications, and modus operandi *are likely to be used* by terrorists, terrorist groups, or in locations of interest?

(C//REL) What we're really asking is:

Can we tell which ones are likely to become a priority need?

Risk Management for SIGINT Threats (U)

- (S//REL) Threat to SIGINT Capability
  - A behavior or technology that has the potential to have a *negative impact* on NSA’s capability to provide SIGINT on a Terrorism Target
- (U) Use Risk
  - The possibility that a particular threat will be adopted by Terrorist targets
- (S//REL) Indications and Warning
  - Early warning of high impact threats to prevent surprise to key stakeholders and reduce risk from Terrorist adoption of technology that would adversely affect SIGINT production

(S//REL) NSA’s ability to manage risk is directly proportional to our ability to detect threats

The data-driven approach (U)

“Count what is countable, measure what is measurable, and make measurable that which cannot be measured”

Galileo (17th century astronomer)

“When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind”

Lord Kelvin (discovered absolute zero)

“You cannot manage what you cannot measure”

Bill Hewlett (co-founder of Hewlett-Packard)

“Not everything that counts can be counted, and not everything that can be counted counts”

- Albert Einstein

So… what is a (CT) trend? (U)

A trend is a ***measurement*** *of occurrence*

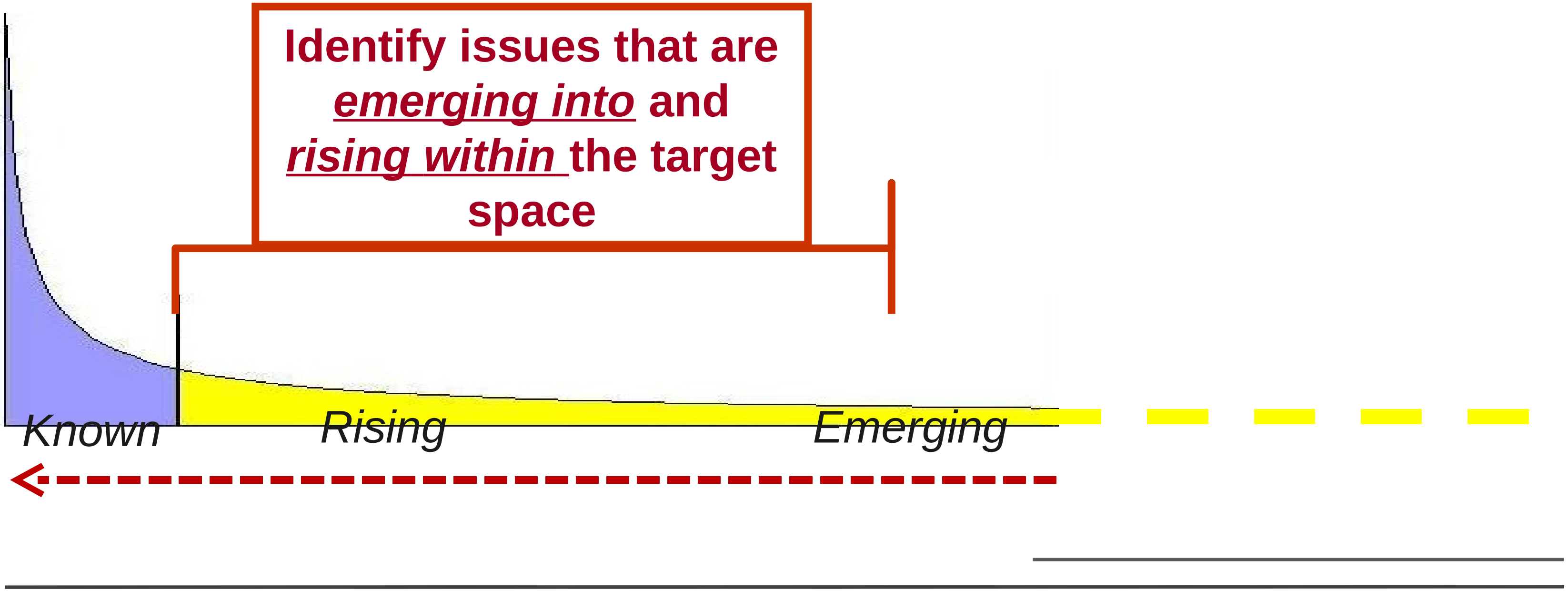
(S//REL) Comparing the behavior of a *single* target…

- Pattern-of-life
- Modus Operandi
- Technology Usage

…to the behaviors seen within the *target space*

- Multiple targets, ***within and across the entire CT enterprise***
- Over a period of time

Prediction and Identification of Priority Needs Prevents Strategic Surprise (U)



Identify issues that are *emerging into* and *rising within* the target space

Making Things Measurable (U)

Emerging Technologies

Technical Thought Leaders

Technologies in Use

Innovation Phases (U)

Adoption

Experimentation

Interest

Technology Adoption Factors (U)

Inn

- Availability

- Vested

- Authorita

- Trusted Source

- Availability of

Optics (U)

- (S//REL) Optic #1: Emerging Technology Discovery
  - Focused primarily on interest and experimentation phases of innovation
  - Watching the Watchers
  - Weaker indicators
  - ***New technologies***

- (S//REL) Optic #2: Technology Use Discovery
  - Focused primarily on adoption phase of innovation
  - Owning the Known
  - Stronger indicators
  - ***New targets***

Analytics and Processes (U)

Emerging

- Producti on
- Technical Thought Leader Scanning
- Production Element Scanning Note Project
- FORTREND – Extremist Technical Sub-Forum
- Administrative Response Technology Use Discovery
- Fore nsic
- Seized Media Trends Tracking
- CNE Trend Tracking and Discovery
- Ne w
- Us er
- Top X – Active
- Technology Pattern of Life Analytic (Automated
- Mobile Handset

Both

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Optic #1: Emerging Technology Discovery (U)

- (S//SI//REL) Emerging Technology & Behavior Discovery
  - Detection of *interest*, *experimentation*, *knowledge transfer* or *direction* using content, metrics approaches
  - Currently using deskside & virtual engagement to leverage TOPI analyst initiative to discover, prioritize, and work against “**strongest**” indicators
  - Leverages inherent TOPI expertise and functions of traffic processing/translation/tasking etc..
  - Embedded analysts, virtual relationships: production “customers”
  - Currently identifying, tracking ‘technical’ thought leaders
  - Technical sub-forums, scanning notes measurements
  - Administrative emails (No-Reply etc..)
  - Forum links, uploaded/downloaded files

Goal: Generate Prioritized Input (techs/behaviors) for Research

Optic #2: Technology Use Discovery (U)

- (S//SI//REL) Technology Use and Behavior Discovery
  - “Stratactical” data sets
  - Includes target-specific data point for each item (e.g. selector)
  - Discovery of target behavior by identifying technology use patterns, trends, and/or anomalies in:
  - User-agents (browsers, OS, devices)
  - Tasking (new tasking, total tasking)
  - Network, Protocol usage (Active User metrics)
  - Visited URLs, web searches
  - Process lists, pre-fetch logs, registry entries, software logs
  - Hardware usage (smartphones, tablets, SD cards)
  - Currently using various tools (XKEYSCORE, SEEKER, BIONICTURTLE, JEMA, JOLLYROGER, MARINA, TUNINGFORK, QFDs, etc…) and approaches with multiple cloud analytics in varying stages of development and/or planning

Goal: Generate Prioritized Input (techs/behaviors) for Research

Measurement Drives Research (U)

(S//REL) Triage begins with **target** indicators of a new technology

Derived from either optic: Emerging or Use Discovery

Interest, Experimentation, Use, Knowledge Transfer, Metric, etc…

Target ▭ Technology ▭ Do other targets use this technology?

This is the central defining question for Trends Analysis:

Do other CT targets use this technology?

Weak vs. Strong Indicators: Brutal Triage (U)

Weak	Medium	Strong
E	E	E
I	I	I
No	No	No
Received a	Received a	Received a
Exper	Exper	Exper
Previous/Low	Previous/Low	Previous/Low
Installed, no	Installed, no	Installed, no
A	A	A
Hig	Hig	Hig
Log files, traffic	Log files, traffic	Log files, traffic

The Wicked Problem Aspect (U)

(S//REL) Defining the problem is the first (wicked) problem

- Triage Stage 1
- Initial priority: (single) target + initial understanding of technology
- Implications Research
- What does the product/service do?
- Current NSA capabilities to detect, collect, exploit, analyze?
- Do any other CT targets use it?
- Triage Stage 2
- Updated priority: target(s) + updated understanding of tech/USSS
- *Validated* Next Steps
- As needed: capabilities/access development requirements
- Reporting: internal, CIR, e-gram; Gaps report; prioritization w/in tech category

Goal: Periodic Reporting Vehicle (U)

- (U//FOUO) Move beyond ad hoc task responses to routine deliverables

- (U//FOUO) Overcoming volume challenge
  - Huge variety of inputs, massive numbers in each
  - Prioritization
  - Visualization

- (S//REL) Moving threats to a simple Risk Assessment model
  - Borrows methodology from models used for executive purposes elsewhere in agency
  - (FAMT, Geopolitical Technology Trends Matrix, TAO...)
  - Opportunities, threats handled separately

Capabilities Development Risk Matrix (U)

Impact > to production Use Risk v	TRIVIAL Loss/lack of insight to small aspect of target communications, presence	MINOR Loss/lack of insight to significant aspect of target communications, presence	MODERATE Loss/lack of insight to large component of target communications, presence	MAJOR Loss/lack of insight to majority of target communications, presence	CATASTROPHIC Near-total loss/lack of insight to target communications, presence
Current Highest Priority Target Use	**Document tracking**	**Fivewes, Facebook chat presentation**	**Mail.ru, TeamViewer, Join.me**	**OTR, Tor, Smartphones, Zoho.com webmail, TrueCrypt**	**Tor+ Trilight Zone + Cspace + ZRTP VoIP client on Linux**
Current Operational Target Use	🟨	🟧	🟥	🟥	🟥
Current Low Priority/Previous Higher Priority Target Use	🟩	🟨	🟧	🟥	🟥
Technical Thought Leader Recommendations, Experimentatio	🟩	🟩	🟨	🟧	🟥

Capabilities Development Risk Matrix

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Current Highest Priority Target Use	Document tracking	Fivewes, Facebook chat presentation	Mail.ru, TeamViewer, Join.me	OTR, Tor, Smartphones, Fastmail, TrueCrypt	Tor+ Trilight Zone + Cspace + ZRTP VoIP client on Linux
Current Operational Target Use					
Current Low Priority/Previous Higher Priority Target Use					
Technical Thought Leader Recommendations, Experimentation					

(TS//SI//REL) With rare exceptions, application-specific solutions are only built based on these two criteria

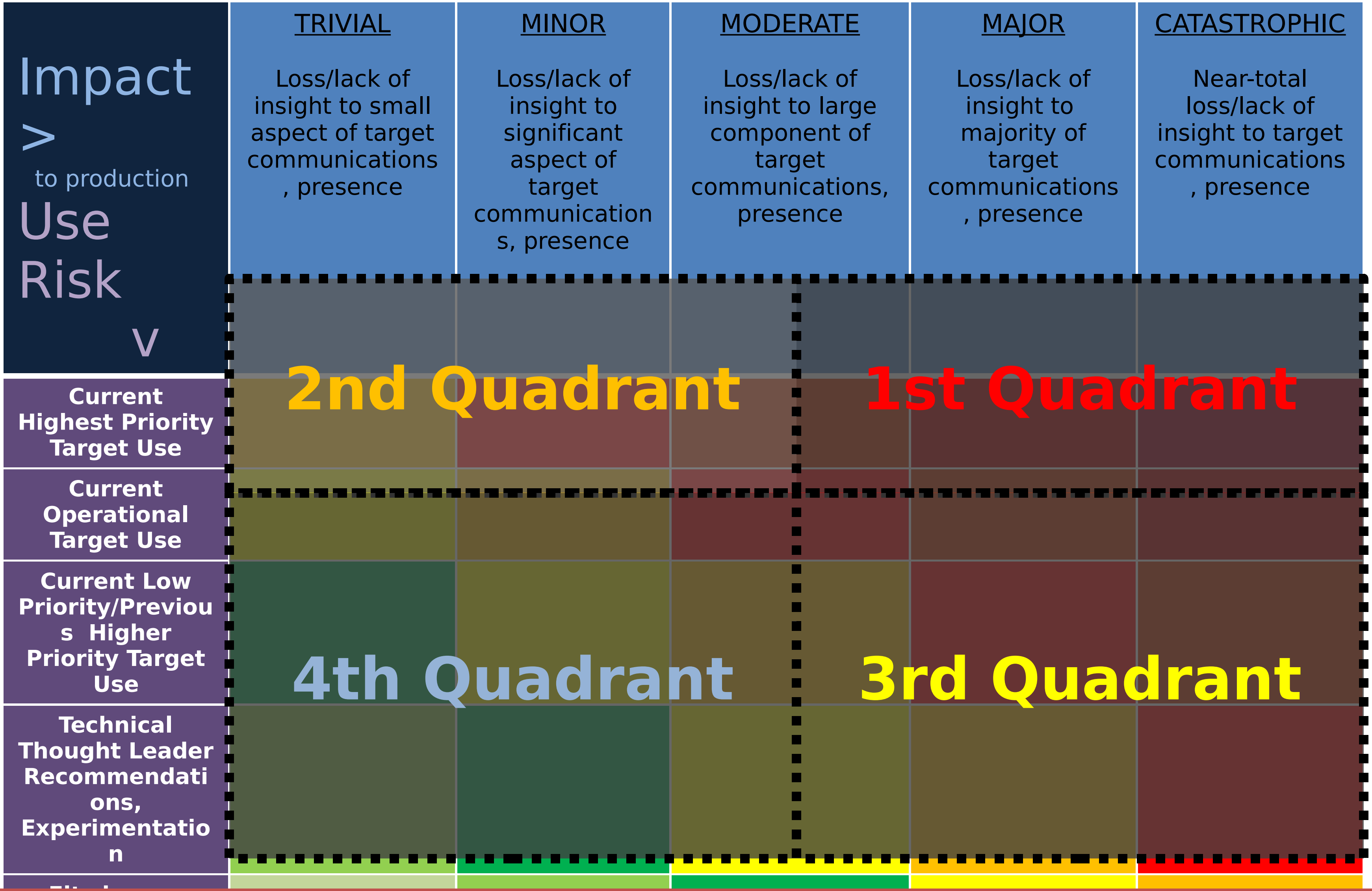
Capability Development Challenges (U)

(TS//SI//REL) With rare exceptions, application-specific solutions are only built based on these two criteria????

- In resource-restrained environment, development of capabilities against ***likely-to-increase in priority*** applications is trumped by standing requirements driven by ***known priority*** applications

- Capabilities development response to current/priority technology threats occurs normally w/in existing resources – but response does not scale, either to the industry or to multiple crises

Simplifying the Risk Matrix (U)



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Current Highest Priority Target Use					
Current Operational Target Use					
Current Low Priority/Previous Higher Priority Target Use					
Technical Thought Leader Recommendations, Experimentation					

Adding in the Solution

Impact > to stakeholders Use Risk v	TRIVIAL Automated solutions not required; manual workflows sufficient: XKS fingerprint	MINOR Minimum automated solutions required: realm creation, simple extraction, presentation	MODERATE Significant, routine capdev required: STARPROC capability, CES detectors, endpoint characterization, correlation analytics	MAJOR Requires focused inter-office capdev: Lead/Program manager needed, SPF required, inter-office/2p/3p working group	CATASTROPHIC Requires SID-level attention: FAMT, LAE; WPMO, AMOD portfolio integration
Current Highest Priority Target Use					
Current Operational Target Use					
Current Low Priority/Previous Higher Priority Target Use					
Technical Thought Leader Recommendations, Experimentation					

2nd Quadrant

1st Quadrant

4th Quadrant

3rd Quadrant

Examples: Jan-February 2012 (TS//SI//REL)

Impact > to production Use Risk v	TRIVIAL Loss/lack of insight to small aspect of target communications, presence	MINOR Loss/lack of insight to significant aspect of target communications, presence	MODERATE Loss/lack of insight to large component of target communications, presence	MAJOR Loss/lack of insight to majority of target communications, presence	CATASTROPHIC Near-total loss/lack of insight to target communications, presence
Current Highest Priority Target Use					
Current Operational Target Use					
Current Low Priority/Previous Higher Priority Target Use					
Technical Thought Leader Recommendations, Experimentation					

TeamViewer
Join.Me
LaplinkGold

Tor
TrueCrypt
TAILS

Muslima
Purematrimony.com
Zemana Anti-Keylogger

Web.de
Cspace
Redphone

Goal: Emerging Technology Snapshot (U)

- (U) Executive version – snapshot of top items only
- (S//REL) Overcoming the challenges of prioritization and volume is still only 50% of the problem
- (S//REL) Stated Preference:
  - Breakdowns by target/target set
  - Preserve opportunity vs. threat
  - Identify HUMINT sources for collaboration

Emerging Technology Snapshot (U)

Target/Org	Tech	Quadrant
AQSL courier	TAILS	1
GIMF	TAILS	
AQ media	TrueCrypt	
S2I42	Join.Me	2
LT, S2I42	TeamViewer	
LT	Laplink	
TTL	Extremist version of Tor	Opportunity
AQ media	Encrypted Webmail	Source

(TS//SI//REL) Full details available as needed

Emerging Technology Snapshot (U)

- (S//REL) Monthly Emerging Technology Snapshot
  - 1-3 page Snapshot (6 page max if previous month data included) to CT leadership
  - Snapshot + supporting full data to MICROEXPANSE
  - Underlying processes in alpha stage
  - Stopgap until maturation of multiple efforts
  - Data Explorer, ECHOBASE
  - Inclusion of FAA/PRISM in GM-Halo

End Results – Tactical & Strategic (U)

- (S//REL) Tactical Outcomes
  - **Lead Generation**
  - Target Development
  - Target Discovery
  - Behavior Detection
  - Access Prioritization

- (S//REL) Strategic Outcomes
  - Prioritization for **Capabilities Development**
  - Driven by target priority: single target + volume of targets
  - Prioritized within tech category, target (set) category
  - Overall CT product line prioritization

Challenges (U)

- (C//REL) Complexity
  - **Understand target, technology, & SIGINT system**
- (S//SI//REL) Getting data is only step 1
  - **Getting a data set is like to getting a new bearer to analyze**
- (U) Visualization
  - **Excel tops out at a million rows…**
- (TS//SI//REL) Clean data
  - **Targets vs. Selectors**

Overcoming Complexity (U)

SIGINT System

SIGINT System

Fingerspitzengefühl

- *Literally “fingertip feeling”*
- *Empathy, sensitivity, tact*
- *Ability of military commanders to react rapidly*

CT Trends Team:

Technology

Technology

SIGDEV analysts

Partner/Enablers

Must understand tech threat implications, provenance and structure of data to manipulate, interpret it

Getting Data is Step 1 (U)

Getting Data is Step 1 (U)

Every Step Takes Time, Effort, Tools and Most Importantly: People to Do the Work

Getting Data is Step 1 (U)

Be customer driven. The ability to get data is endless. The ability to do work isn't.

Visualization (U)

(TS//SI//REL) Excel tops out at a million rows…

- 19 branches, 30+ target sets, ~200 realms, ~800 domains, ~45000 selectors = *1 million rows/~2.5 weeks* for summarized active user events from EO12333 alone
- Spreadsheets are good, but not everyone knows how to use a pivot table
- Each dataset can easily provide 4-5 or more pivoted looks for each branch/target set = *minimum 100-150 slides*

(S//REL) Intent is to routinely produce multiple large datasets on a monthly basis for collection management, research purposes

Visualization (U)

(S//REL) Analysts work at the selector level

- Leadership wants data presented at the target level

(S//REL) Automated population of technology, behavior information in analyst workflow tools, databases

(S//REL) Each separate visualization task takes manpower, time away from operational analysis

Clean Data (U)

- (S//SI//REL) Metrics will only provide a near-accurate picture: ground truth will always be the domain of the TOPI and based on content

- (S//SI//REL) Some selectors (accurately) map to multiple targets, multiple teams, multiple organizations

- (S//SI//REL) Some selectors simply don’t have a known target, only a target set

- (S//REL) Need to correlate across widely different datasets requires creation of normalized bridge datasets (e.g. comparing executables to domains)

- (S//SI//REL) TKB/UTT are victims of years of “fill in the blank” freeform data entry; very slowly being addressed (~2015?)

Rising Strategic Issues (U)

- (TS//SI//REL) Encrypted Webmail Services
  - Atabmail, Zoho, Safe-mail, Fastmail, HMA Mail
- (TS//SI//REL) Remote Desktop Viewers/Remote Access Tools
  - TeamViewer, Join.me, Cybergate
- (TS//SI//REL) Aggregators/Over-the-Top Messaging Services
  - WhatsApp, Nimbuzz, eBuddy

What Next? (U)

- (S//SI//REL) Continue to build, strengthen, expand:
  - internal workflows, research and discovery capabilities

  - collaboration with production elements
  - Operational support via embedded analysts at NSAW
  - Tradecraft, technical support virtually with extended enterprise

  - partnerships with FVEY SIGDEV community
  - Establish and expand dialogue opportunities
  - “Failure Sharing” – tradecraft sharing and operational deconfliction

- (S//REL) Technology Trends MyNoc

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Question
s?

Comment
s?