(S//REL TO USA, FVEY) IR.21 – A Technology Warning Mechanism

SDC2010

[redacted]

SSG4/T3C Technical Director

Derived From: NSA/CSSM 1-52
Dated: 20070108
Declassify On: 20341201

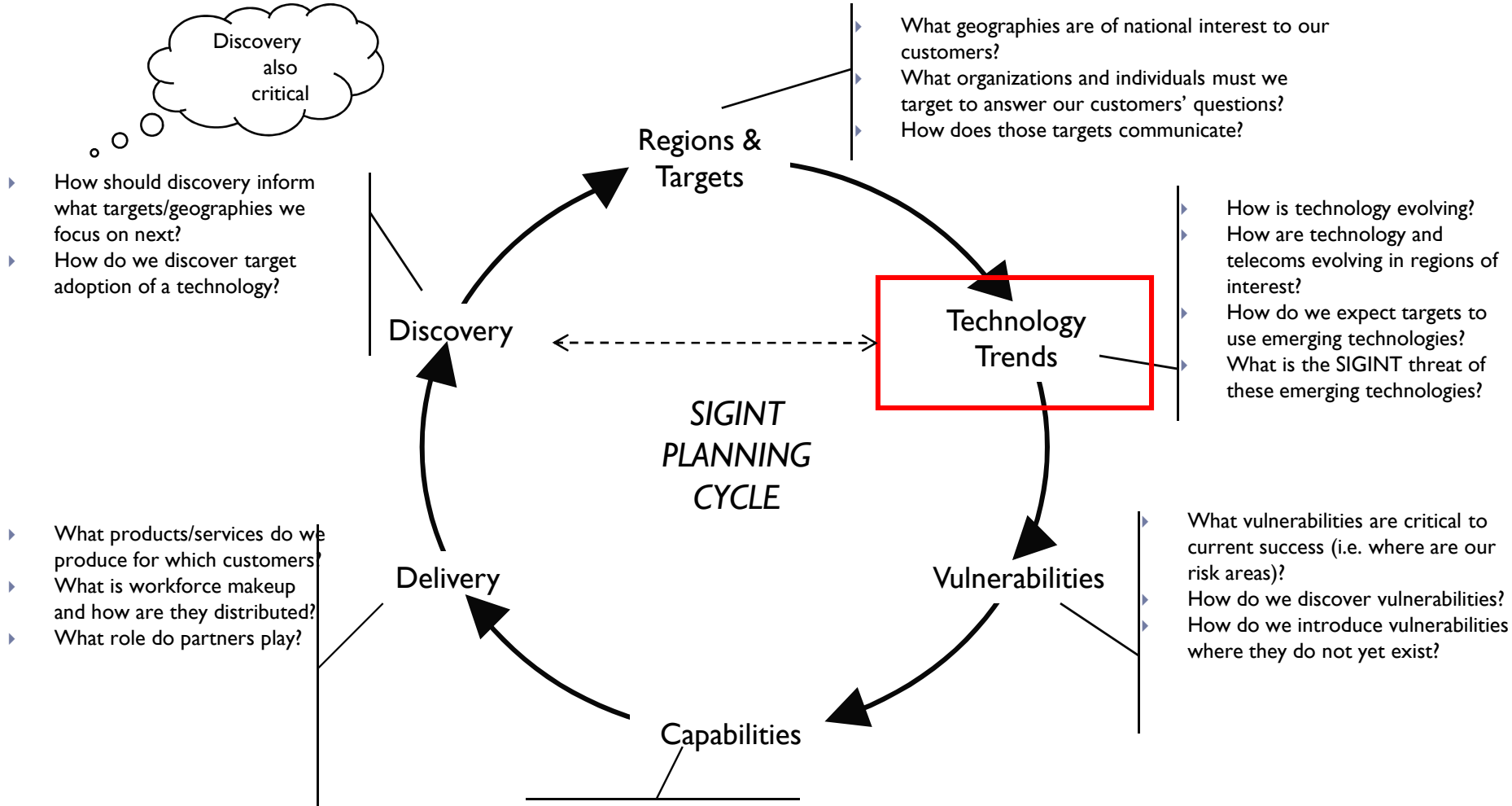
Classification

- This briefing is classified:
- TOP SECRET//COMINT//REL TO USA, FVEY//

(U//FOUO) Today's Agenda

- (U) Emerging Operating Model for Trends and Forecasting
- (U) Wireless Evolution Paths
- (S//REL TO USA, FVEY) Analytic Framework
- …and Process
- (S//REL TO USA, FVEY) Meet AURORAGOLD
- (U) An Invitation to Join – Your Use Cases…
  - Includes Home Work Assignments …

(U//FOUO) Effective Forecasting: Geopolitical Regions and Targets



- What geographies are of national interest to our customers?
- What organizations and individuals must we target to answer our customers' questions?
- How does those targets communicate?

- How is technology evolving?
- How are technology and telecoms evolving in regions of interest?
- How do we expect targets to use emerging technologies?
- What is the SIGINT threat of these emerging technologies?

- What vulnerabilities are critical to current success (i.e. where are our risk areas)?
- How do we discover vulnerabilities?
- How do we introduce vulnerabilities where they do not yet exist?

- What capabilities do we need to develop to take advantage of technology vulnerabilities?
- What techniques to do we deploy to take advantage of those vulnerabilities (e.g. CNE, supply chain, mid-point, etc.)
- What role does enabling, cooperative access, HUMINT, 2nd parties, etc. play in building those capabilities?

- What products/services do we produce for which customers?
- What is workforce makeup and how are they distributed?
- What role do partners play?

- How should discovery inform what targets/geographies we focus on next?
- How do we discover target adoption of a technology?

(U) Two Types of Investigations

- (S//REL TO USA, FVEY) **Horizon Scanning**
  - Objective: Initial identification and assessment
  - All source research
  - Answer the question: Does this technology appear to be a large risk to the SIGINT system? Why or why not?

- (S//REL TO USA, FVEY) **Deep Dive**
  - Objective: Cause a funding decision(s)
  - All source research; emphasis on geographic uptake trends; target uptake plans or vignettes.
  - Answer the question: Are SIGINT targets taking up this technology? How *fast*?
  - Implicitly contrast the above with the *cost and time* needed to remediate any SIGINT system shortfalls.

(U) Trends and Forecasts: A Geo-temporal Tracking Problem

- (U) Forecast:
  - "An estimation of a Future Condition" …
  - "To calculate or predict some future event or condition usually as a result of the analysis of available pertinent data" *– Merriam Webster*

- (U) Trend:
  - "To extend in a general direction; follow a general course"

– Merriam Webster

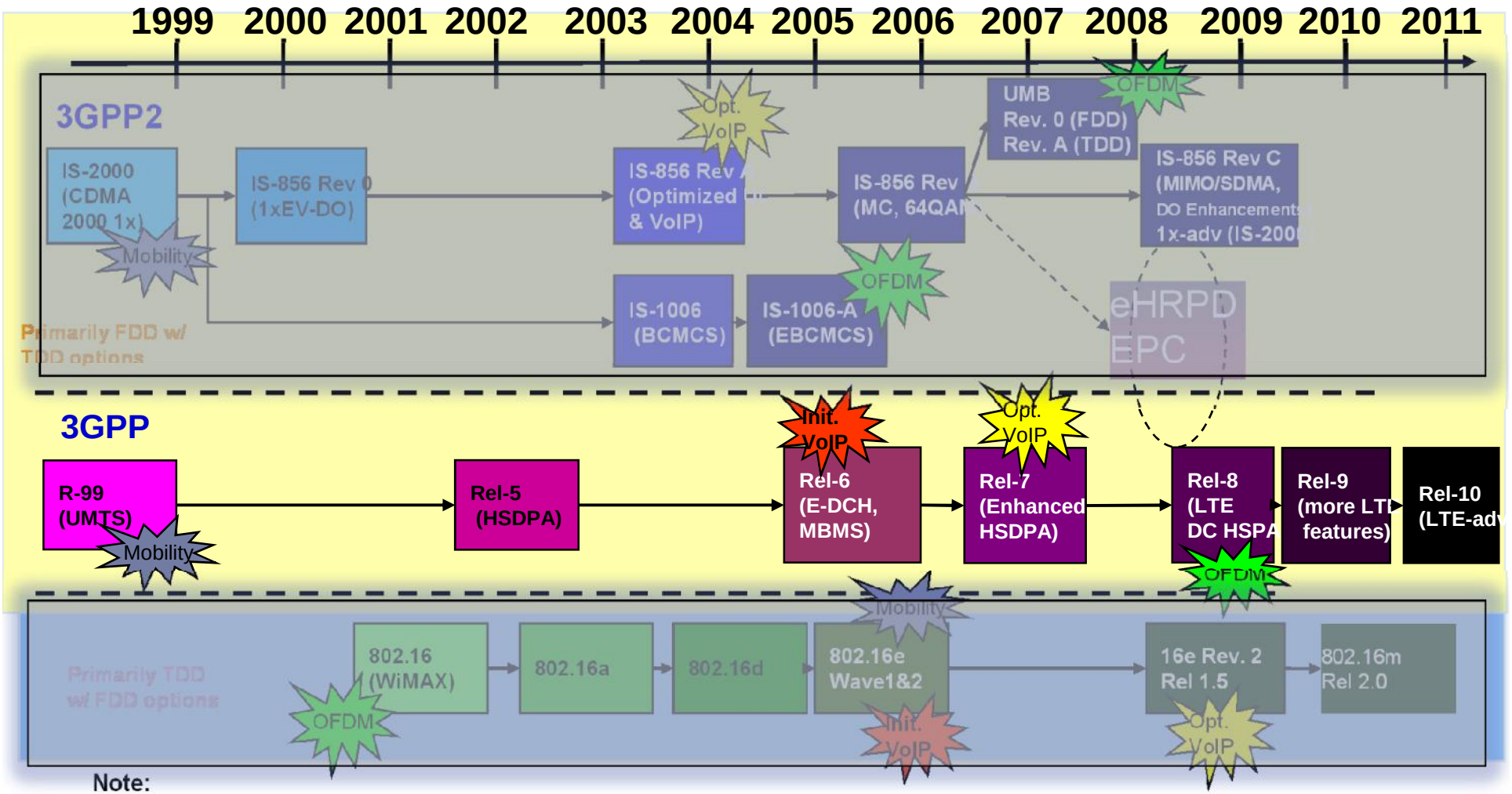
- (U) By necessity, a trend-line requires measurement of understood variables across time.

(U) Roaming Agreements

- (U) Allow a mobile subscriber to use resources on a visited network
  - Each carrier's IR.21 is a technical document that:
    - Describes the operator itself in various ways
      - Location, business codes, etc.
    - Describes access to the IP network of the operator
      - DNS, IP addresses, ASN, etc.
    - Describes:
      - Radio Access Network: technology(ies) type(s)
      - Frequency(ies)
      - Telephony routing information (MSISDN ranges; E.212)
      - SCCP gateways (Point codes)
      - Mobile Application Part protocol in use
      - Hardware, software versions of certain network elements…

- (S//REL TO USA, FVEY) Hypothesis: We can identify and track a carrier's technical evolution with IR.21 and other data.

(U) 3G Wireless Standards Evolution – Overview

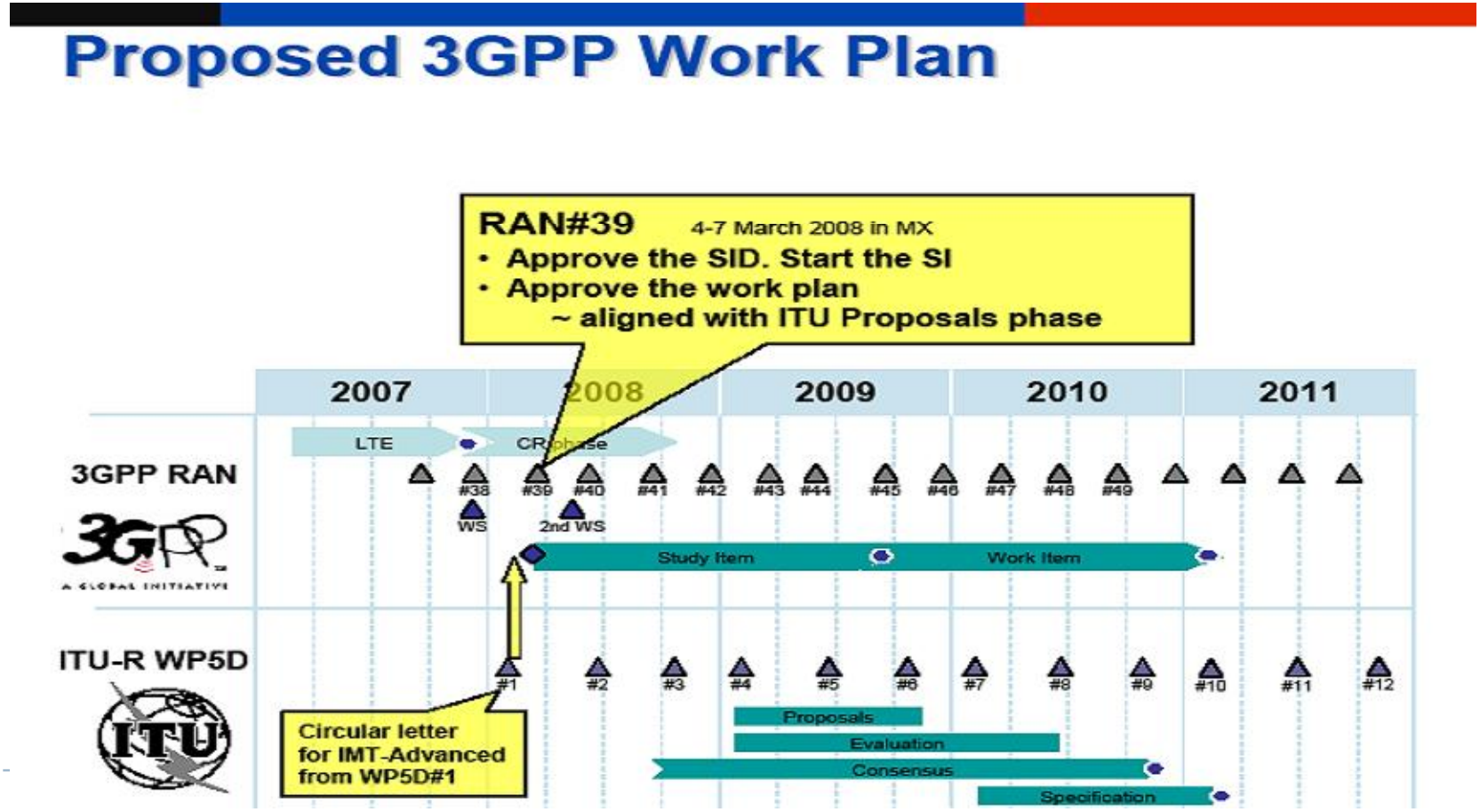


Note:

- **Dates shown are standards completion dates** (or expected completion dates.)
- "Initial VoIP" not as spectrally efficient as "Optimized VoIP".
- "Mobility" indicates when each particular standard supports mobility inter-operability between the terminal and BTS.

(U) And What About 4G?

- (U) **IMT-adv is an ITU led effort to set requirements for next gen. mobile networks**
  - Just as ITU's IMT-2000 defined 3G, ITU's IMT-adv will define 4G



(U) Framework for Analysis…

- (U) 3GPP: Defines technology migration paths.
  - "Releases" – A Clear Technology Roadmap
    - 3G begins with Release 99
    - Other releases: 04, 05, 06, 07, 08, 09, ….*10, 11 (future)*
      - See: www.3gpp.org/ftp/Information/WORK_PLAN/Description_Releases/
    - Releases cover:
      - Access: GSM, EDGE, HSPA, LTE, LTE-Advanced, etc.
      - Core: GSM Core, Enhanced Packet Core…
      - Services: MS, etc.

- (U) GSMA: Defines carrier information exchange required to enable roaming
  - Changes to IR.21 format warn of imminent technology roll-out
  - An IR.21 is a GSMA-mandated document. IR.21 are exchanged between Wireless operators with roaming agreements, to the GSMA, and to certain clearing house operations.

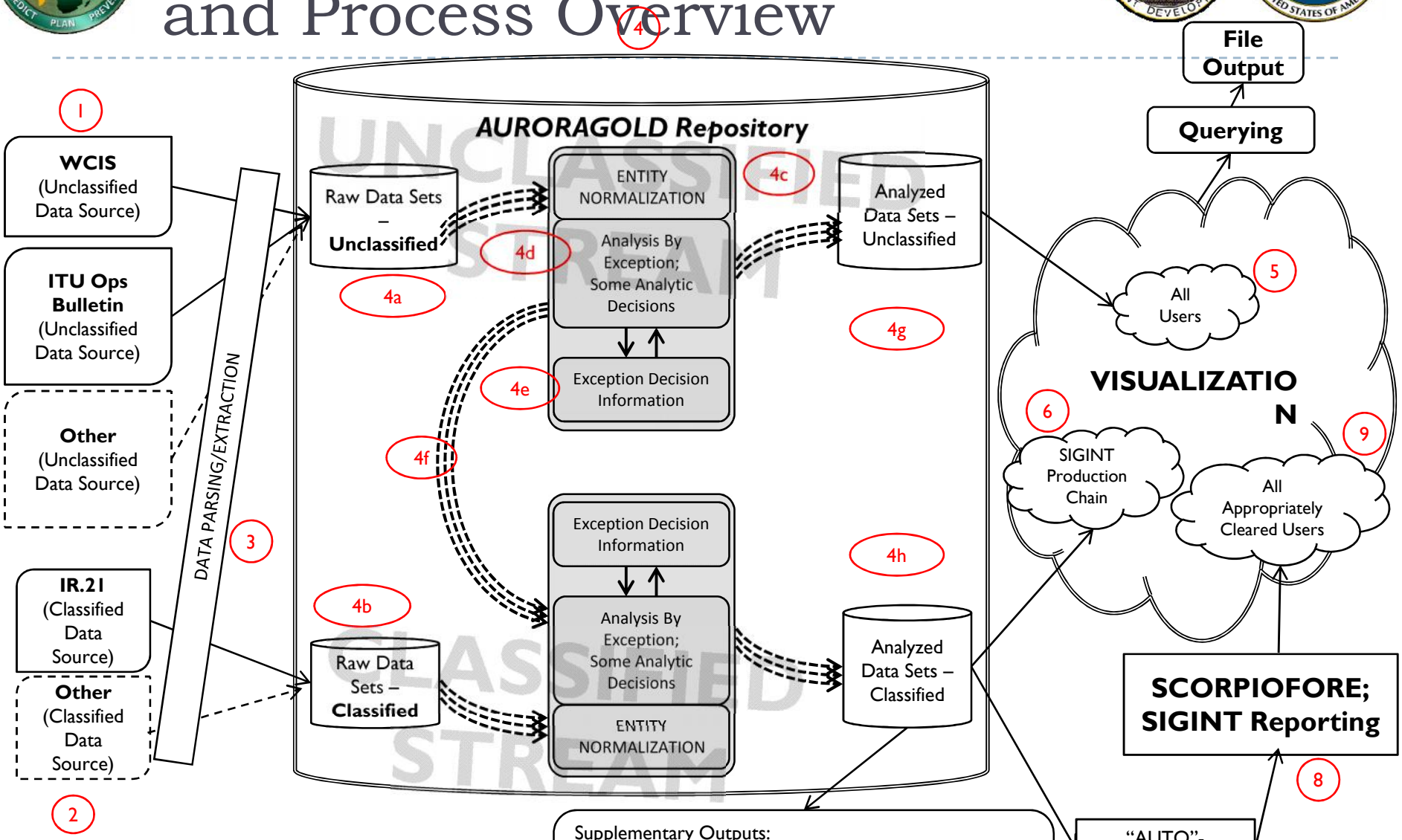
(U) Analytic Process

- (S//REL TO USA, FVEY) Data analysis process is to match information in IR.21, or elsewhere, against Releases in the Technology Roadmap
  - Example: CAMEL Phase 4 (aka CAMEL4) as proxy for Release 5 deployment

- (S//REL TO USA, FVEY) Analytic goals:
  - Establish a date-time for a release deployment
  - Track releases at the per network level
  - Display status at the national, regional, hemispheric or global scale
  - Measure speed of adoption at each scale
  - Identify early and late adopter tendencies by network

- (S//REL TO USA, FVEY) Deliverables:
  - Adoption trends over time
  - Forecasts derived from trends and framework changes
  - Formal reporting of data and conclusions – as a dataset

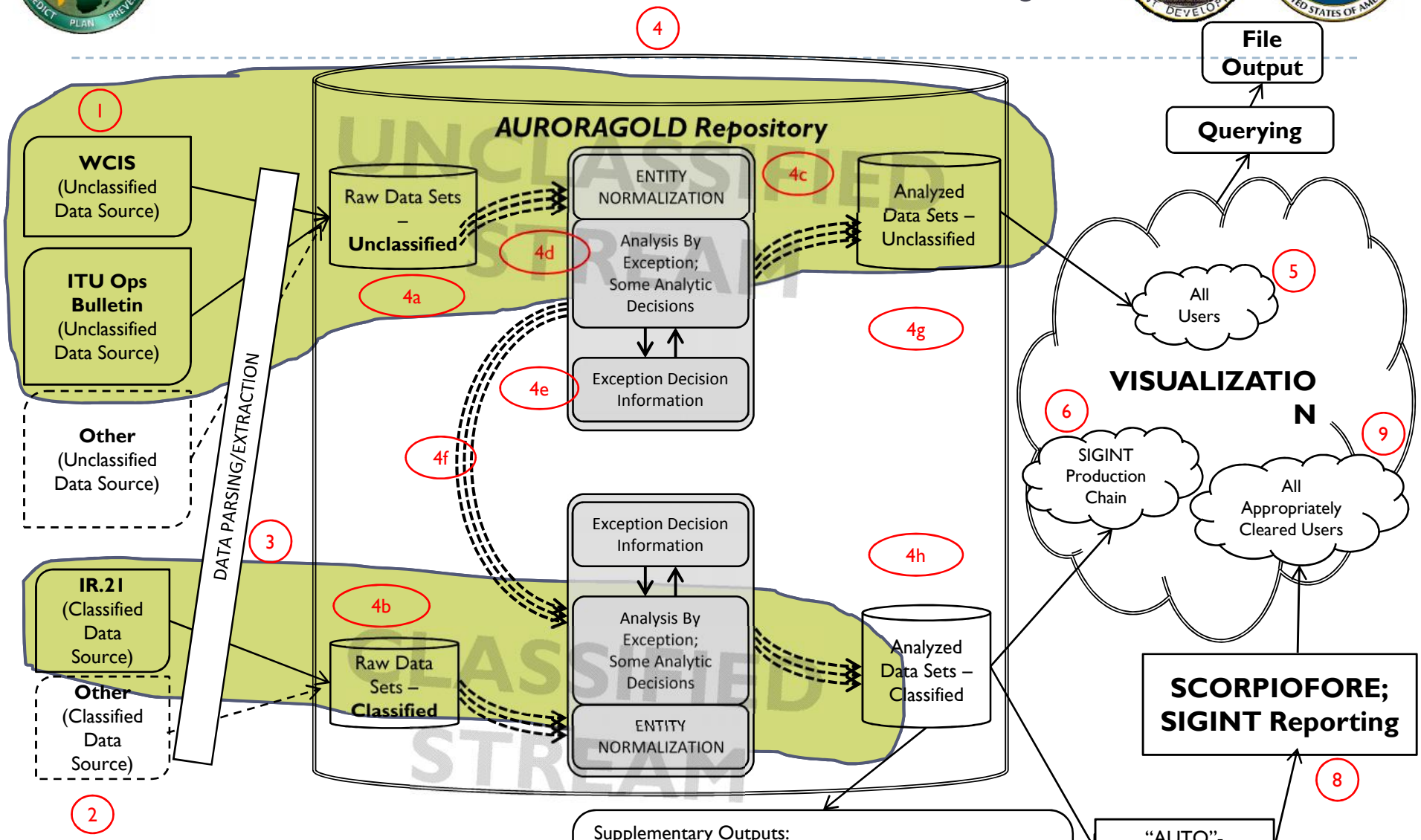
(TS//SI//REL TO USA, FVEY) Data Flow and Process Overview



Numbers in red are for reference only

21 May 2010

(TS//SI//REL TO USA, FVEY) What Is Done Today



Numbers in red are for reference only

21 May 2010

(S//REL TO USA, FVEY) Information Delivery Vehicles – At NSA

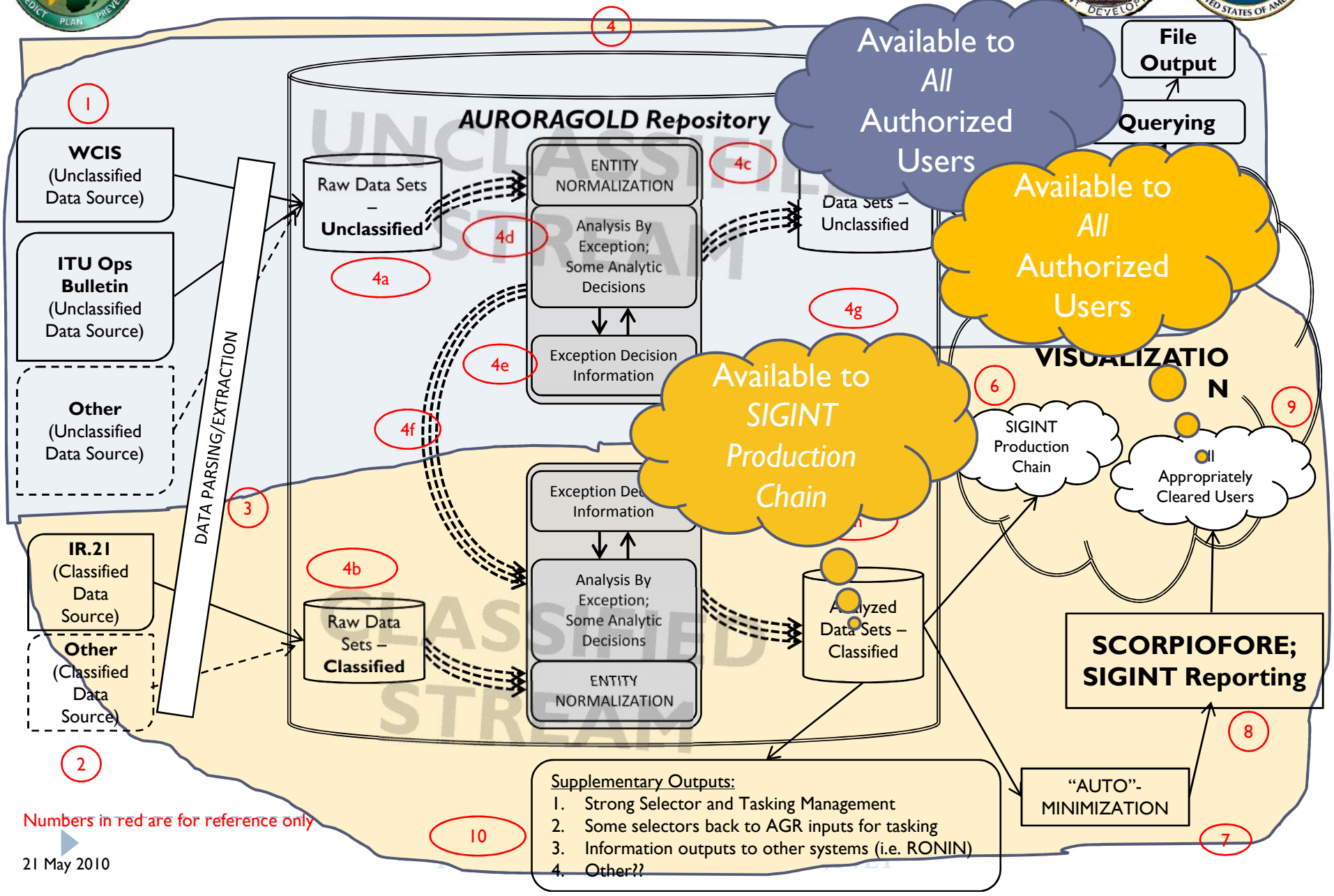
- (S//SI//REL TO USA, FVEY) Mobile IP Information:

- (S//SI//REL TO USA, FVEY) Telephony and Provider information:

- (S//REL TO USA, FVEY) Worldwide Wireless Market information: T3C
  → packaged for WPMO consumption
  - Drives its portfolio investment planning process
  - Affects ~80% of the portfolio (2009), per customer.

- (U) Various and sundry others …

(TS//SI//REL TO USA, FVEY) Future Implementation



Numbers in red are for reference only

21 May 2010

(U) Information – Now What?

- (S//REL TO USA, FVEY) Make the data useable
  - Available in or out of the SIGINT production chain
  - Attach flows to value-adding chains and processes
  - Deliver as a data-set
  - Recognize other data sets exist and also are part of analytic processes (federation anybody?)
- (S//REL TO USA, FVEY) Make the data traceable
  - Includes auto-sourcing of data origin
  - Time-stamping
- (S//REL TO USA, FVEY) T3C will do technology trending and warning…
- (U) Would your analytic processes benefit from this data set?

(U) Your Invitation to Join

- (U) We are few; we welcome partnership.
  - Can you help?
  - Do you have a better way?
  - Let's pull together!!

- (TS//SI//REL TO USA, FVEY) We are preparing to measure the breadth of our access to IR.21 documents…
  - Goals:
    - Do we cover all 3GPP networks?
    - Tweak access
    - Tweak selectors
  - Indexer will provide PWID for all identified IR.21, after dedupe.

(U) What Are Your Use Cases?

- (S//REL TO USA, FVEY) This is your segment—to make the notetaker's job simpler please categorize your use case; describe impact:
  - A) IP Network
  - B) Call Control – Switched Voice
  - C) Hardware model and software version information
    - Group Discussion….

- (U) Thank you for your time and contributions
  - [redacted]
    - [redacted]