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

SDC2010

[REDACTED]  
SSG4/T3C Technical Director

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

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# Classification

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



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(U//FOUO) **Today's Agenda**

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- ▶ (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...

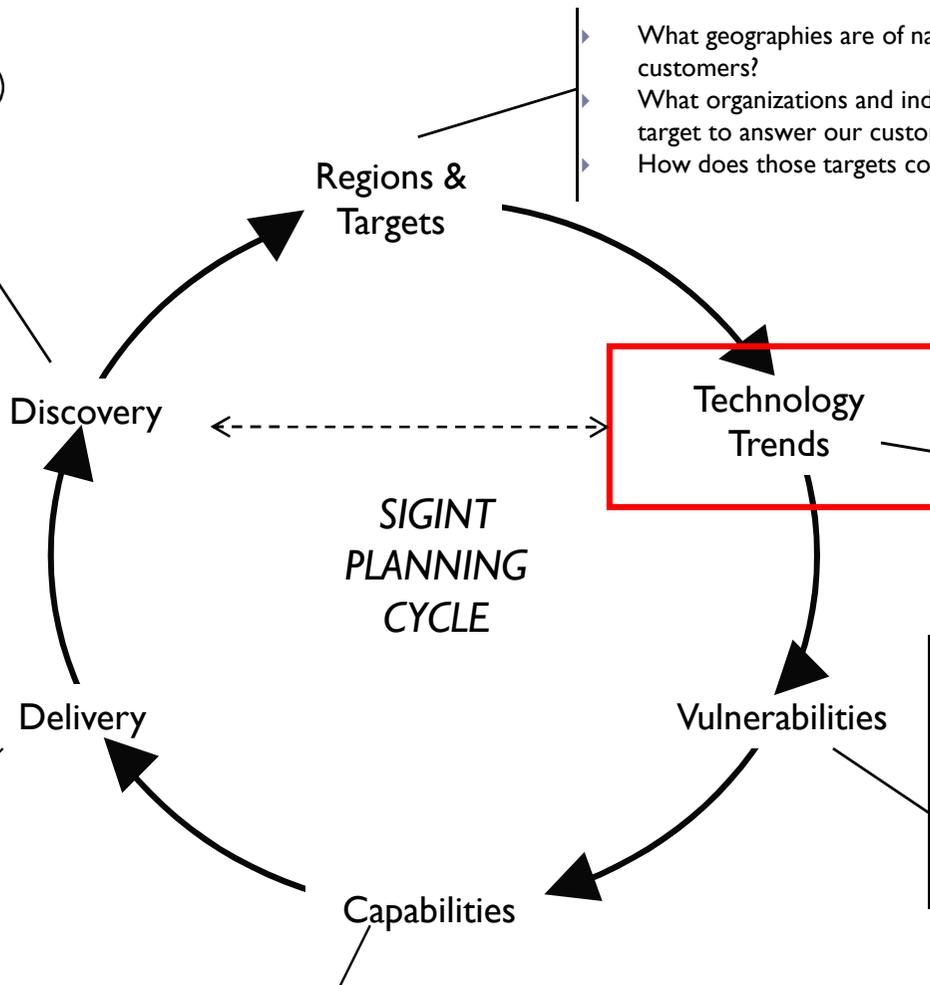




# (U//FOUO) Effective Forecasting: Geopolitical Regions and Targets

Discovery also critical

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



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

- ▶ 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 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?



## (U) Two Types of Investigations

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

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- ▶ (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.**



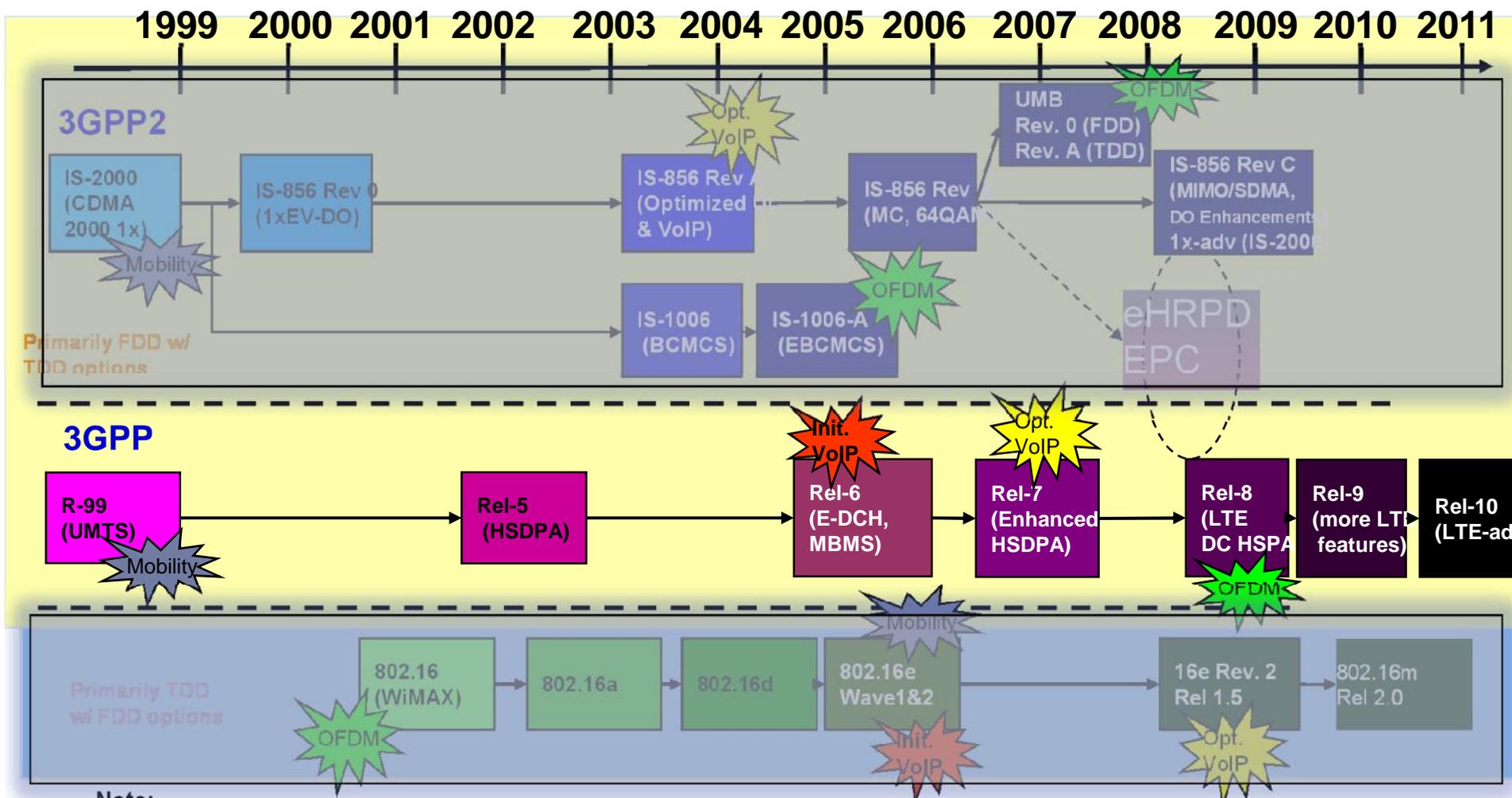
## (U) Roaming Agreements

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- ▶ (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:**

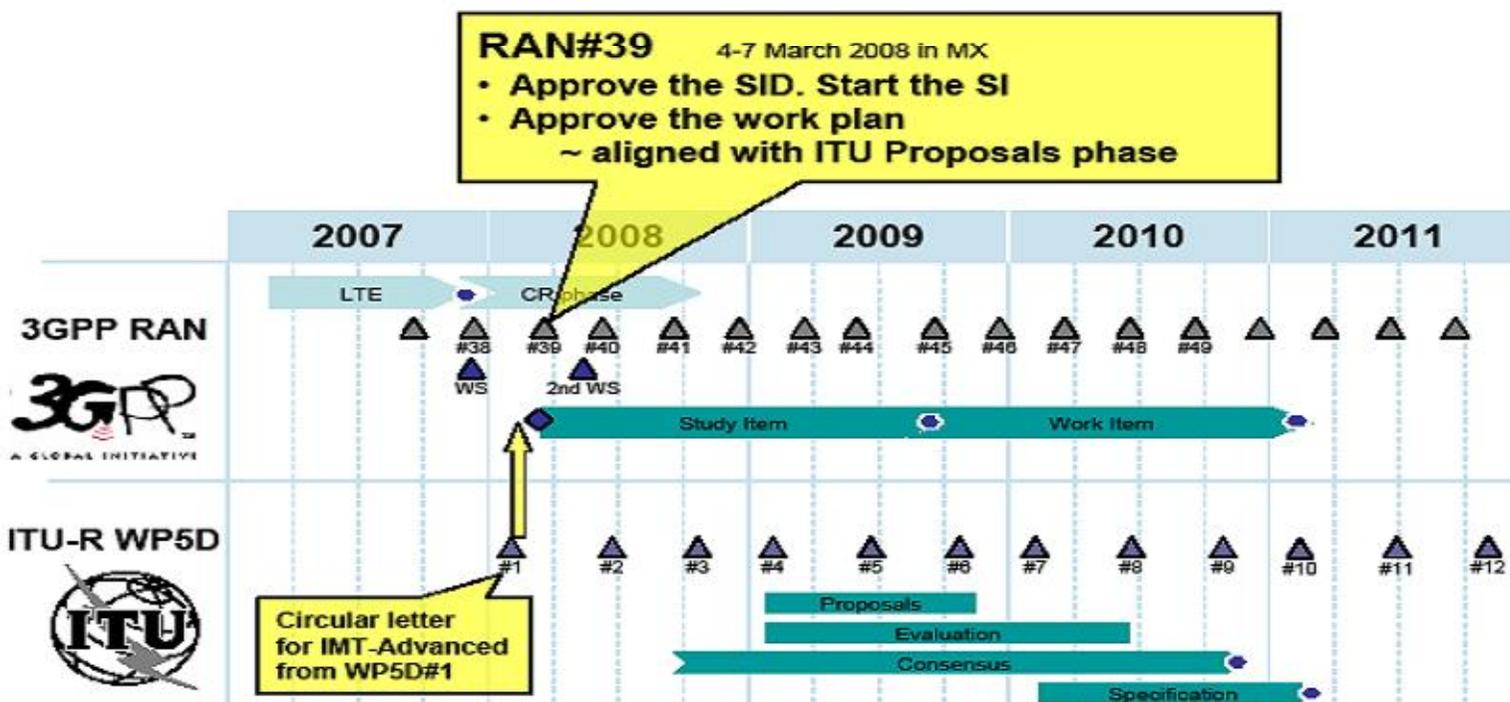
- **Dates shown are standards completion dates** (or expected completion dates.)
- “Initial VoIP” not as spectrally efficient as “Optimized VoIP”.
- “Mobility” indicates when each particular standard supports mobility inter-operability between the terminal and BTS.



# (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

## Proposed 3GPP Work Plan





## (U) Framework for Analysis...

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### ▶ (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/](http://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.

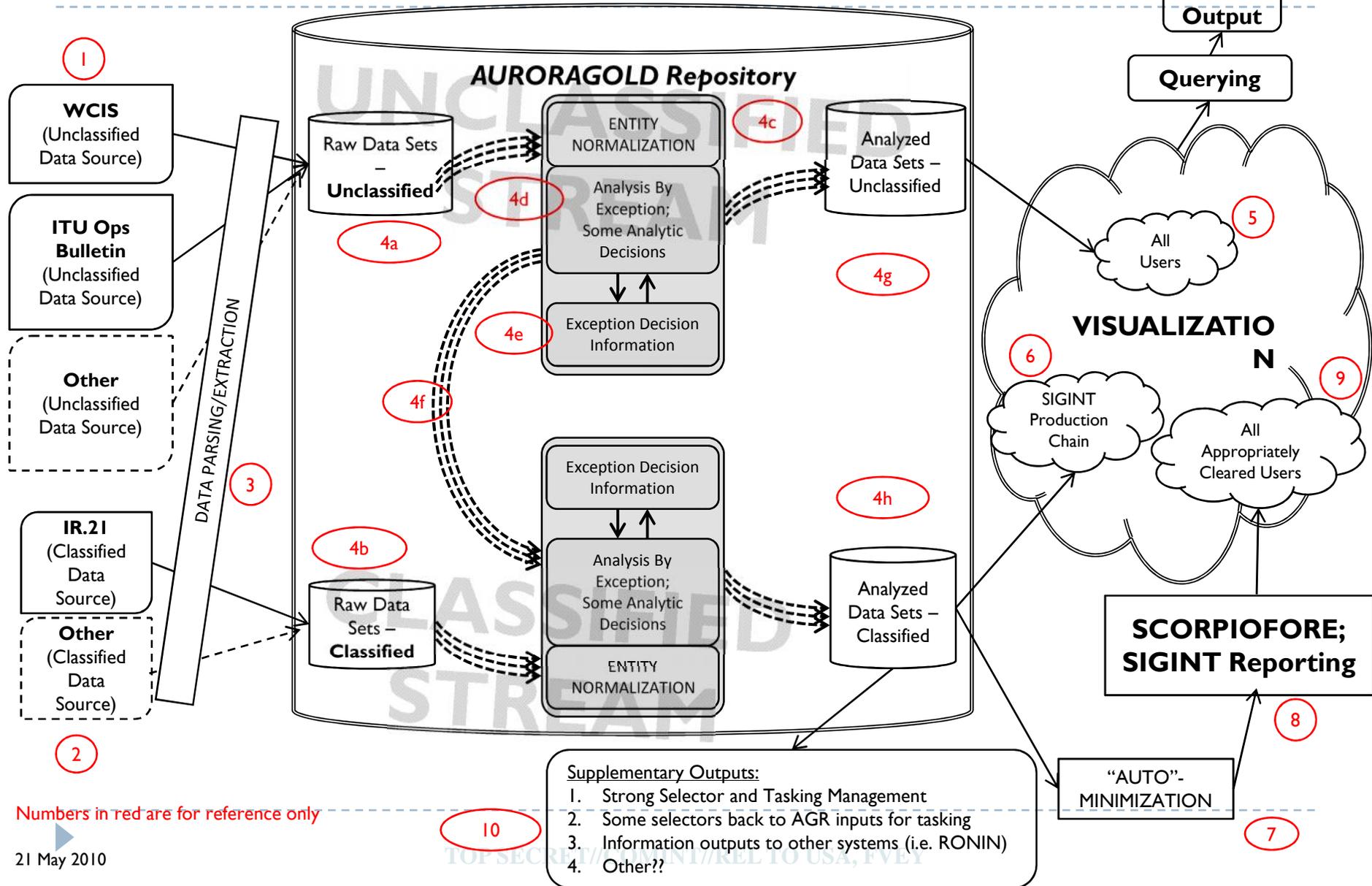


## (U) Analytic Process

- ▶ (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
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- ▶ ▶ Formal reporting of data and conclusions – as a dataset



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



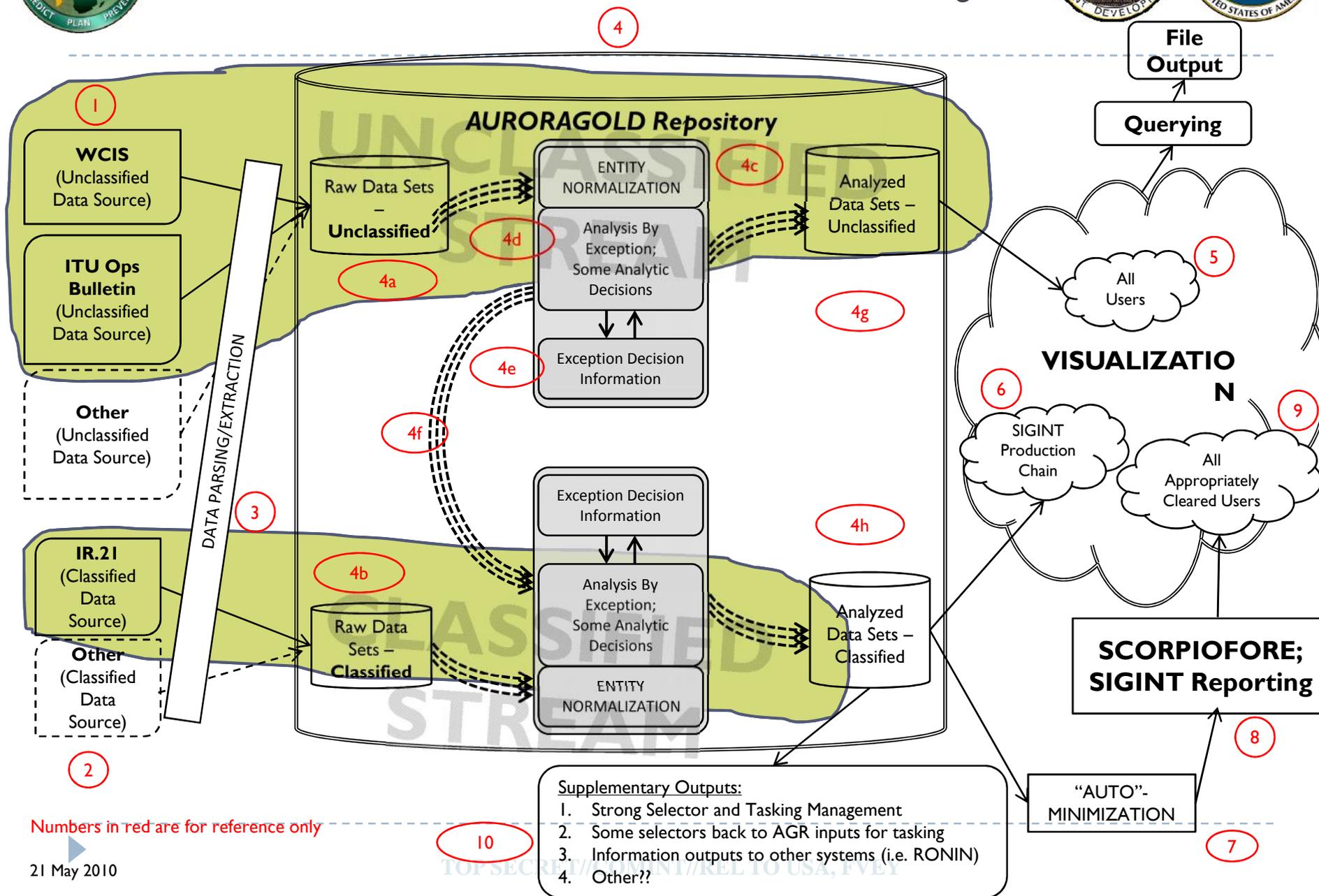
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# What Is Done Today



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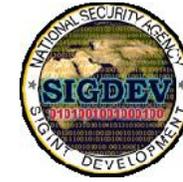
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(S//REL TO USA, FVEY) **Information  
Delivery Vehicles – At NSA**



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



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

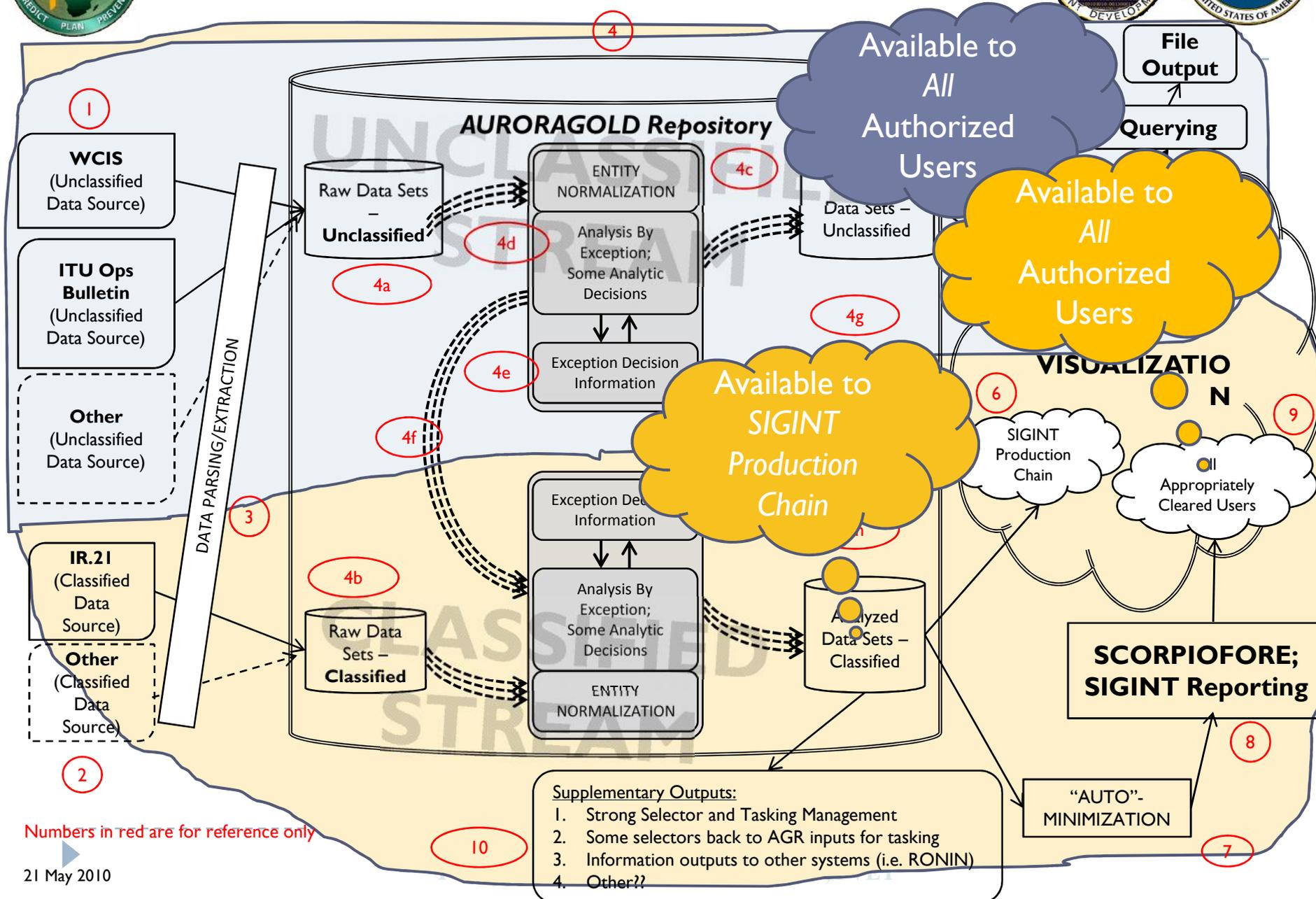
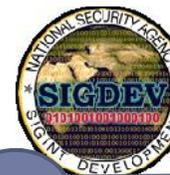


- ▶ (S//REL TO USA, FVEY) **Worldwide Wireless Market information:T3C**
  - packaged for WPMO consumption
    - Drives its portfolio investment planning process
    - Affects ~80% of the portfolio (2009), per customer.
- ▶ (U) **Various and sundry others ...**

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# Future Implementation



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## (U) Information – Now What?

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- ▶ (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

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- ▶ (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?

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- ▶ (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....



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▶ (U) Thank you for your time and contributions

- ▶ [REDACTED]
- ▶ [REDACTED]

