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

SDC2010

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:
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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...

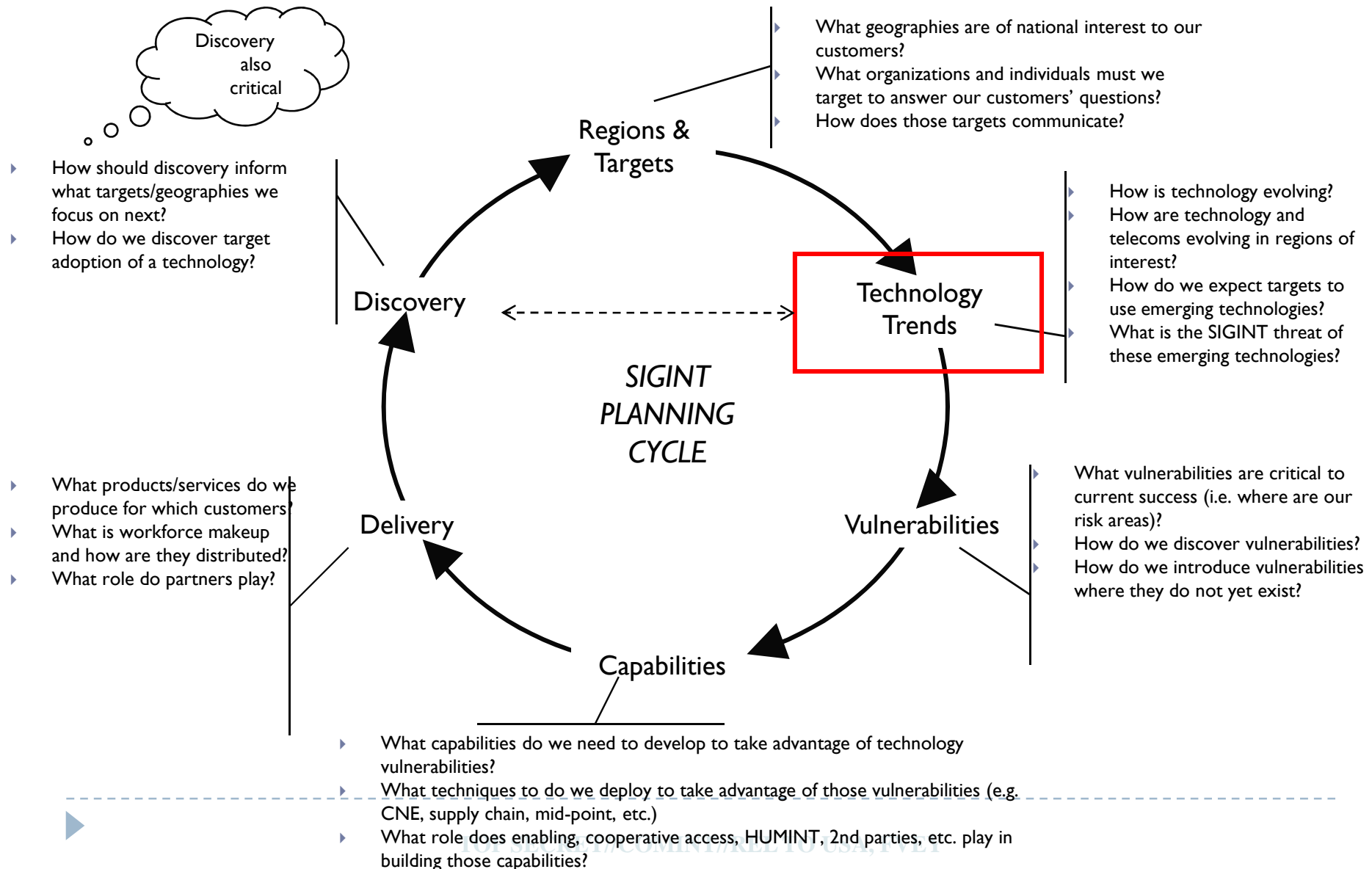




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# (U//FOUO) Effective Forecasting: Geopolitical Regions and Targets





## (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.**



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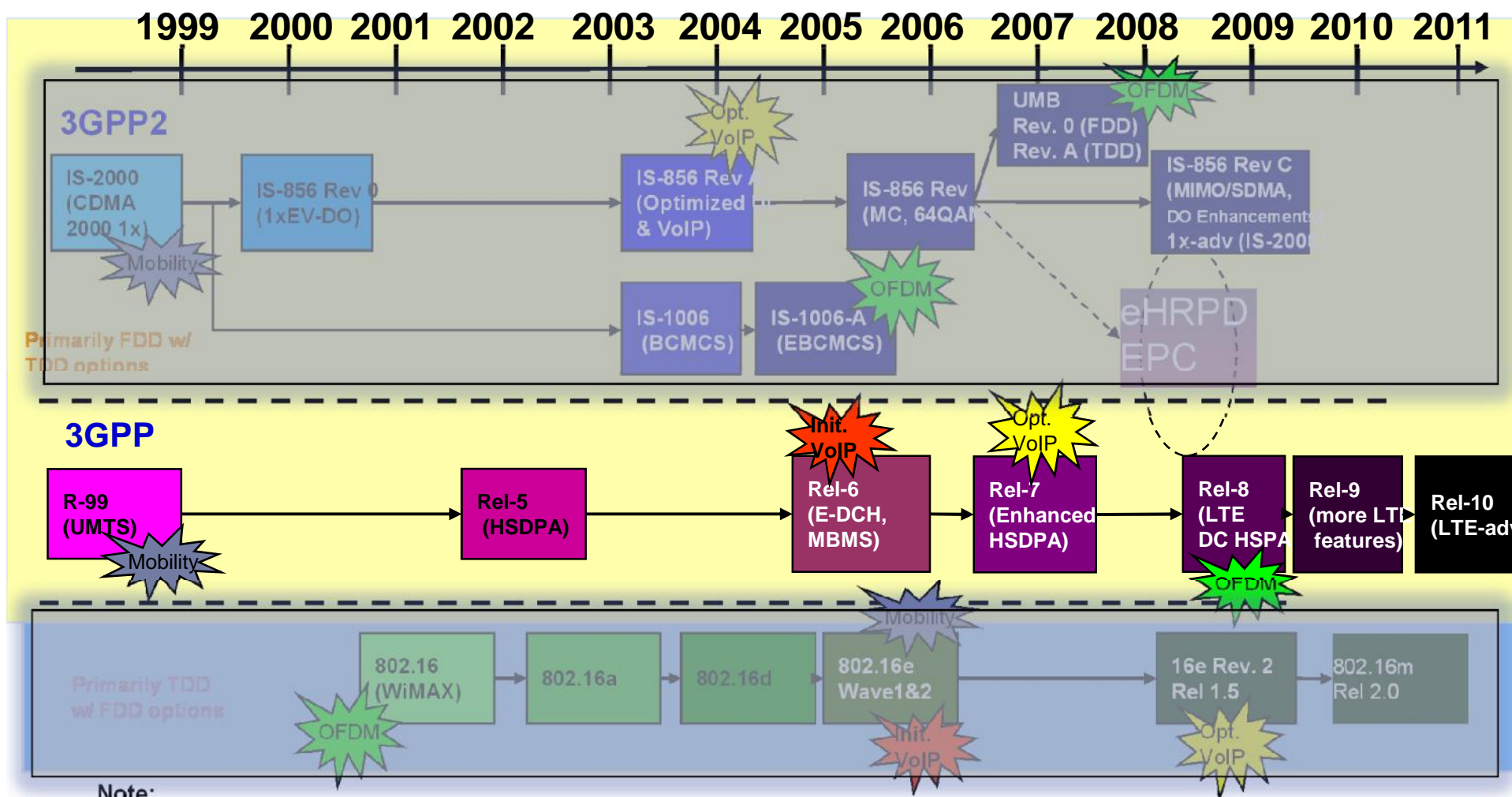
## (U) Roaming Agreements

- ▶ (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.

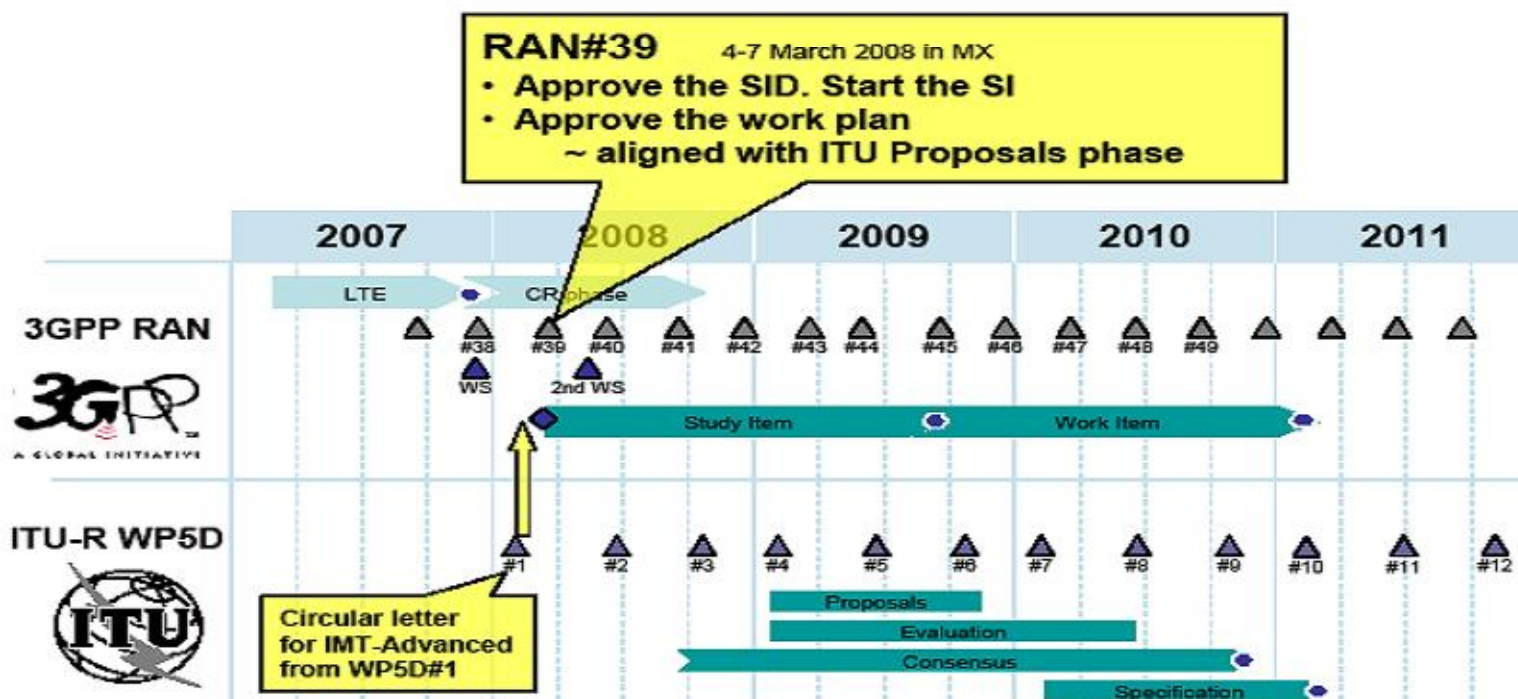




## (U) And What About 4G?

- ▶ (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

### Proposed 3GPP Work Plan





## (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/](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.2I, 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:**

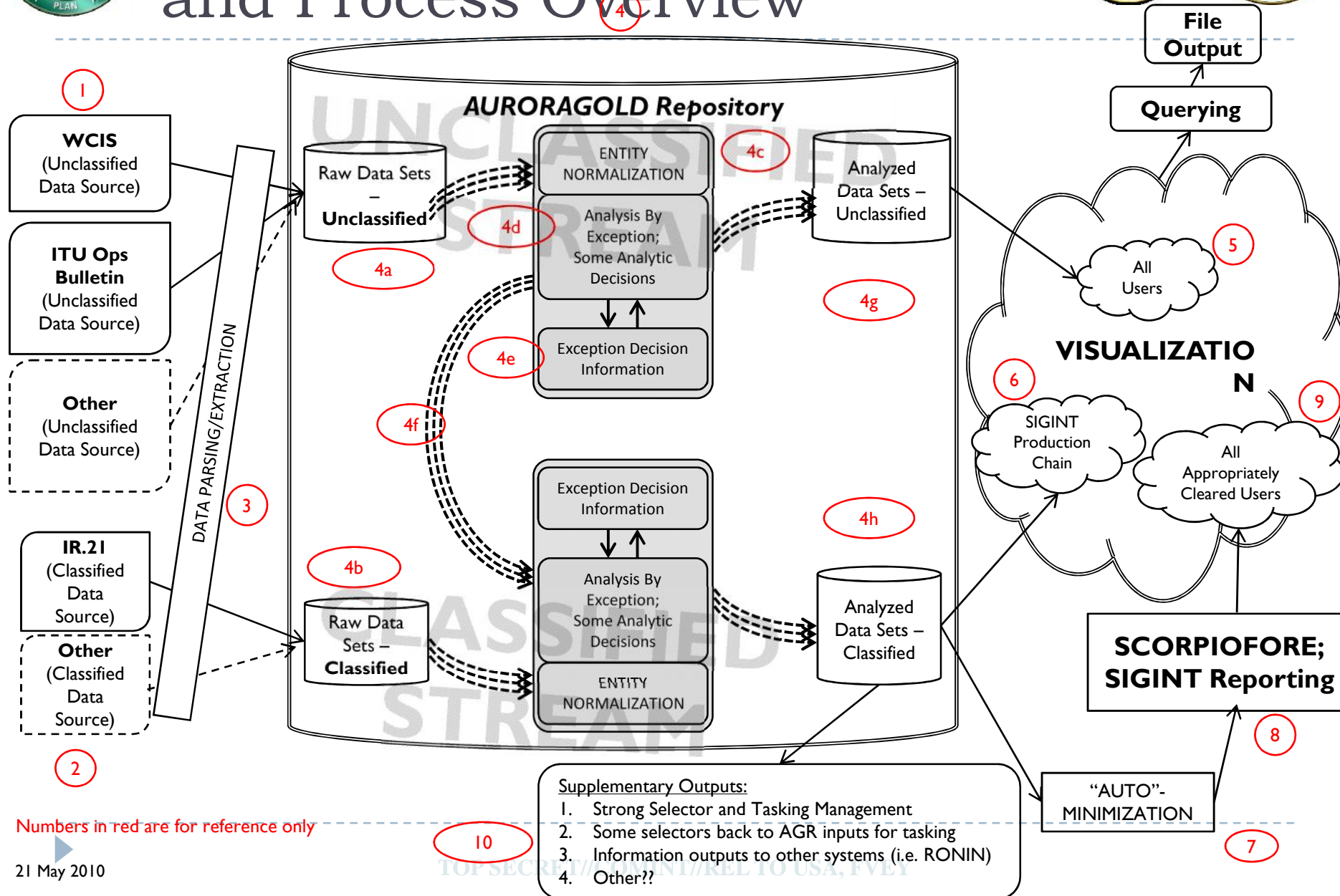
- ▶ Adoption trends over time
  - ▶ Forecasts derived from trends and framework changes

- ▶ ▶ Formal reporting of data and conclusions — as a dataset



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



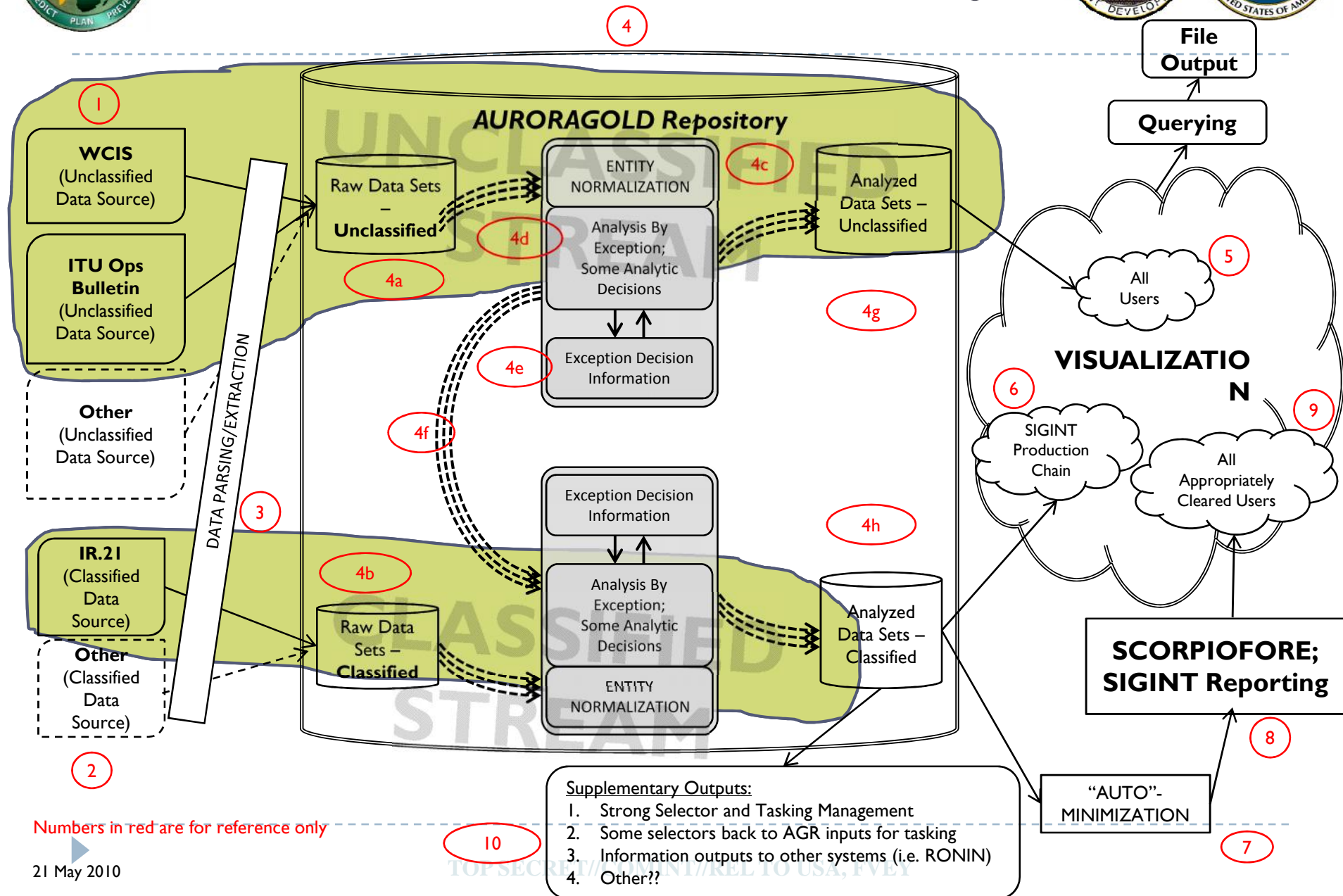




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# What Is Done Today



Numbers in red are for reference only

21 May 2010



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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 ...



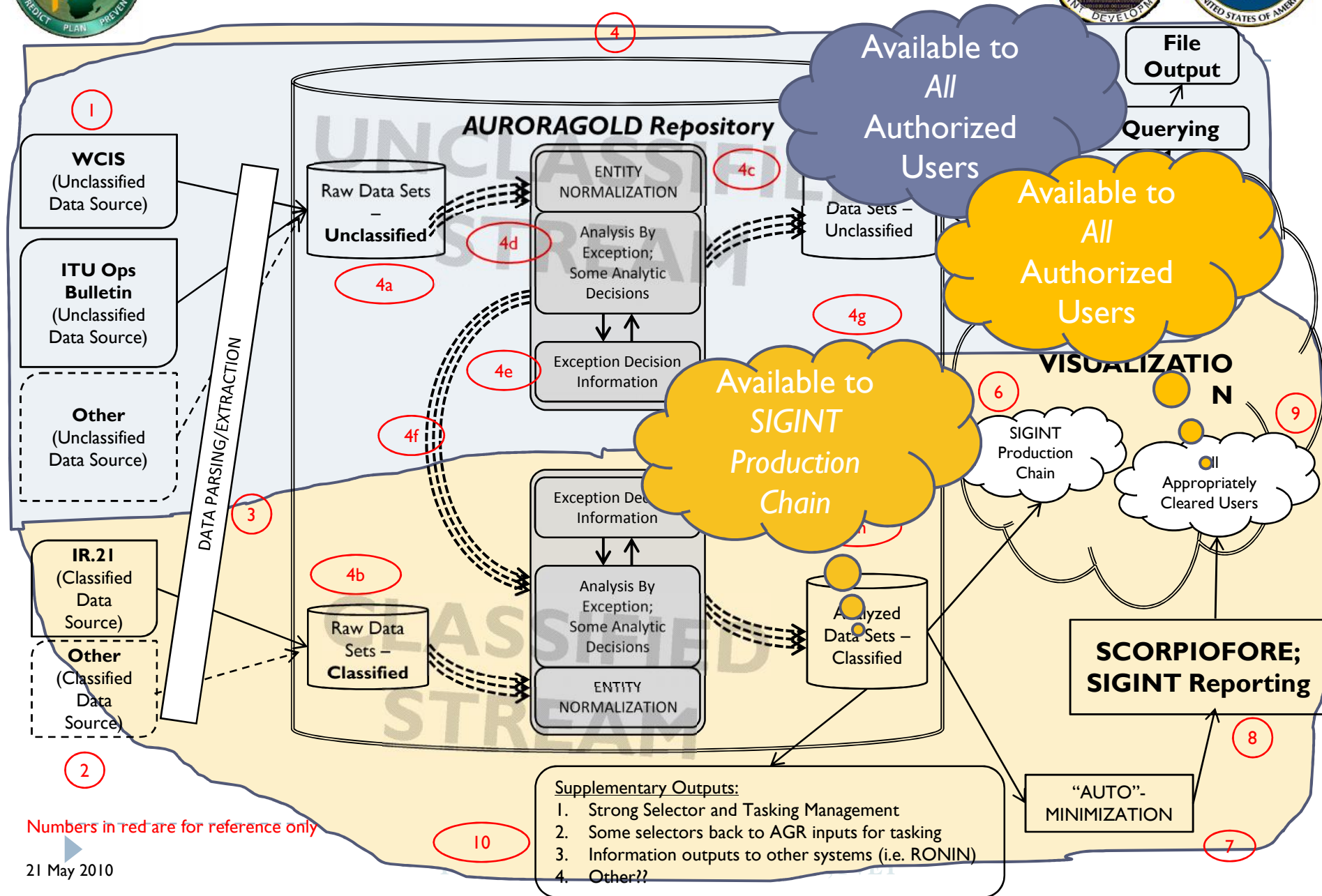
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# Future Implementation







## (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?**
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## (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.2I documents...**
  - ▶ **Goals:**
    - ☐ Do we cover all 3GPP networks?
    - ☐ Tweak access
    - ☐ Tweak selectors
  - ▶ Indexer will provide PWID for all identified IR.2I, 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



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