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***Enabling Enterprise Systems Engineering
A Structure for Building a Net Centric GIG***

ICCRTS

15 June 2005



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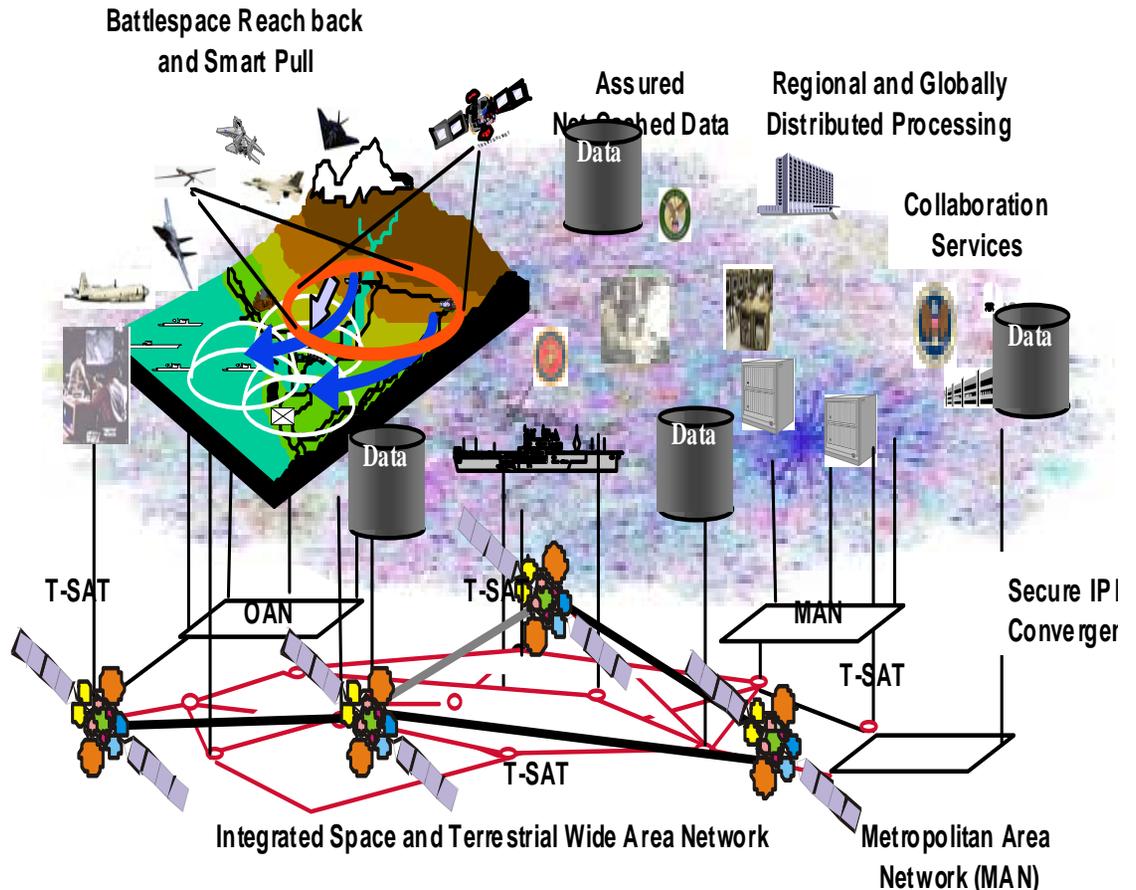
Engineering a Weapon System

■ Procured by

- different people,
- under different processes,
- with narrow objectives and requirements. and
- *Always changing*

■ With a mission to provide . . .

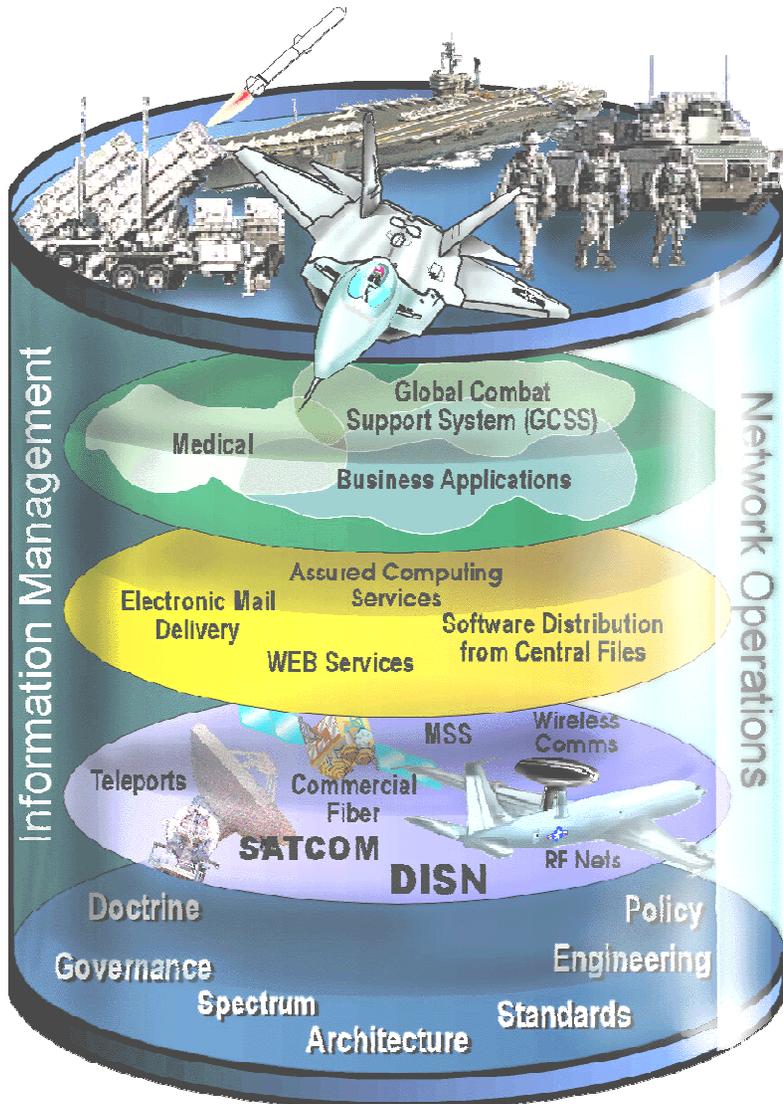
- Virtual voice, data, video on,
- applications between individuals,
- anywhere, any place, any time.



Dozens of programs, 100's of decision makers . . How hard could it be, it's just people



What is needed for net centric vision?



Transformational Doctrine support to end users

- Instant dynamic connection and access
- Connect all users any place, any time
- Allow their applications to work
- Insure that network degrades gracefully
- Reduced operational footprint

Applications that work across the network

Discoverable data and application services

Thousands of common access nodes (radios)

Dynamic, Roaming Broadband & Narrowband

- TSAT, MUOS, LoS Networks
- GIG-BE
- End to End Network Resource Management
- Information assurance to support operations



The Enterprise Challenge

- Enterprise-level technical requirements are undefined for a significant number of GIG end-to-end issues
- End-to-end documentation that defines functional, performance, and interface guidelines that programs can build to is unavailable
- No *single* decision body to resolve technical, policy, programmatic issues quickly on proposed end-to-end solutions

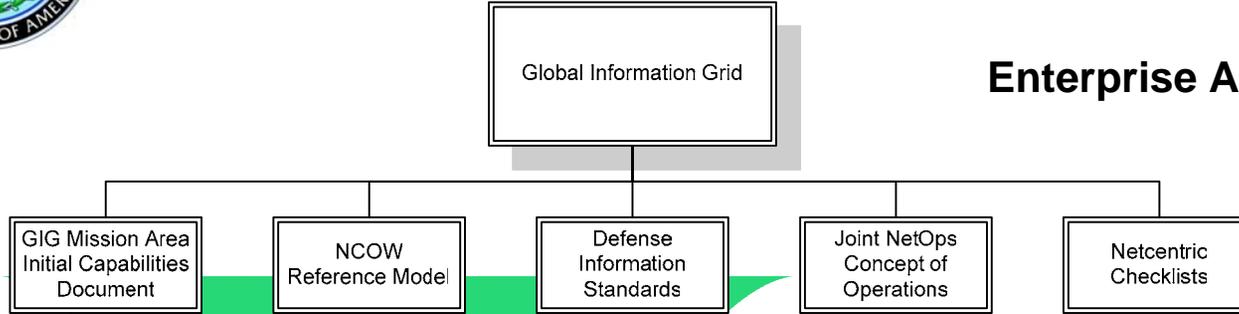
Key programs are moving forward and need resolution ASAP



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Documenting Results as Technical Guidelines: Net-Centric Implementation Documents

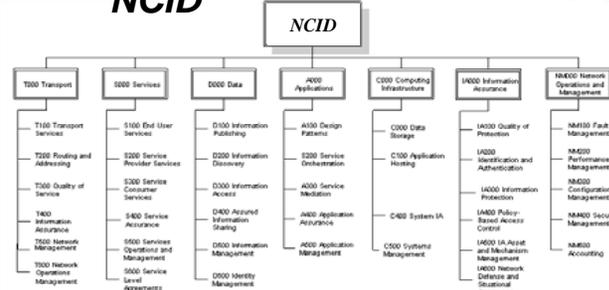
Enterprise Architectural Guidance



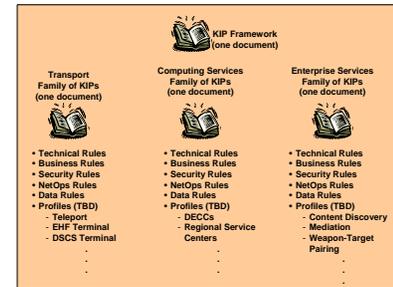
Enterprise Technical E2E Guidance

The Missing Link

NCID

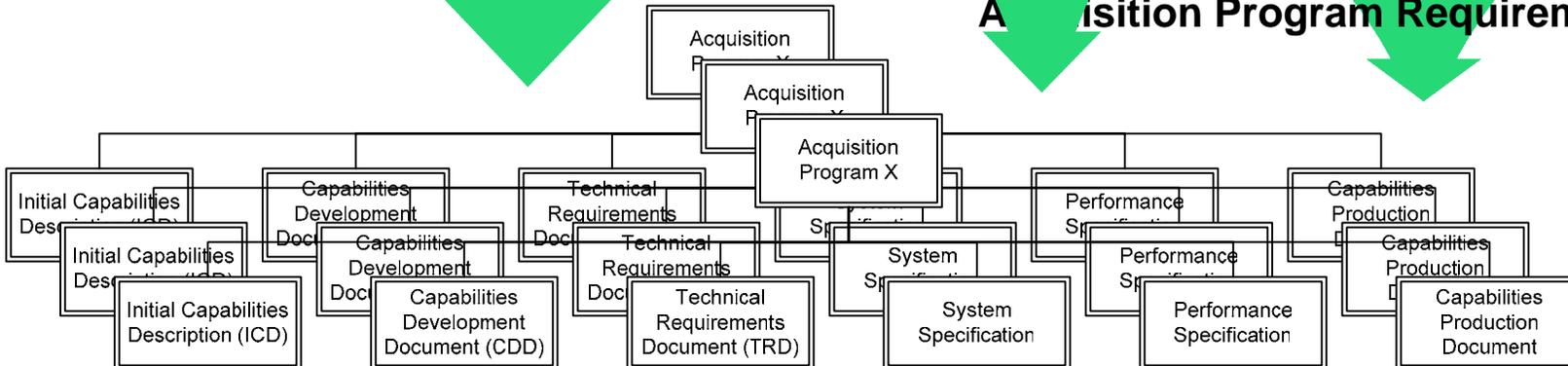


KIPS



Stds & Profiles

Acquisition Program Requirements





Enterprise Engineering is about Balance . . .

- **If the Internet was developed to meet a specification, we would still only have the DARPA NET, however . . .**

- **Without enterprise requirements definition, networks would only interface effectively at Tier 0 effectively defeating the transformational advantages of many next generation GIG components**

- **To paraphrase Yogi Berra, the Enterprise Engineering is**
 - **50% Engineering**
 - **50% Policy**
 - **50% Politics**



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E2E Working Group Performs Enterprise SE

Army/ Navy / AF augmentation for tactical edge discussions

ASD(NII)/DoD CIO

Senior GIG Systems Engineer

GIG Senior Systems Engineering Board
Chair: Senior GIG Systems Engineer

Members: Senior Sys Engineering Rep from: Army, Navy, AF, USMC, AT&L, USD(I), DOT&E, Joint Staff J-6, STRATCOM, JFCOM, IC-CIO, DISA, MDA, NSA GIG IA SPO, TCO, TCM MJPO, GIG-BE SPO, JTRS JPO, NCES SPO, GIG Architect, & E2E Evaluation Facilities (NRL)

Analysis and Experimentation

- GIG Evaluation Facility
- Modeling and Simulation

Cross Segment Focus Groups

- GIG Routing Working Group
- QoS Working Group
- Spectrum Working Group
- GIG Standards
- Tactical Edge

GIG Segment Focus Groups

- Comm./ Transport
- Core Services
- Applications and Data
- Information Assurance
- Network Management

Mission Analysis

- Mission Threads
- Network Operations

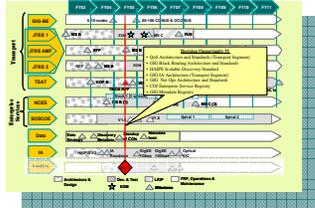
Migration Engineering

- IP Convergence
- IPv6 Transition

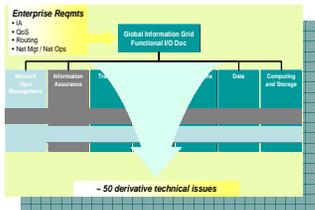
Are IC interests adequately represented?



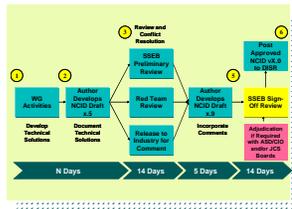
Implementing GIG E2E Tech Baseline Results



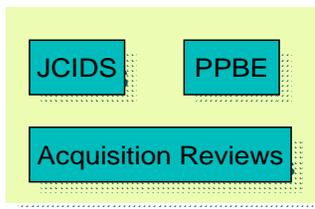
- **Address key issues for program milestones**
 - Work with individual program offices to identify early needs
 - Act as the “interface’ across GIG segments



- **Document results as technical guidelines**
 - Net-centric Implementation Documents (NCID)
 - Incorporate in technical baseline for individual programs



- **Document results as technical guidelines**
 - Employ net-centric tenets and concepts
 - Perform end-to-end trades across multiple programs
 - Develop end-to-end technical solutions across GIG

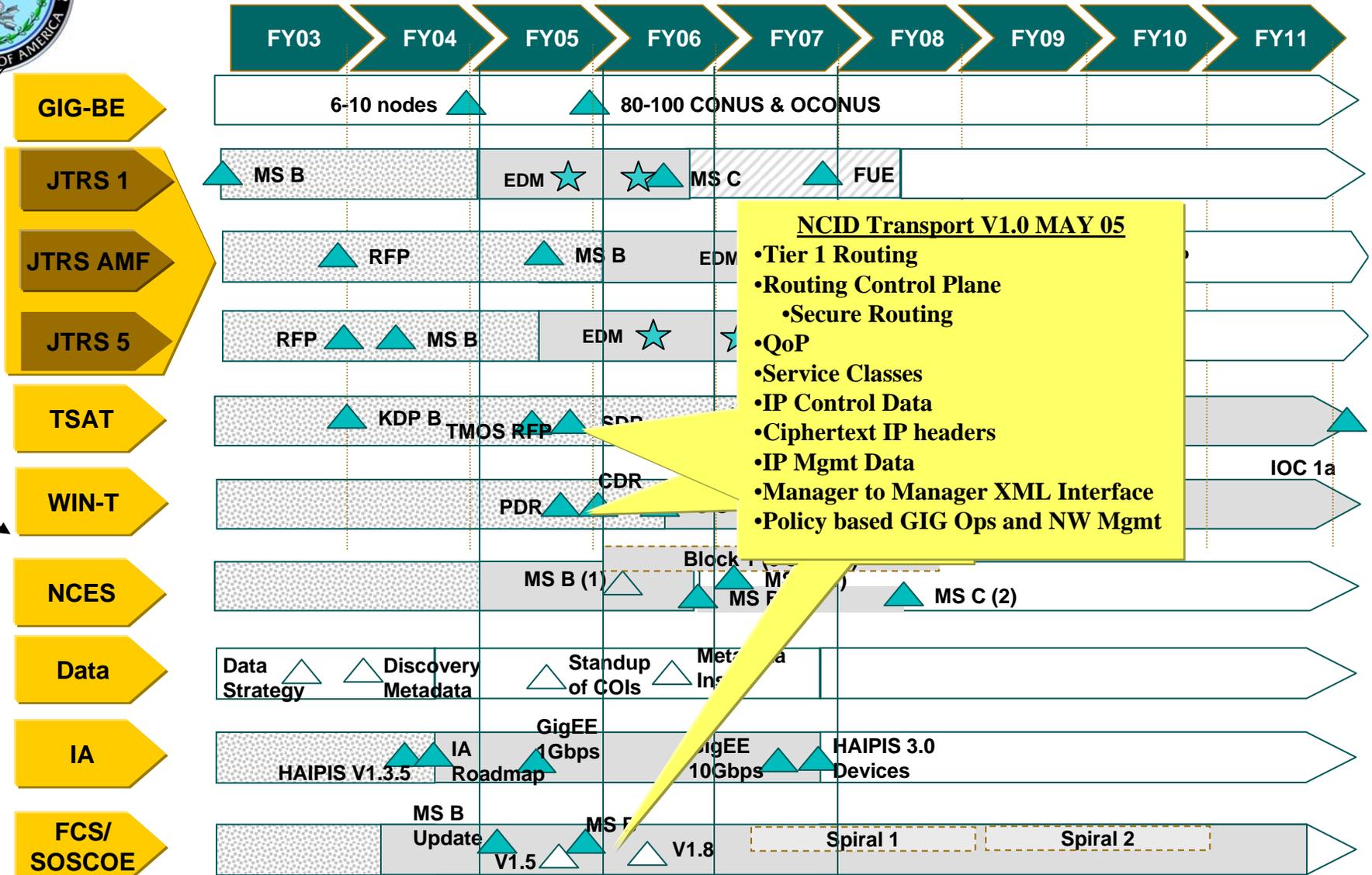


- **Use existing DoD processes to incorporate change**
 - Track, support & update JCIDS requirements documents
 - Promote net-centricity during acquisition reviews
 - Develop arguments for budget actions and reviews



Program Milestones Drive Technical Resolution Priorities

Transport

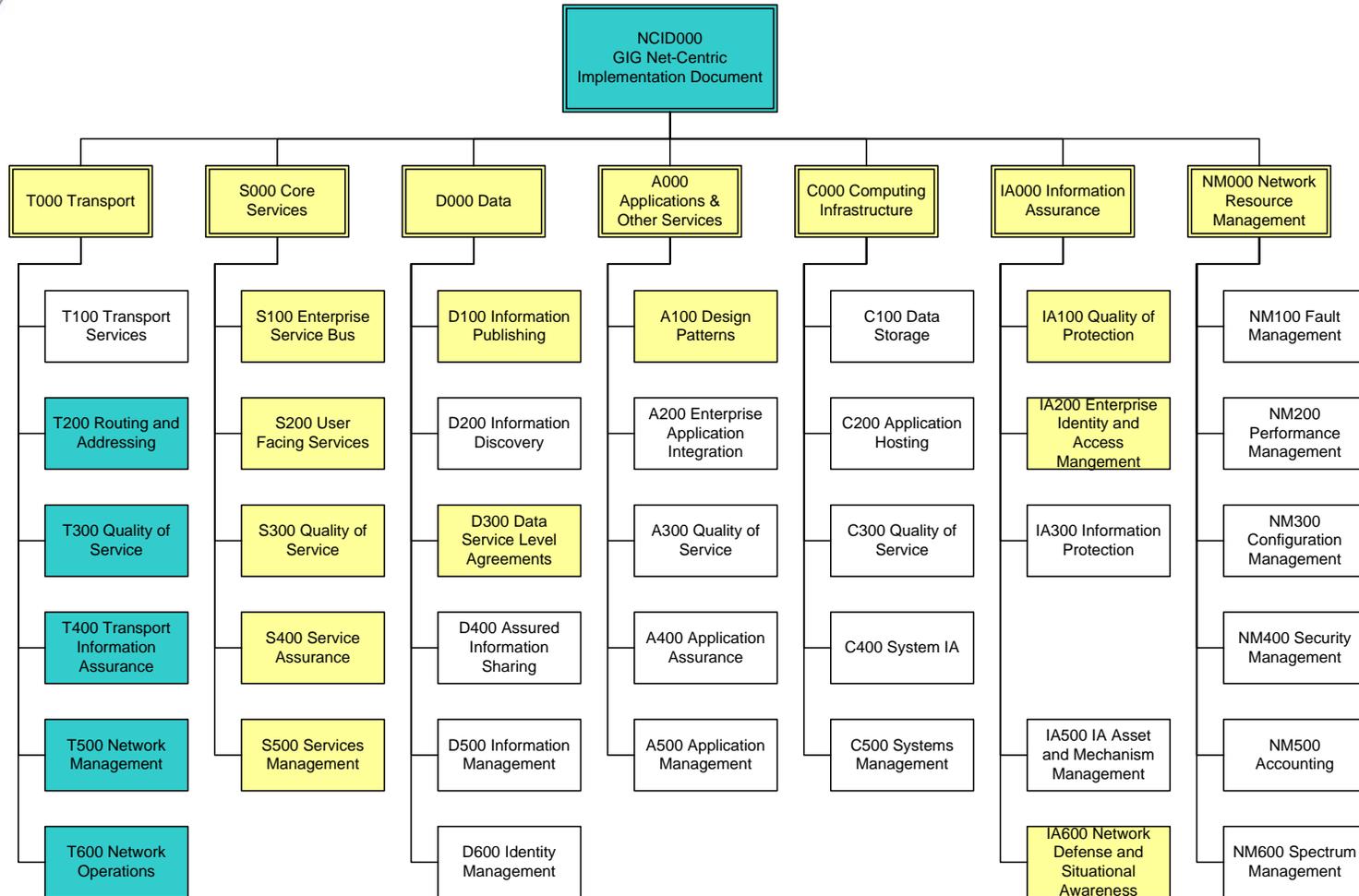


IC programs/needs should be included



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GIG NCID V2.0 Development



V1.0 Complete, V1.x Revision

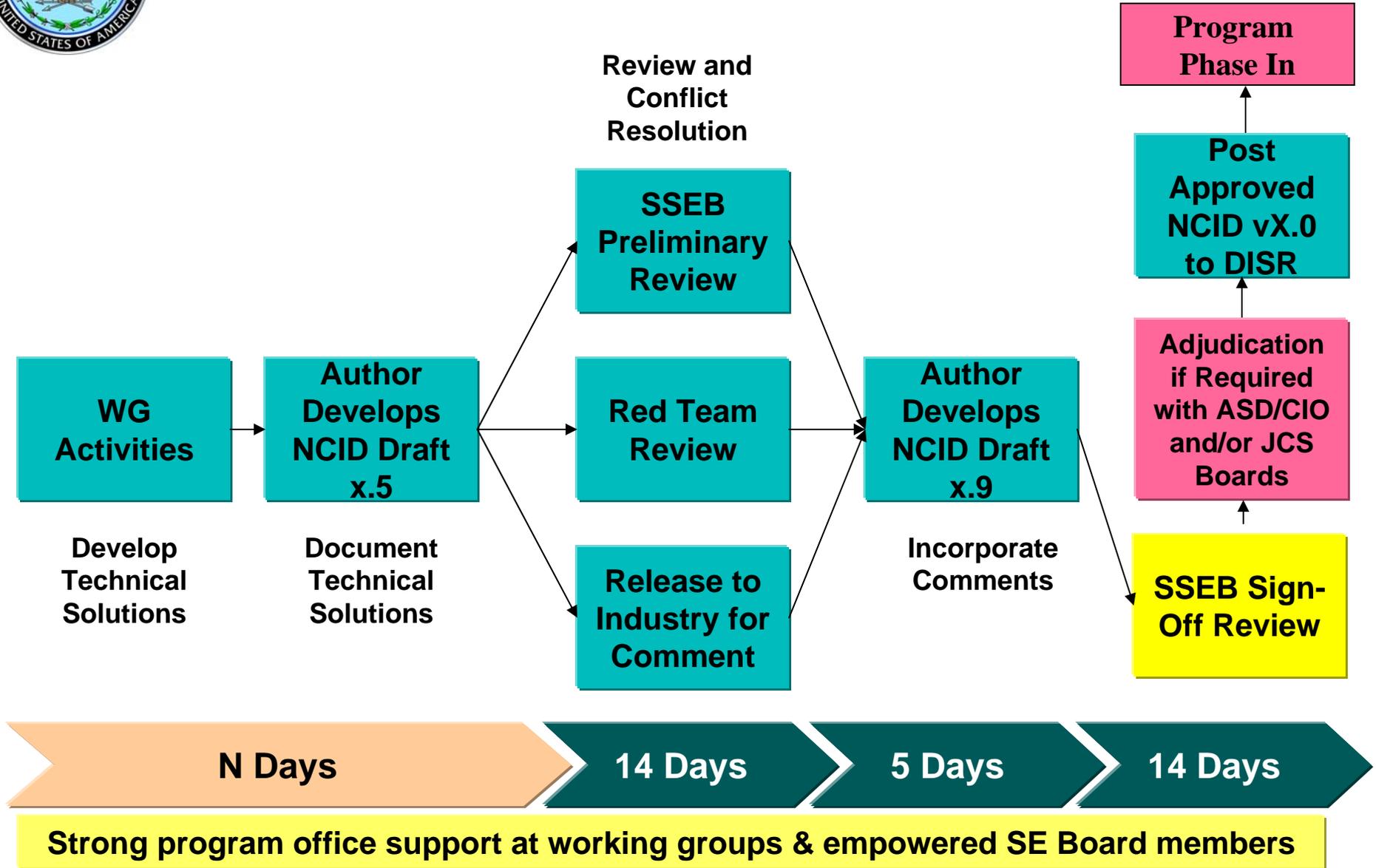
New for V2.0

Next Phase: Define tactical edge, extend definition of remaining segments, develop performance budget framework and initial allocation to segments



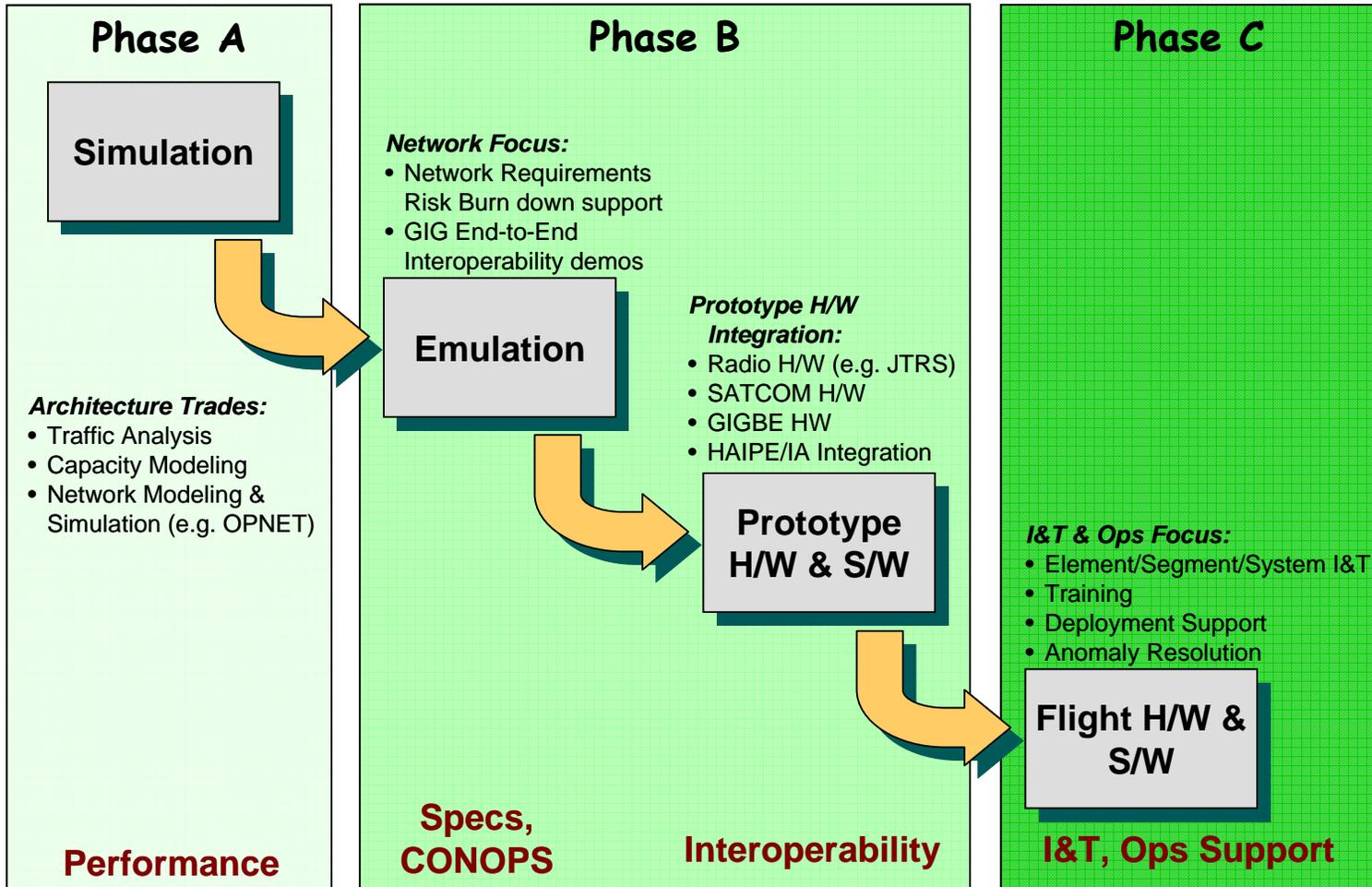
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GIG NCID Development & Review Process





Assessment, Tools, and Metrics



A federated approach to performance assessment must evolve and deploy over time



Guidelines for Future Analysis

- **Any system can meet user needs under no load and no system can meet it in saturation**
- **Ground Rules**
 - **Requirements are only meaningful in the context of an operating scenario and operating conditions**
 - **Define conditions based on current deployment projections NOT hypothetical what-if scenarios**
 - **Scenario parameters should be top level and should avoid over specification**
 - **Operating conditions (loads, environmental) should reflect *realistic operating points* NOT worst case conditions**



Guidelines for Future Analysis (Con't)

- **End-to-End Requirements are a balancing act**
- **Reflect *realistic* user expectations**
- **Provide *acceptable* application performance**
- ***Consider inherent component network limitations* that are difficult or impossible to overcome**
- **Define *one requirement* for the same parameter**
- ***Be clear* – specify exactly what a parameter means**
- ***Measure at user end point*, not an interesting node**



Guidelines for Future Analysis (Con't)

- ***Don't over analyze or over simulate in the beginning***
- ***Back-of-the Envelope*** calculations are required first
- ***Get Feedback*** from developers and end-users before proceeding to detailed evaluation
- ***Don't*** define performance at a component level
- ***See yourself in the developers or operators shoes***
- ***Over estimate*** the ability of future users to innovate



Net Centric Support for Your Customer

- **Critical Skills** – Provide technical talent in all areas (DoD mission requirements / doctrine, all aspects of the technical discussion (IP, Network Control, Routing, etc), in-depth program knowledge of things using or part of the GIG).
- **Effective Engineering Management Processes** – Use CAIV / Trade, requirements management that looks end-to-end across all GIG elements.
- **Technical Tools** - model, emulate, test etc all key questions on GIG performance and cost in a net centric, loosely coupled environment
- **Decision Window Roadmaps** - effectively control the scope and schedule of work (what needs to be decided by when to what level of detail) for the GIG and all programs within the GIG.
- **Oversight** – Look across programs for opportunities to evolve to net centric tenets.
- **Experienced Leadership** – the teams who lead the process must have both Government and Industry experience – participate & communicate at all levels



Your Market Is Evolving Now.....

■ Imperatives

- Significant “one time” \$ tied to upcoming program decisions
- Time sensitive need to define and publish enterprise solutions
- Programs need guidance to ensure consistency across the GIG

■ Net Centric impact on future DoD market trends / opportunities

- Legacy programs will phase out – users like *useful* connections
- Net Centric programs will survive and grow
- Enhance market longevity by evolving to net centric tenets now
- Satisfying end-to-end net centric criteria will improve Po & Pwin
- Solutions that contribute to future mobile markets will win in DoD



Why now



Iraqi Leadership Strike



C-17's Into Bosnia



Transformational Warrior

. because they are here already