

Space - Cyberspace

Responsibility – Protection

Ethics – Social Responsibility

- **Internal and external factors affect massively**
 - 1. *ECONOMIC DEVELOPMENT*
 - 2. *PROFITABILITY*
 - 3. *INCREASE INCOMES*
 - 4. *Increase or Decrease of POVERTY*
 - 5. *SOCIAL BENEFITS*
 - 6. *GENERAL WELL-BEING*

- **Also, disturbances of the SUPPLY CHAIN locally and globally affect**
 - 1. *ECONOMIC SURVIVAL*
 - 2. *VITALITY & GROWTH*
 - 3. *DEMONSTRATIONS & REVOLUTIONS*

- **But ABOVE EARTH or SPACE-related issues affect our
PROSPERITY & SECURITY & WELL-BEING**

2021 ...

G20 ROME SUMMIT
30-31 OCTOBER 2021



PEOPLE
PLANET
PROSPERITY

PEOPLE

PLANET

PROSPERITY



2023 ...

What is the theme of the G20 23?

The theme of the Indian G20 Presidency,

One Earth, One Family, One Future,

drawing upon the age-old belief of Vasudhaiva Kutumbakam, was endorsed by all.

2024 ...

2024 G20 Summit

Theme: "**Building a Just World and a Sustainable Planet**"

Host: Brazil

Key focus areas: Addressing global challenges with a focus on social inclusion, the fight against poverty, energy transition, and climate action

2025 ...



Solidarity

Equality

Sustainability

Earth
exists as part of the
Cosmos

OURANOS ...

How
Space
affects

Life, Social Policies, Wellbeing, and Prosperity,...

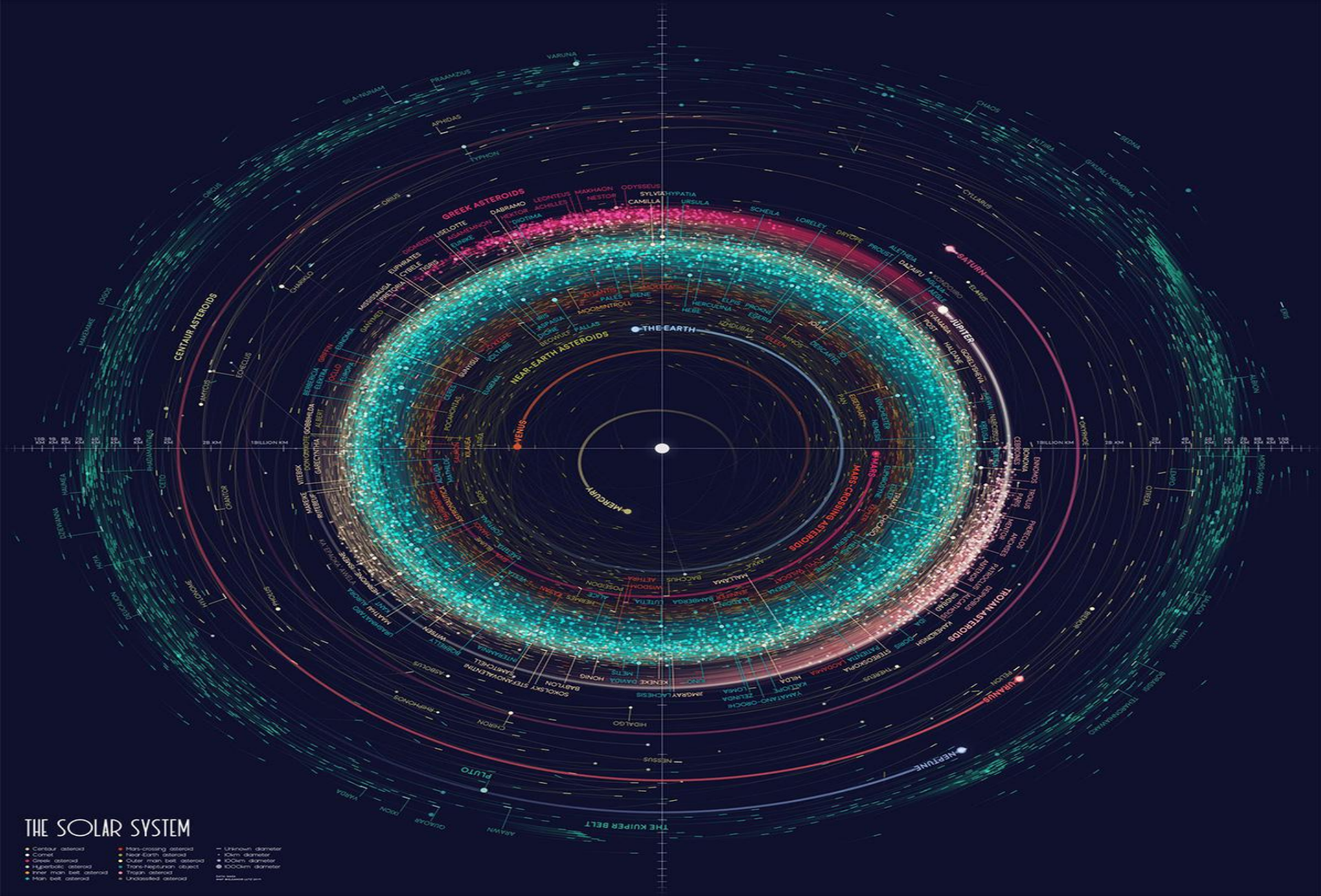
Contents

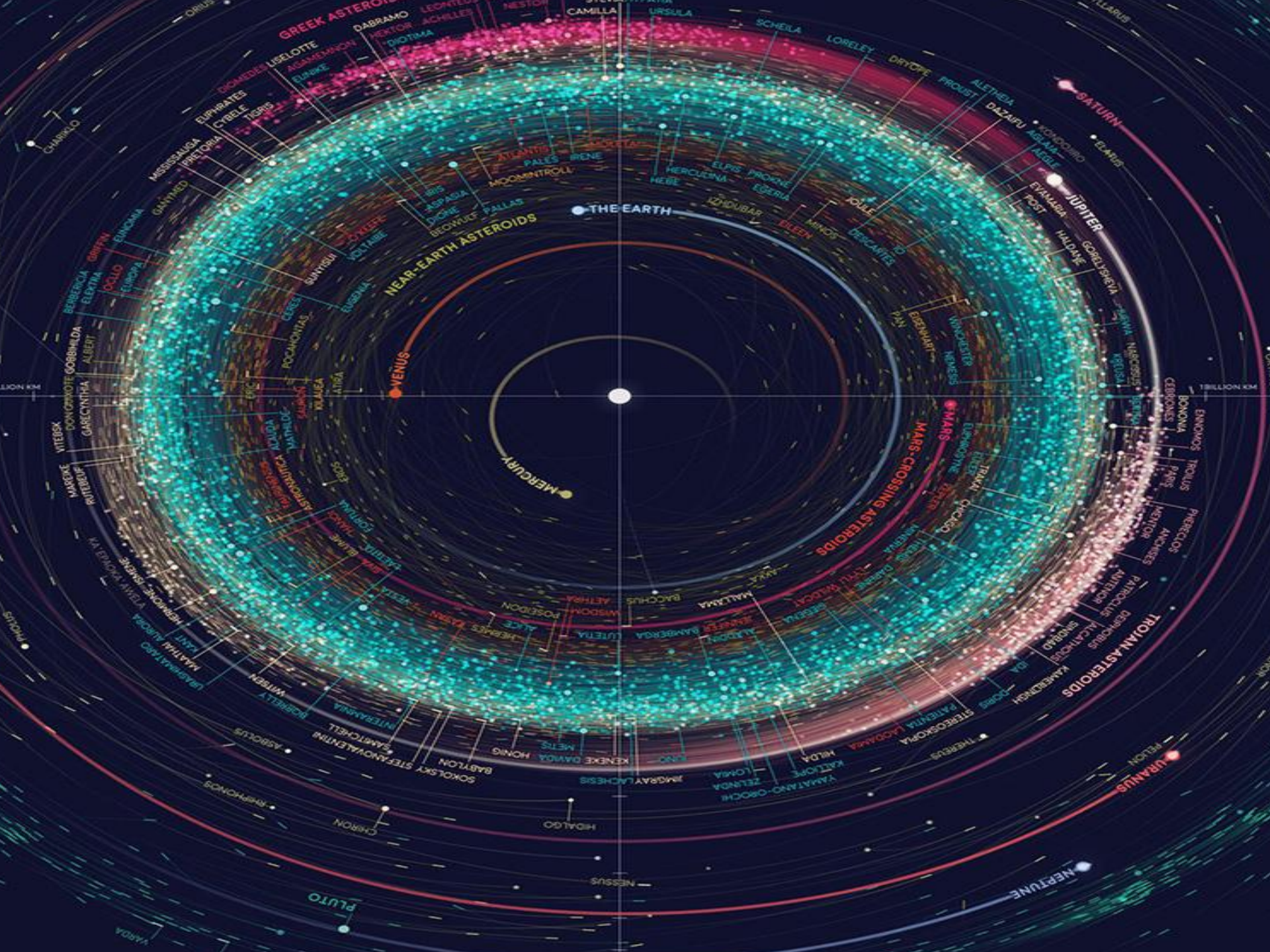
1. *Space-The new frontier*
2. Exploring Space or Spying Earth
3. Tracking-Watching-Spying-Profiling-Cheating ...
4. MAMMY BLUE
5. Next Decade-Space AIMS and Social Challenges
6. *Cyberspace-Cybersecurity-Individual SHARED RESPONSIBILITY-Social Wellbeing*

1. Space ...

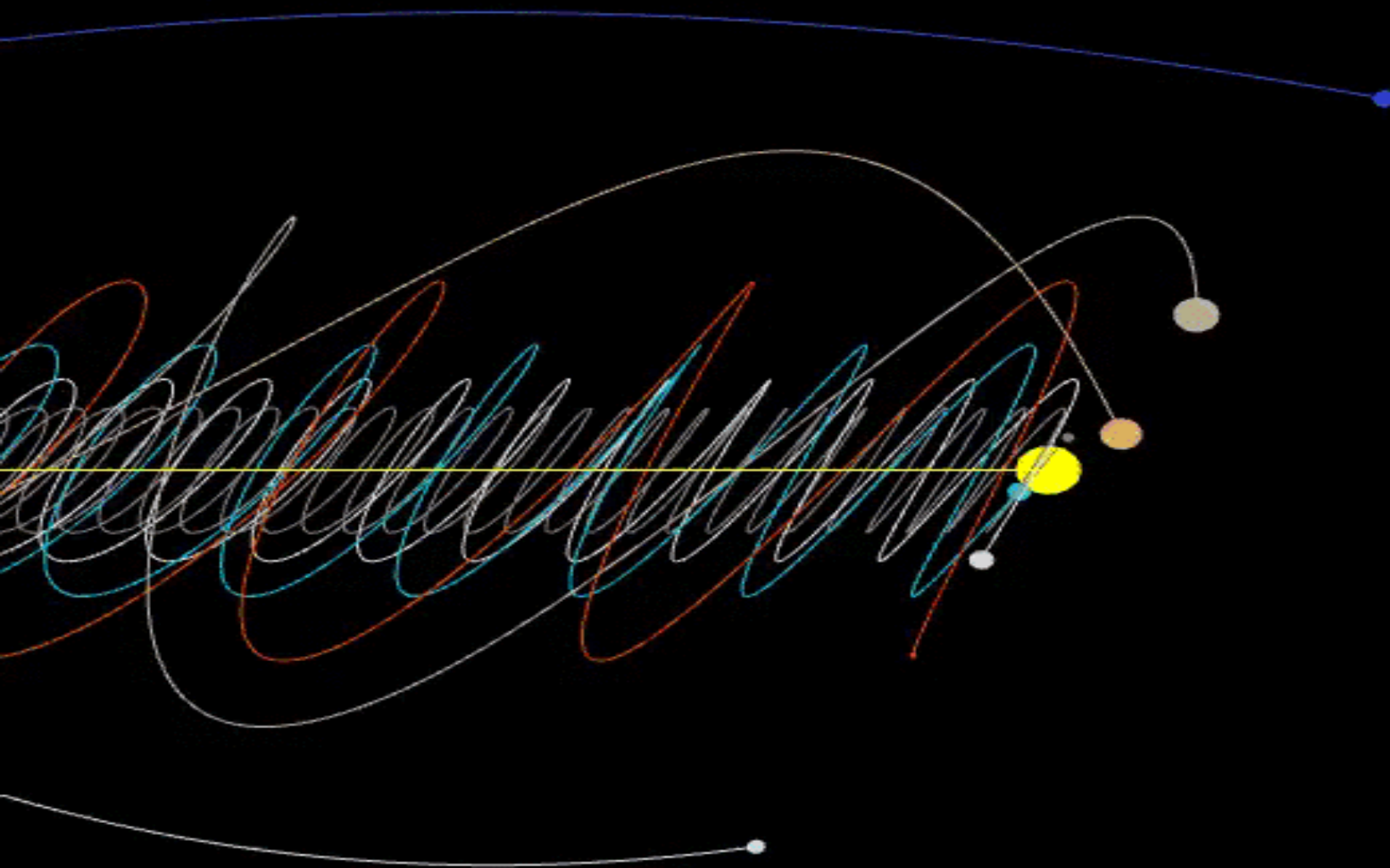
The new frontier

Space





Our ... tiny ... Solar System



Our Home ... so small ?

Dwarf planets get their name from their tiny size. They are all smaller than Earth's moon!



Jupiter
☾ 139,820 km

Earth
☾ 12,742 km



Earth's Moon
☾ 3,475 km

The Dwarf Planets



Orcus

☾ 910 km



Ceres

☾ 940 km



Sedna

☾ 995 km



Quaoar

☾ 1,110 km



Gonggong

☾ 1,230 km



Makemake

☾ 1,430 km



Haumea

☾ 1,560 km



Eris

☾ 2,326 km



Pluto

☾ 2,377 km

The IAU officially recognizes 5 dwarf planets. We include 4 additional dwarf planets that are widely recognized by members of the scientific community, especially amongst leading planetary researchers like Dr. Gonzalo Tancredi, Dr. Michael Brown, and Dr. William Grundy. There are many more potential dwarf planets in our solar system not listed here that are under investigation.

Our first steps ... into ... Space

1957 – First satellite launched: Sputnik1

1961 – First human in space: Yuri Gagarin

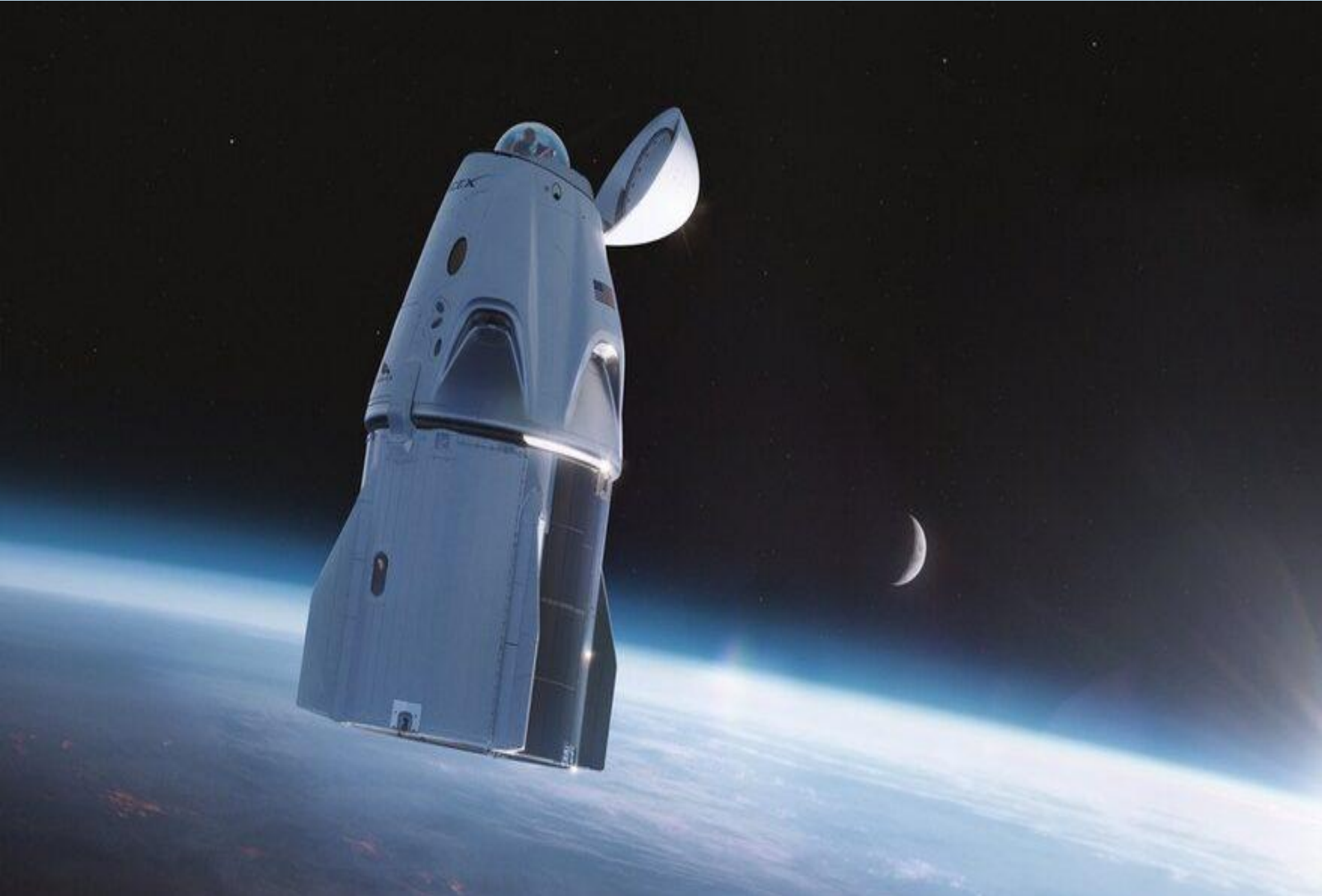
1965 – First human spacewalk: Aleksei Leonov

1969 – First human on the Moon: Neil Armstrong

1984 – First untethered spacewalk: Bruce McCandless

1998 – First modules launch to begin construction of the International Space Station

Americans ... in Space (21st Century)



Americans ... in Space ... 2021

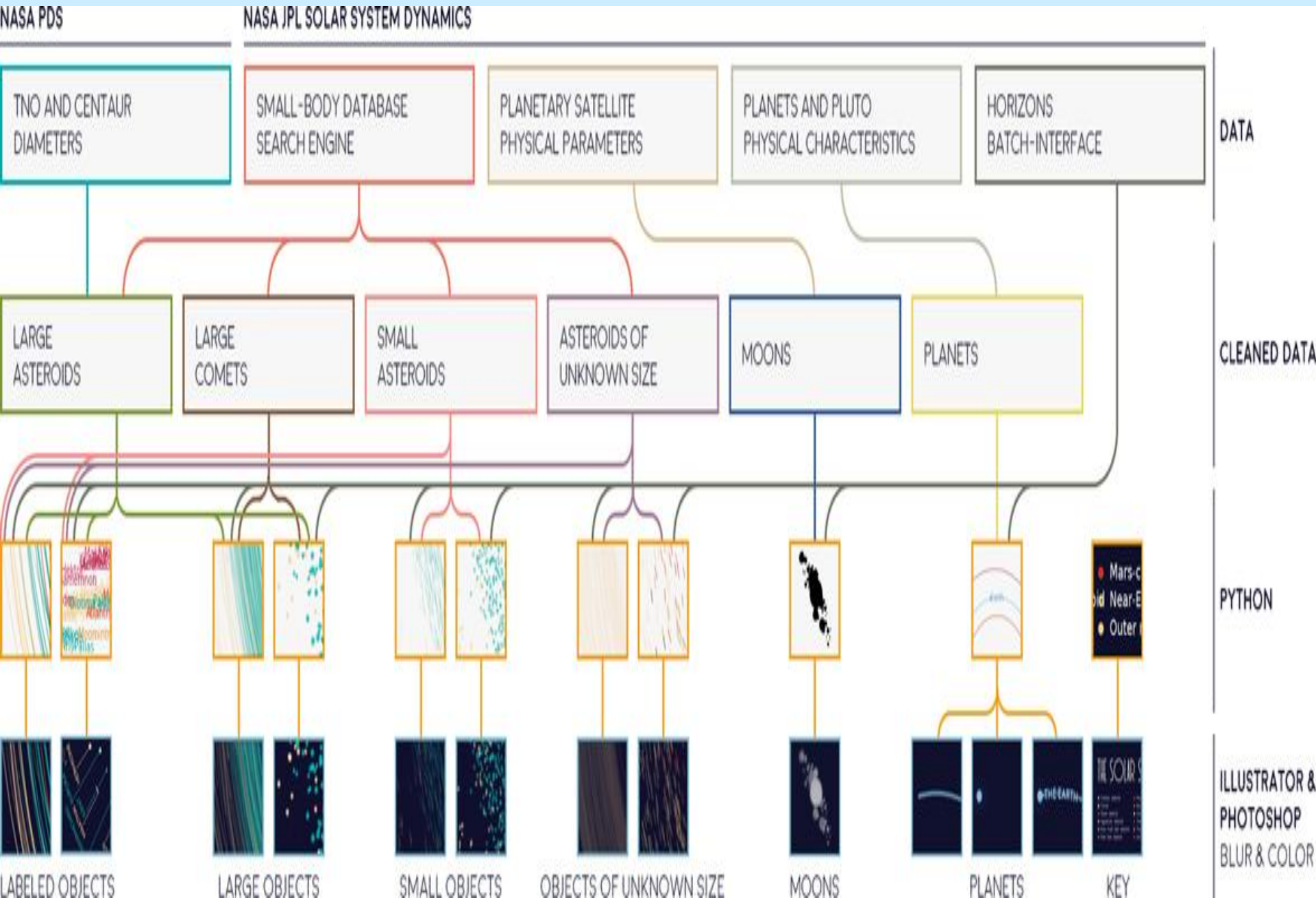


SpaceX said it will send someone around the moon on its BFR vehicle and will identify that person at a Sept. 17, 2021, event.

Russians too ... in Space in 2021

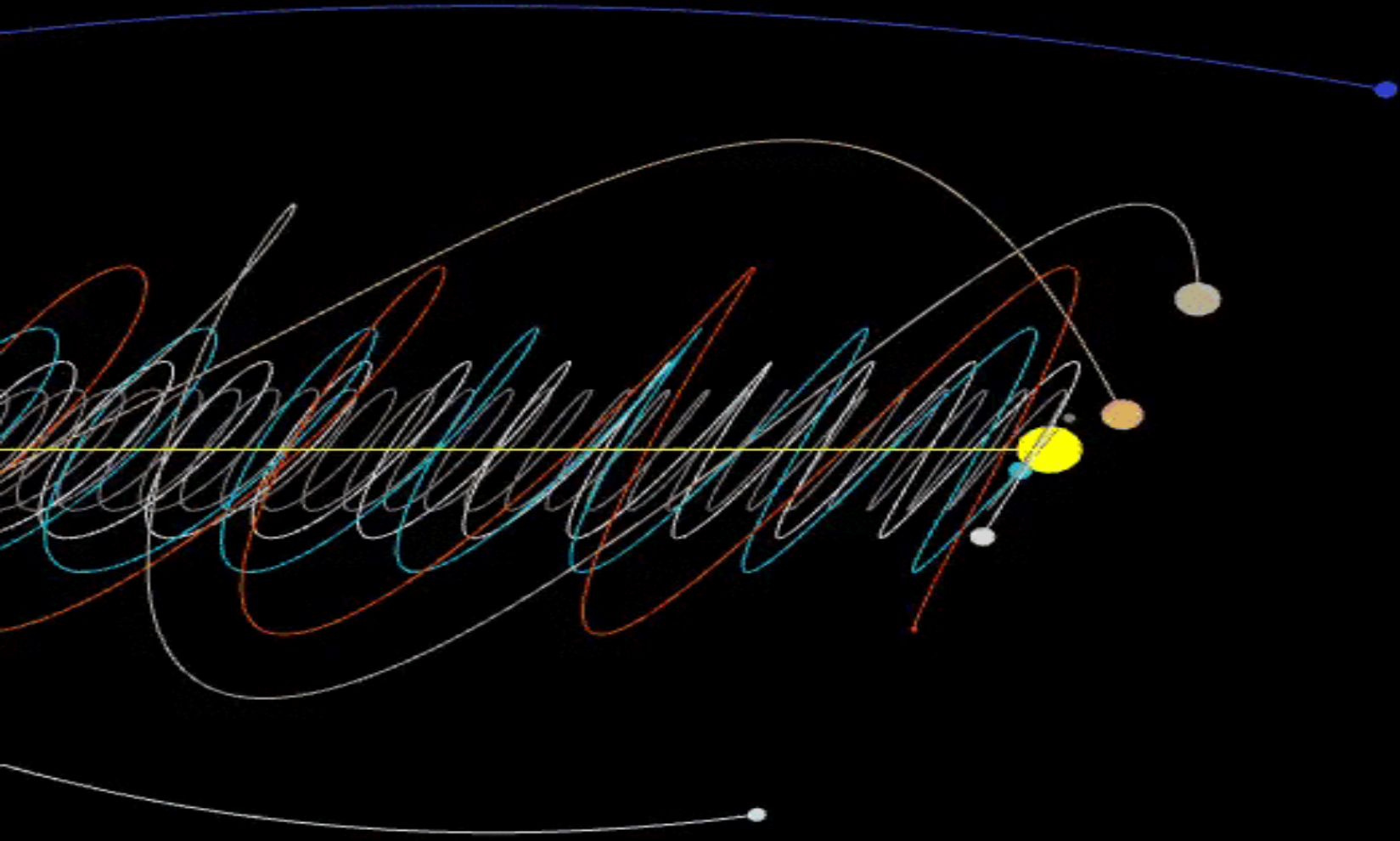


Mapping & Collecting Data from ... Space



2. Exploring Space or Spying Earth ?

Who is watching ... Earth ...? ... with WHAT ?



... Satellites

The new space race is on. Hundreds of satellites are launched into Earth's orbit every year for purposes ranging from communications and IoT, to environmental monitoring and border security.

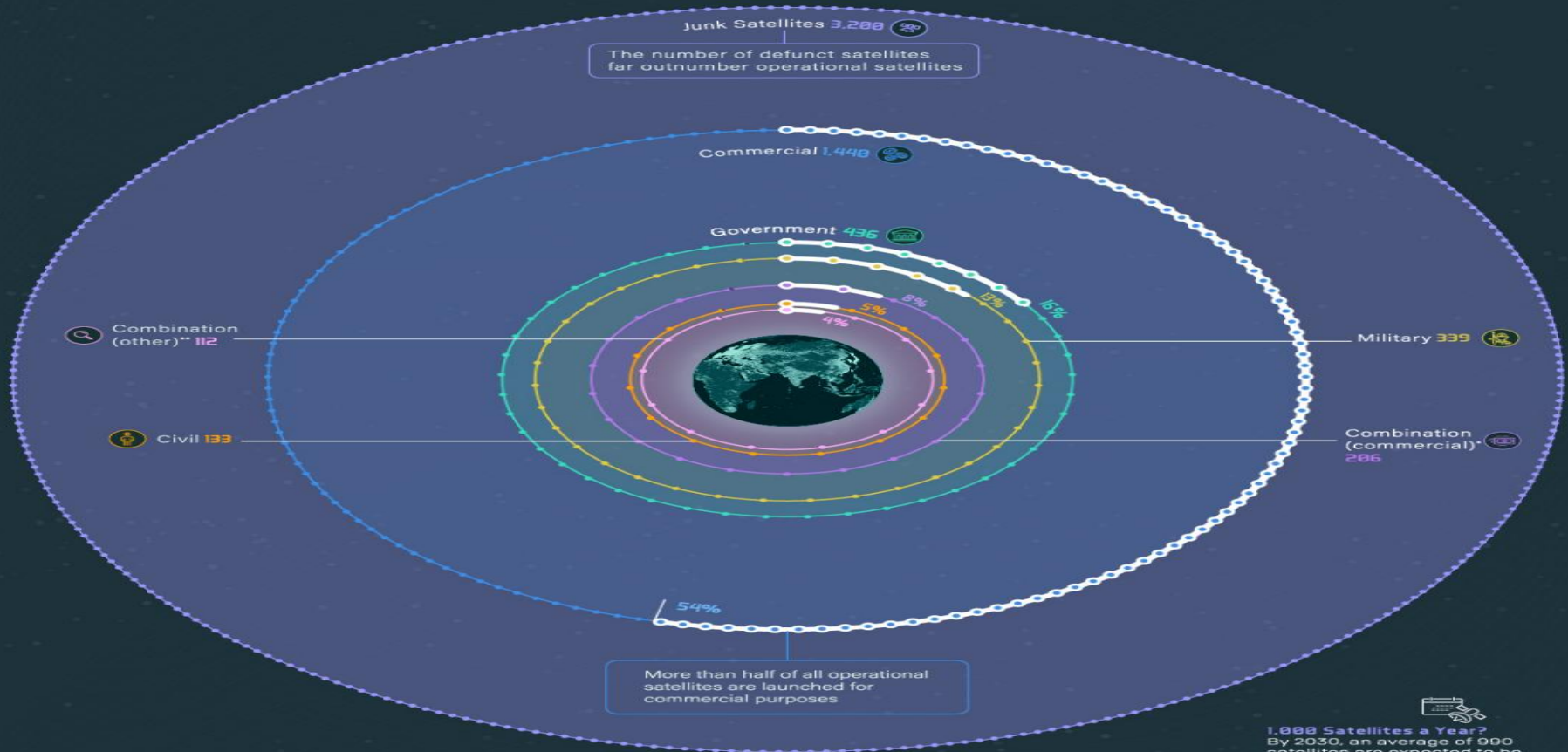
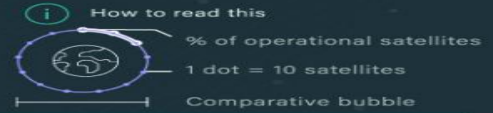
Thousands more defunct satellites are orbiting the planet as space junk. In total, there are nearly 6,000 satellites circling our tiny planet—and that number keeps growing.

Earth's Satellites: Operational vs. Junk

1 dot = 10 satellites



All of Earth's Satellites



Mission Impossible ... by Satellites

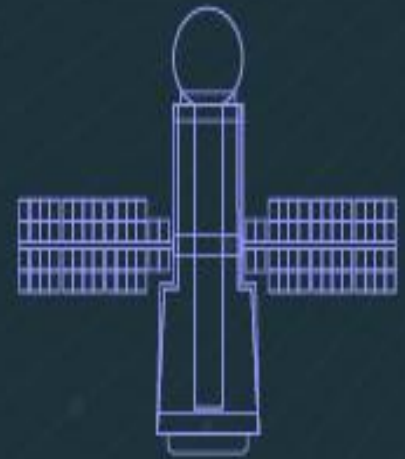
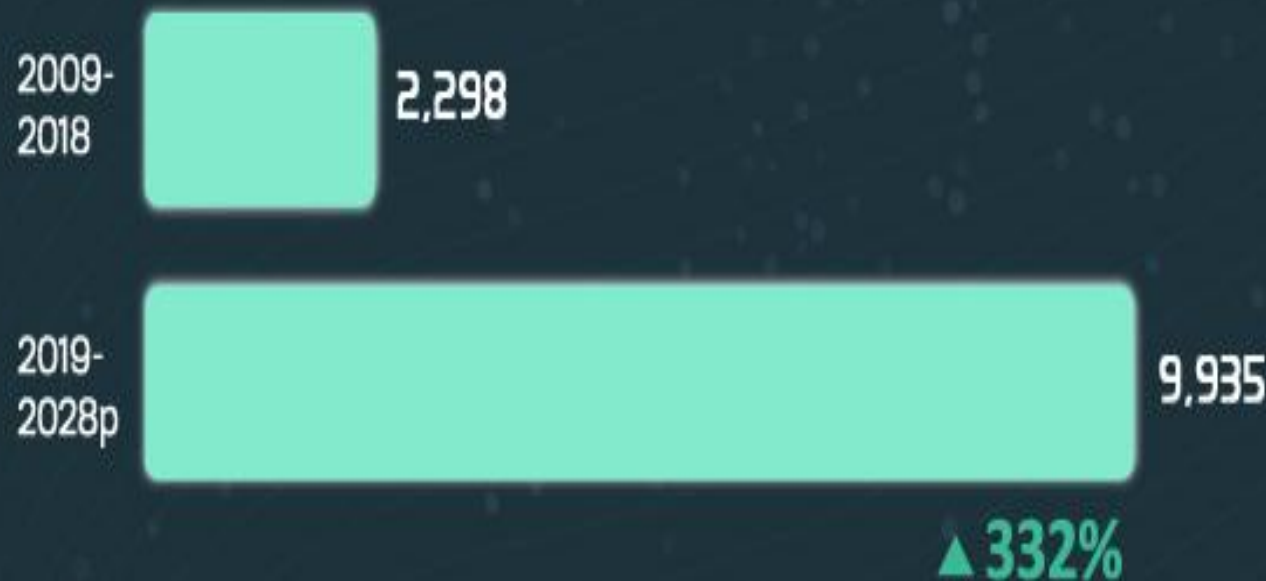
Satellites with a Purpose



Satellites: 10,000 +

Satellites Skyrocket

Past, Present, and Future Satellites Launched



An average of 990 satellites will be launched yearly by 2028.



Source: Euroconsult, 2019

Who controls the skies?

Who Owns Earth's Orbit?

Commercial satellite operators

% of all commercial satellites

More than half of all operational satellites serve commercial purposes. With growing constellations and new market entrants, space operators have set their sights on mass connectivity, analytics, and earth monitoring.



SpaceX - 358 satellites

22%

SpaceX launched 175 additional satellites in the span of one month, August-September 2020.



Planet Labs - 246 satellites

15%



Spire Global

89 satellites

5%



Iridium

78 satellites

5%



OneWeb - 74 satellites

4%



Other

49%



Source: UCS

Who invests in & owns most of Satellites?

Countries that Dominate Earth's Orbit



How to read this

5%

Operational satellites %

130

Operational satellites as of April 2020

Comparative size bubble



Affordable Space

With the success of its reusable rockets, SpaceX is on track to reduce launch costs by as much as US\$6 million per flight.



Commercial Launch Options Skyrocket

China leads the world in orbital rocket launches, while in 2018, the U.S.'s SpaceX broke the record for most commercial rocket launches in a year.

Source: Euroconsult, ESA



Satellite Types

Operational Satellites by Type	Number of Satellites	Percentage of Operational Satellites
Commercial	1440	54%
Government	436	16%
Military	339	13%
Civil	133	5%
Combination (Other)	112	4%
Combination (Commercial)	206	8%
Defunct Satellites	3200	

Commercial Satellites ???

Commercial Satellites by Purpose	Number of Satellites
Communications	1007
Earth Observation	446
Navigation / GPS	97
Tech Demonstration & Development	87
Other	9
All Commercial Satellites (including combination)	1646

Satellite Owner/Operator	Number of Satellites	Country of Operator/Owner
SpaceX	358	USA
Planet Labs, Inc.	246	USA
Spire Global Inc.	89	USA
Iridium Communications, Inc.	78	USA
OneWeb Satellites	74	United Kingdom
SES S.A.	51	Luxembourg
Intelsat S.A.	51	USA
ORBCOMM Inc.	35	USA
DoD/US Air Force	33	USA
Globalstar	32	USA
European Space Agency (ESA)	26	ESA
O3b Networks Ltd.	20	United Kingdom
Chang Guang Satellite Technology Co. Ltd.	15	China
Gonets Satcom	15	Russia
Sky Perfect JSAT Corporation	15	Japan
Telesat Canada Ltd. (BCE, Inc.)	14	Canada
Echostar Corporation (entire payload leased from Telesat Canada Ltd.)	9	USA
Zhuhai Orbita Aerospace Science and Technology Co.	13	China
Aerospace Corporation	12	USA
DirecTV Latin America/Intelsat	12	Brazil

Selected ... Satellites “looking in” ... Cyprus ...

Ministry of Defense	33	Egypt
Hellas-Sat Consortium Ltd.	3	Greece
Russian Federal Space Agency	3	Russia
Samara State Aerospace University, SGAU	3	Russia
Sky and Space Global, UK	3	United Kingdom
Space-Communication Ltd.	3	Israel
Hellas-Sat Consortium Ltd./INMARSAT	1	Greece/United Kingdom
INMARSAT, Ltd.	13	United Kingdom
Turksat	3	Turkey
AISTech	2	Spain
Arab Satellite Communications Org. (ASCO)	2	Multinational
Italian Defense Ministry/Telespazio	1	Italy
NSLComm	1	Israel
OHB Italia	1	Italy
AISTech	1	Spain
Elbit Systems	2	Israel
German Aerospace Center (DLR)	2	Germany
University of Vigo/Alén Space	1	Spain
Es’hailSat	1	Qatar

- Many people believe that the vaccines for Covid have a mission
 - to control and/or kill many people

- We should take a closer look that
 - *our lives, privacy, health and wellbeing*
 - *are massively affected by*
 - *SPACE TOOLS that control and manipulate tools*
 - *that everybody sleeps with DAY & NIGHT*
 - *but in fact, these tools ...*

3. Tracking ...

Watching ...

Spying ...

Profiling ...

Deceiving ...

Cheating ...

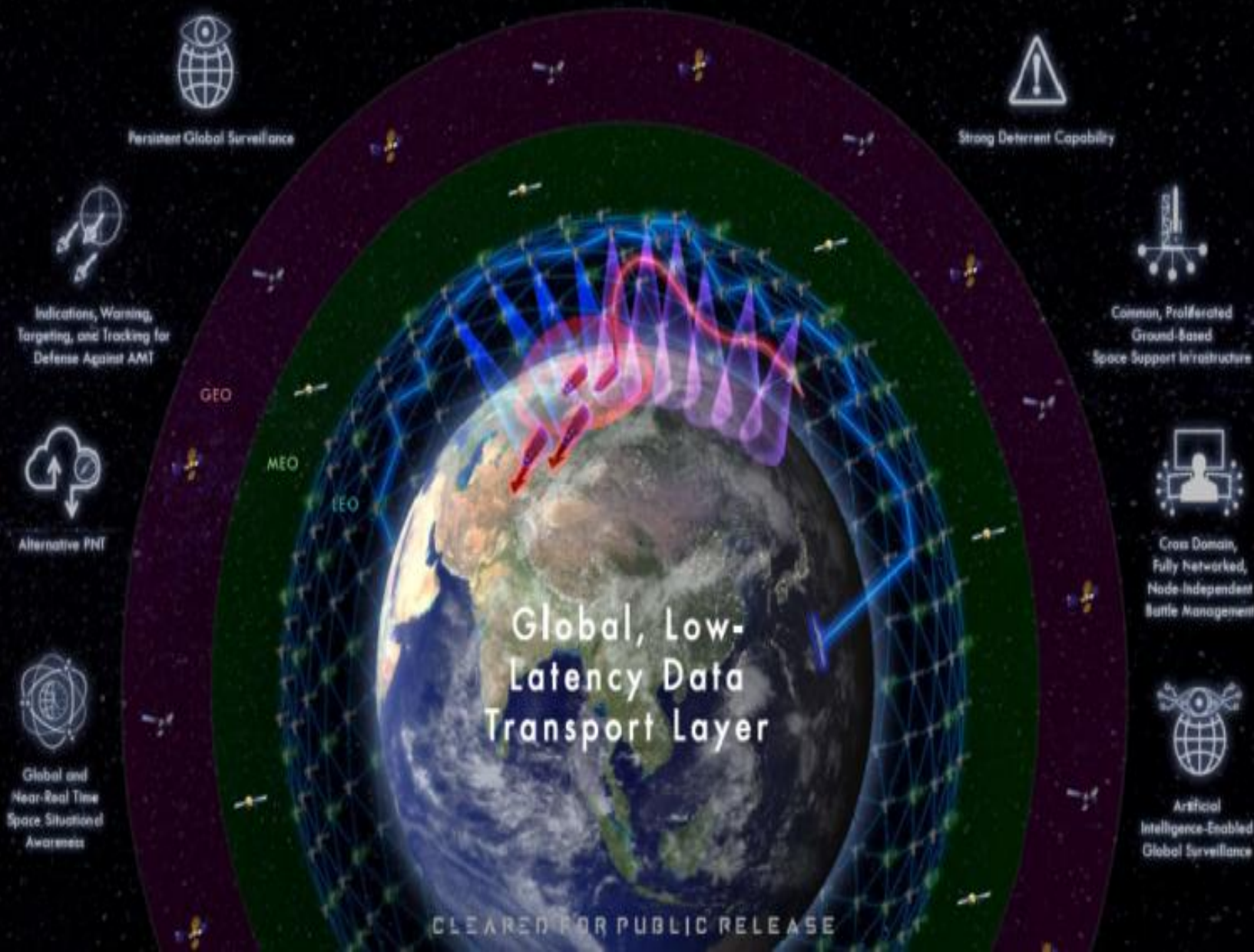
Satellites Net ... **MODEL** ...



Transport Layer



EIGHT PRIORITIES



CLEARED FOR PUBLIC RELEASE

Satellites Net before Covid ...

SPACE DEVELOPMENT AGENCY INDUSTRY DAY

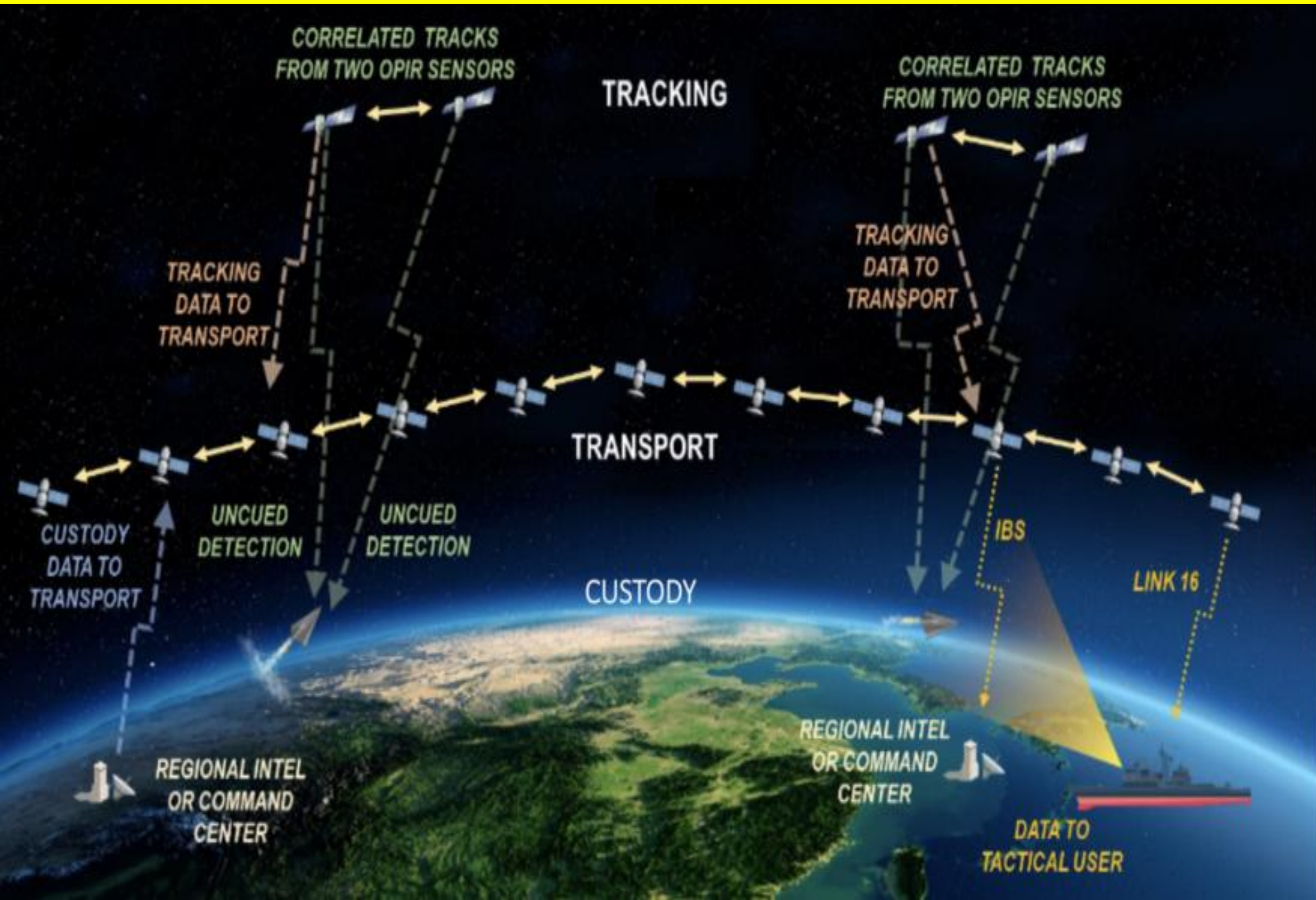


07/23/2019

Chantilly, VA

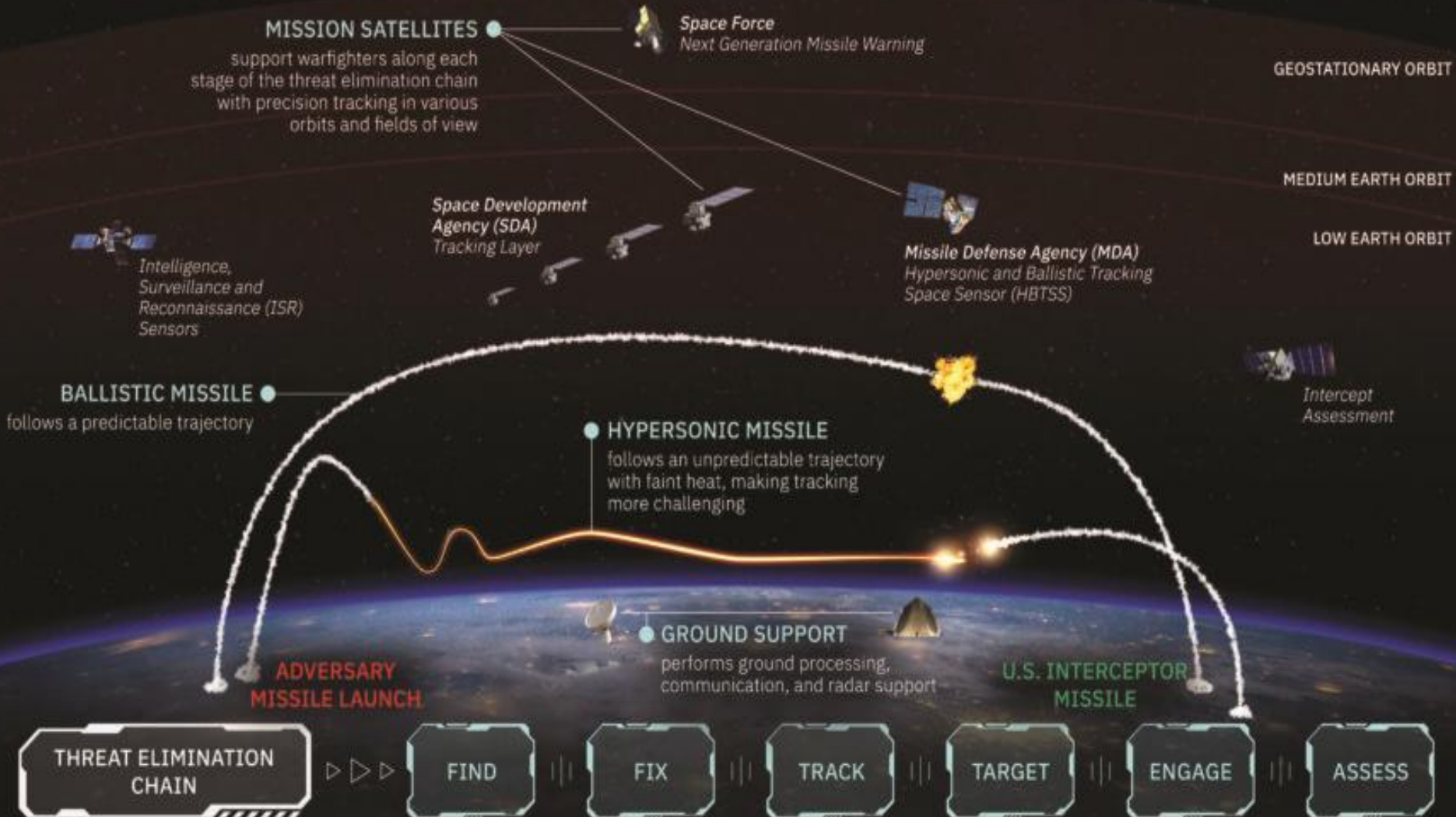
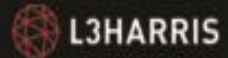
DISTRIBUTION A: APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

First Objective ... COMMUNICATIONS



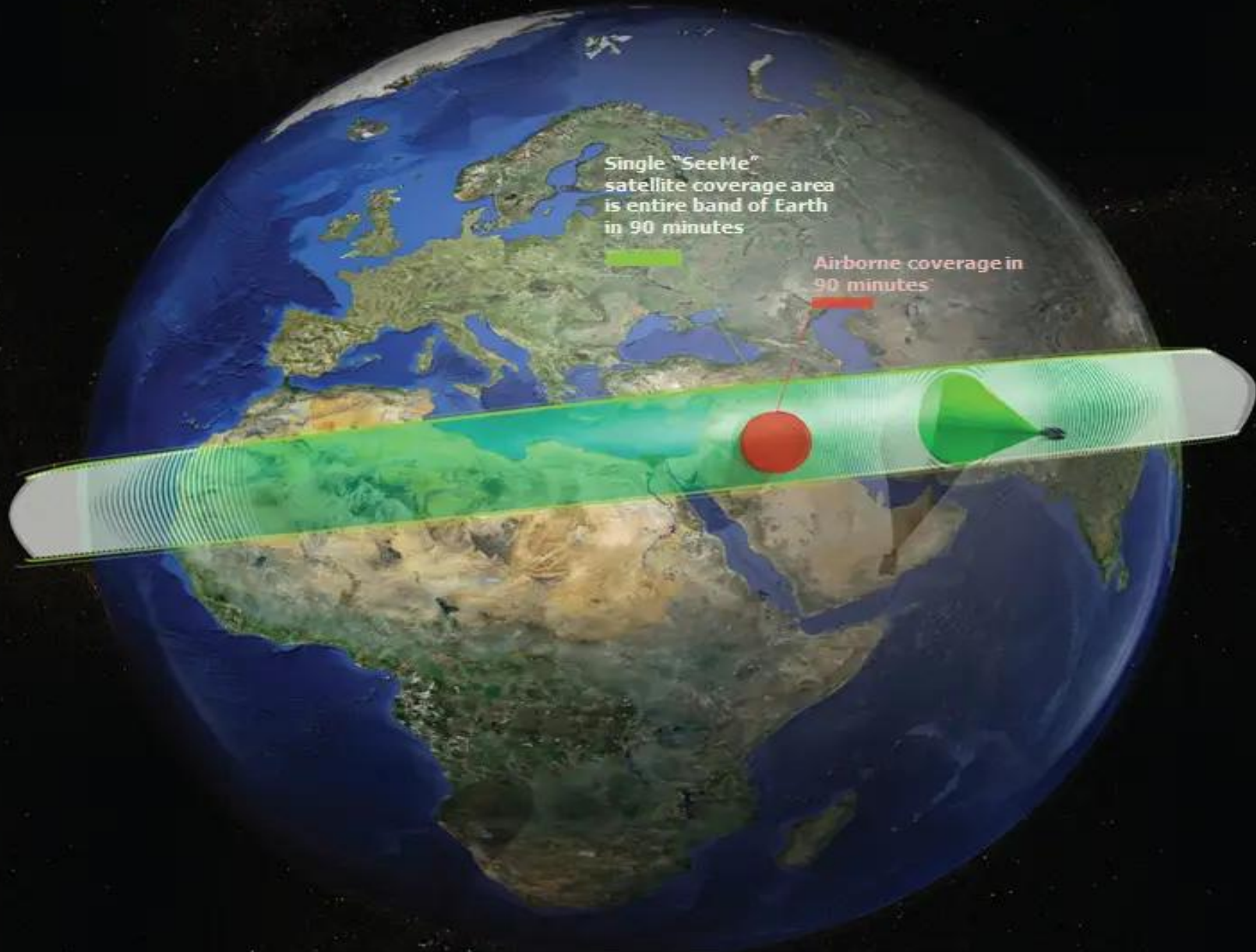
...but always **MILITARY** objectives first ...

SUPPORTING WARFIGHTERS FROM ADVERSARY THREATS

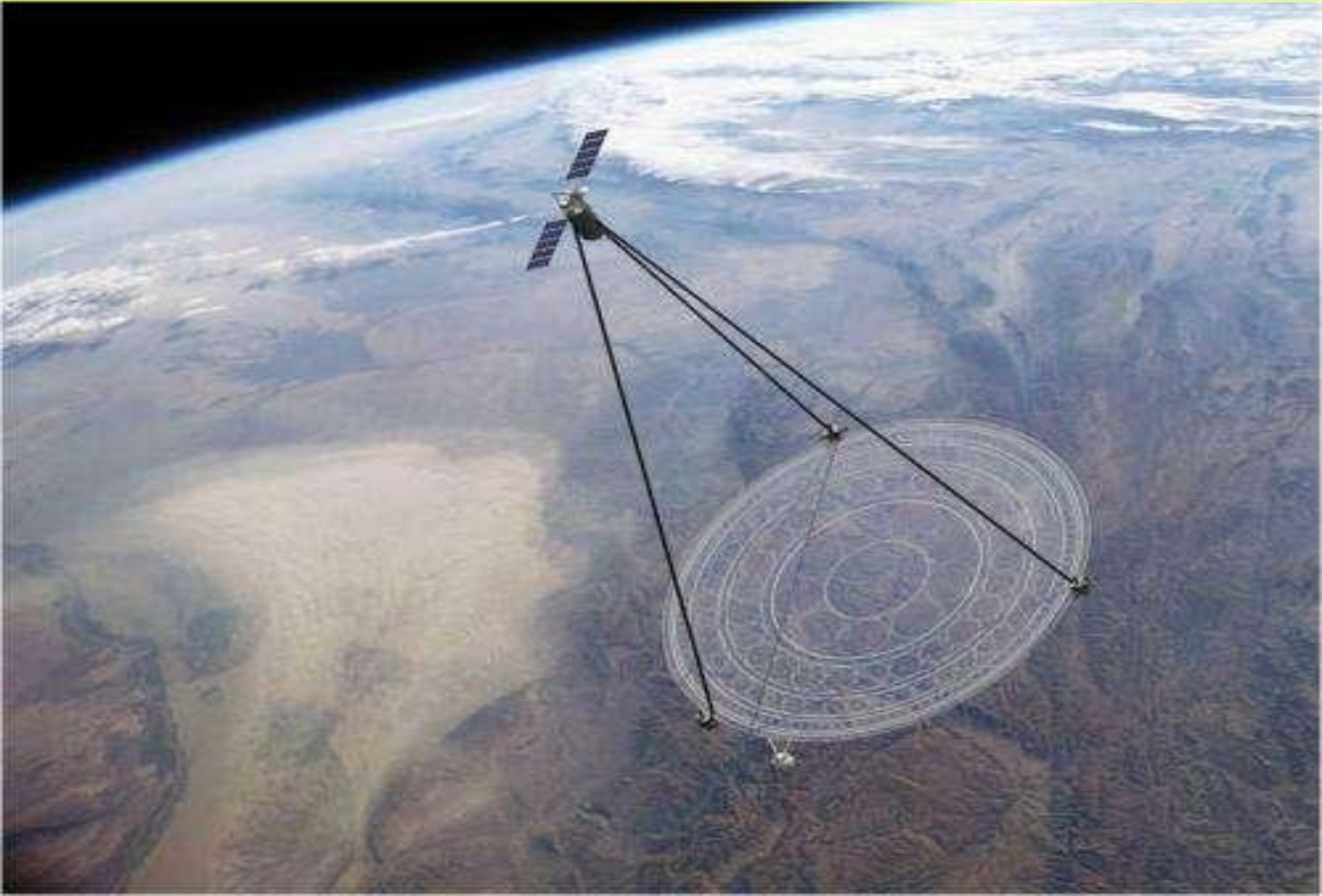


L3Harris, which has won Missile Defense Agency and Space Development Agency contracts within the last year to produce missile-tracking satellites, outlines a “threat elimination chain” in this graphic.

... 1.5 hours ... around Earth



... 1.5 years ... onto one location



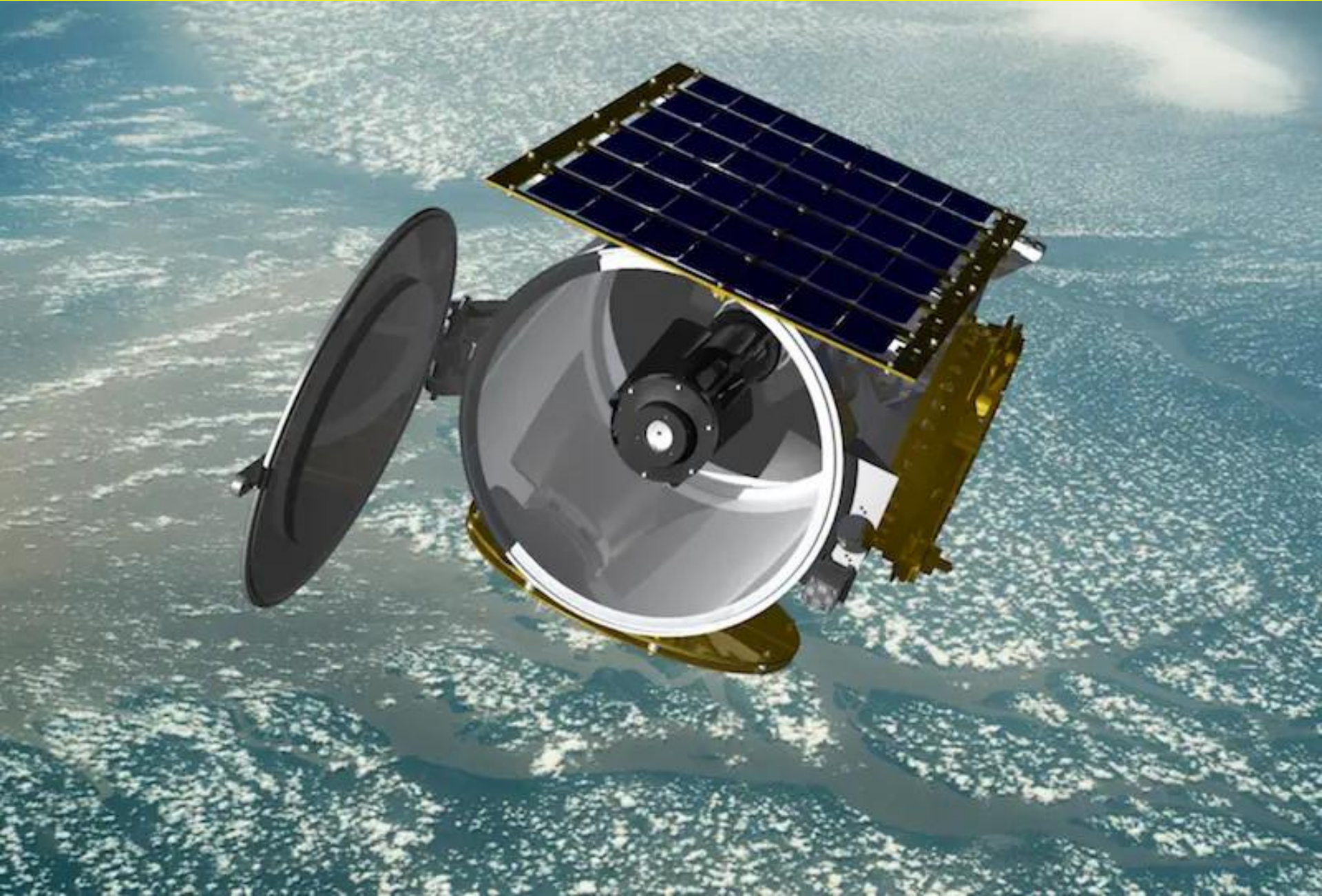
... watching **ITALIAN** soccer ...



Overlapping coverage of Cyprus ...



... using **SOLAR PANELS** ... above **GREENLAND**



... EVERYBODY ... is DETECTED



... **EVERYBODY** ... could be watched & crosschecked ...



...but always **MILITARY** in mind ...

Military Space - Pivot to Low Earth Orbit (LEO)

Demonstrate a space order of battle architecture that cannot be easily defeated by a near peer, and enables one to two year technology refresh cycles vs current 10 year cycles.

LEVERAGE:

Commercial LEO

Mega-Constellation

- Global "Space Internet"
- High-speed crosslinks
- Launch, operations, and ground infrastructure in place



Commercial Network Satellite



Military Satellite

DEVELOP:

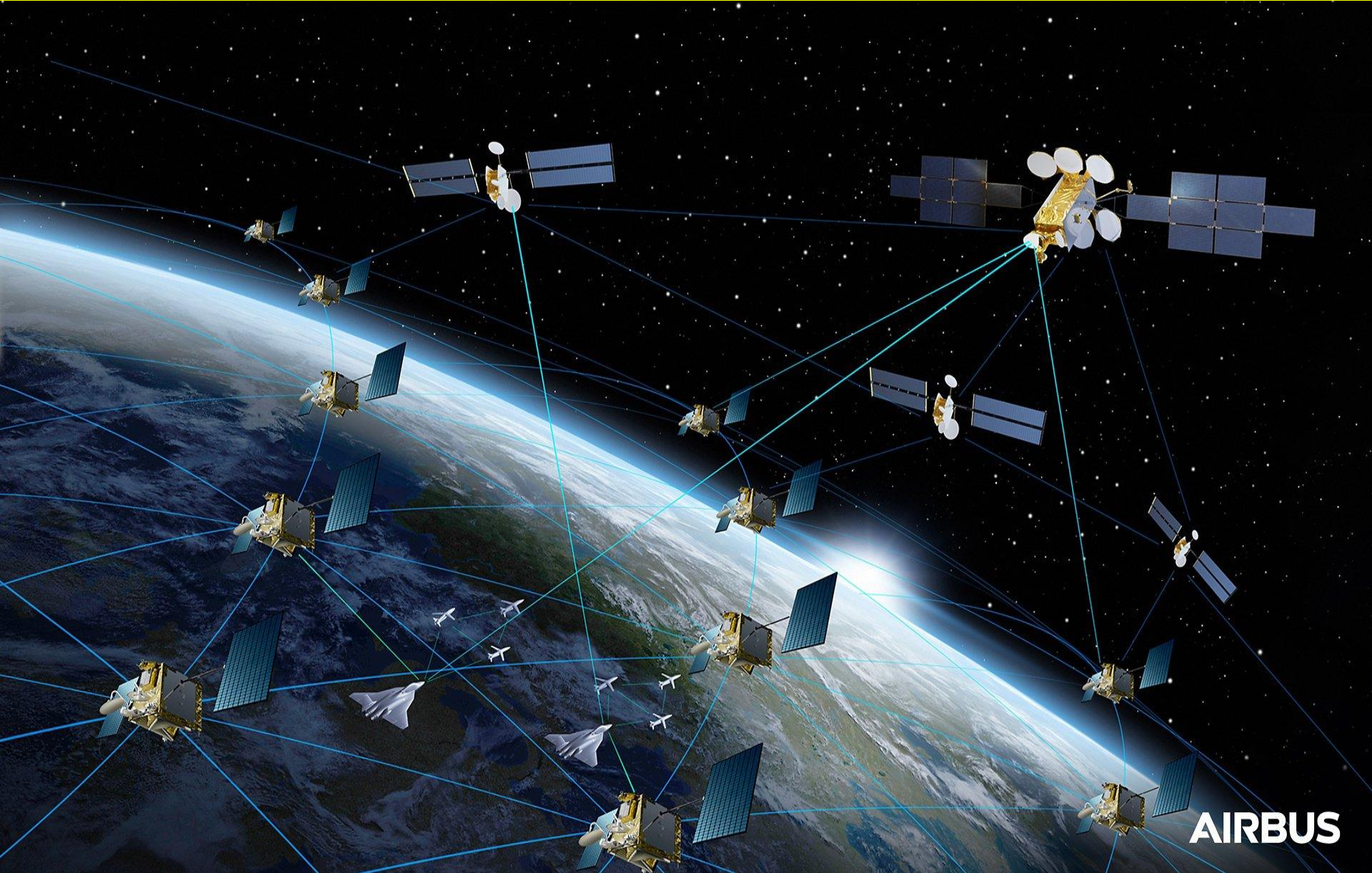
Co-Orbiting Military Demo Constellation

- Rapid tech refresh
- Resilience
- Global persistence
- Autonomous ops
- Overhead Persistent Infrared (OPIR)/Position Navigation Timing (PNT)/ Communication/Radio Frequency (RF)
- Low-cost commoditized COTS bus
- Rapid response to future threats



Artist's Concept

...Europeans too ...



No Air dominance without Space dominance - Defence - Airbus

... Hollywood shows us ...



... and the US army plans ...

ENABLING OPERATIONS IN THE FUTURE BATTLESPACE



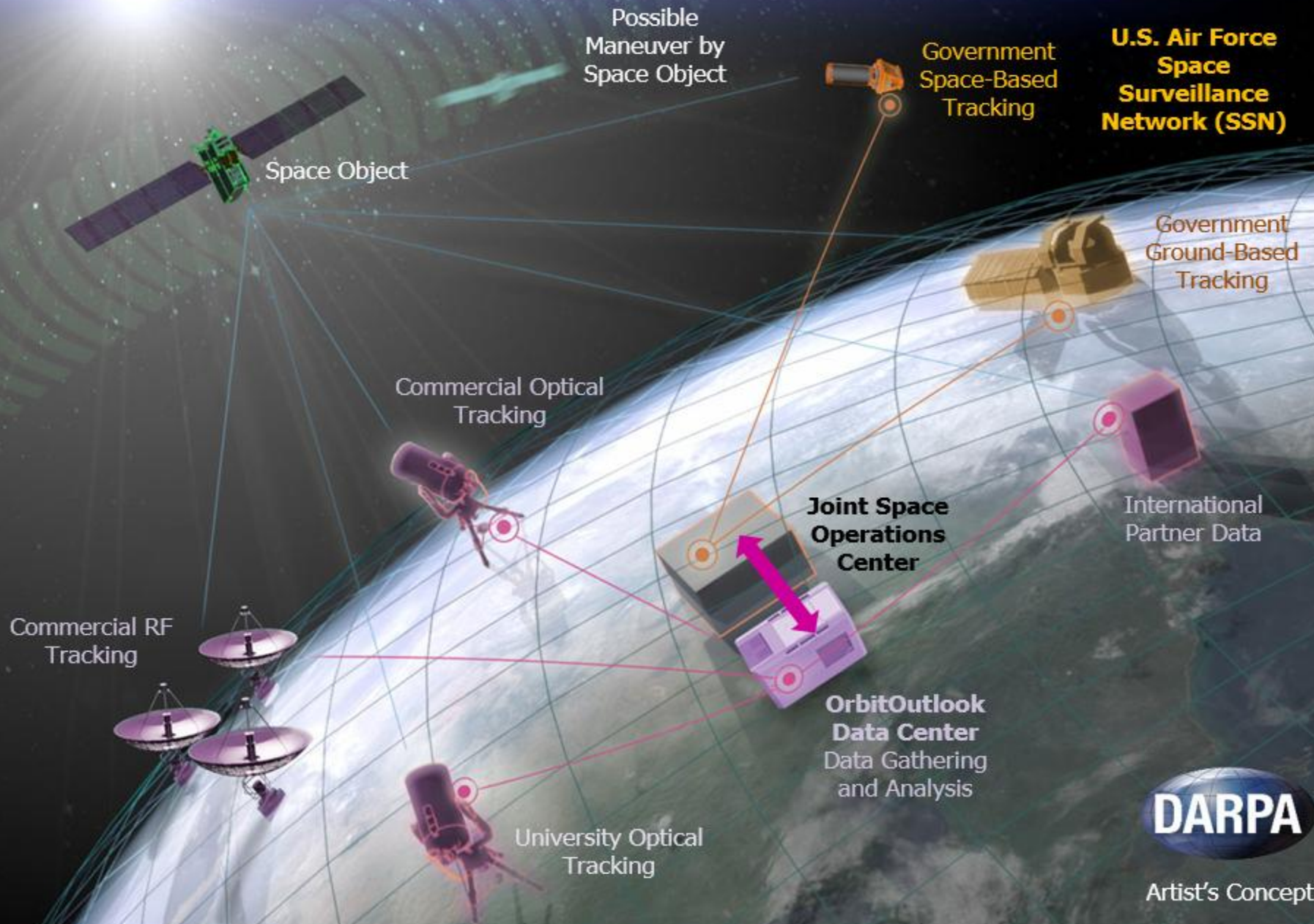
DISSEMINATING THE FUTURE TODAY

© 2004 Blackwell Publishing Ltd *Journal of Internal Medicine* 255: 105–112

... near future ... *(not a movie...)*

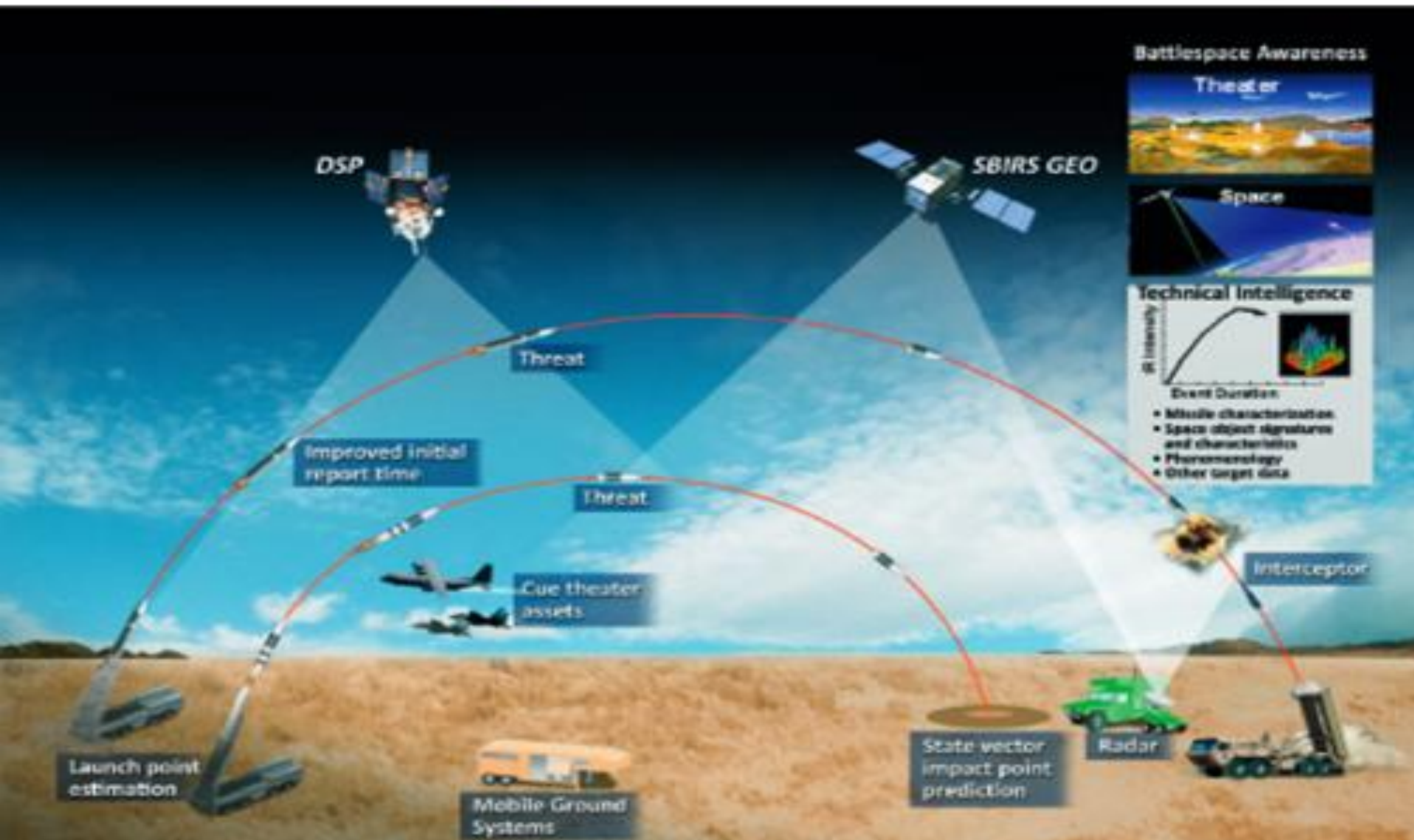


...Space Surveillance Network (SSN)



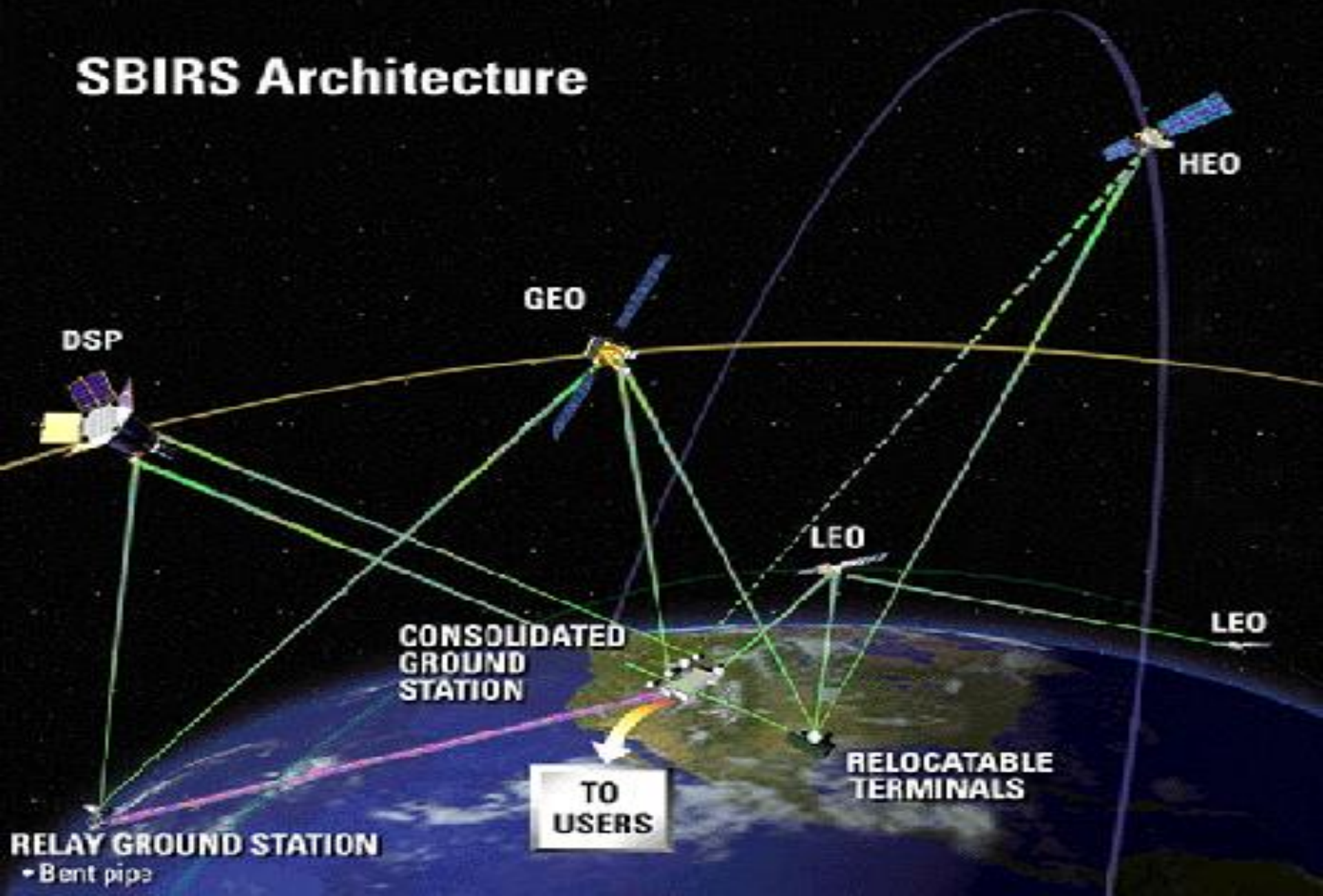
...Space Based Infrared System (SBIRS)

SBIRS System Architecture



...Space Based Infrared System (SBIRS)

SBIRS Architecture



...Space Based Infrared System (SBIRS)

SBIRS Architecture Baseline High Now - Low Later

4 Satellites Geosynchronous
Orbits (GEO)

- 1st Delivery '02

2 Satellites Highly Elliptical
Orbits (HEO)

- 1st Sensor Delivery '01



TBD Satellites Low Earth
Orbits (LEO)

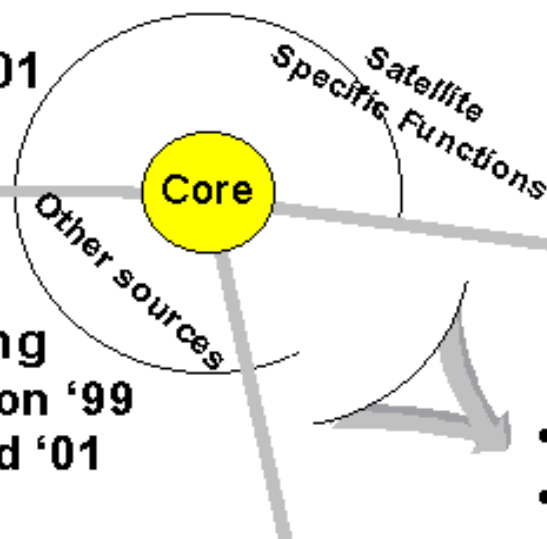
- DAB '97

- 1st Delivery '06

Multi-IR Source
Ground Processing

- DSP Consolidation '99

- Objective Ground '01



• DSP - Operational
• ALERT - Operational



Integrated Architecture to Meet SBIR System ORD

4. *From ...* **MAMMY BLUE ...**

**Every applicable innovation
to become
Commercial and
Benefit Society
Is born and starts
from the
Military ...**

For the last 70 years from ... **MAMMY BLUE** *...*



Like all Mothers-Priority: PROTECTION



**PIVOTAL INVESTMENTS
IN BREAKTHROUGH TECHNOLOGIES
FOR NATIONAL SECURITY**

DARPA



DEFENSE ADVANCED
RESEARCH PROJECTS AGENCY

Best Wishes for the New Year



Advanced Research Projects Agency-Energy



DARPA history



SATURN F1
Rocket Engine



Stealth Fighter



Speech Recognition



Microelectromechanical Systems
(MEMS)



1960

1970

1980

1990

2000



ARPA Established
1958

M16 Assault Rifle

ARPANET

Global Hawk

DARPA &ARPA ...(Mother & Daughter)

DARPA: Creating Breakthrough Technologies for National Security

For nearly 60 years, the Defense Advanced Research Projects Agency (DARPA) has had a singular mission: to make pivotal investments in breakthrough technologies for national security. Through its investments, DARPA catalyzes the development of new capabilities that give the Nation technology-based options for preventing—and creating—strategic surprise.

Established in 1958 as part of the U.S. Department of Defense, DARPA is designed to pursue opportunities for transformational change rather than incremental advances. It does so collaboratively as part of a robust innovation ecosystem that includes academic, corporate, and governmental partners. And while its focus is always on the Nation's military Services, which count on DARPA to create new strategic and tactical options, DARPA's work has historically catalyzed fundamental breakthroughs that have benefited broader society as well.

and sometimes entire industries have sprung from DARPA-funded research—reflecting the Agency's commitment to pursue its ideas all the way from initial concept to demonstration of practical feasibility through prototype development.

DARPA programs are led by program managers who come from academia, industry, national laboratories and other parts of government for stints that typically last just a few years—a time limit that helps drive the Agency's signature sense of urgency. They



THE ADVANCED RESEARCH PROJECTS AGENCY-ENERGY OVERVIEW

ABOUT ARPA-E

The Advanced Research Projects Agency-Energy (ARPA-E) catalyzes transformational energy technologies that could create a more secure and affordable American future. We advance high-potential, high-impact energy technologies that are too early for private-sector investment. ARPA-E awardees are unique because they are developing entirely new ways to generate, store, and use energy.

ARPA-E projects have the potential to radically improve U.S. economic prosperity, national security, and environmental well-being. We focus on transformational energy technology projects that can be meaningfully advanced with a small investment over a defined period of time. Our streamlined awards process enables us to act quickly and advance cutting-edge areas of energy research.

ARPA-E empowers America's energy researchers with funding, technical assistance, and market readiness. Our rigorous program design, competitive project selection process, and active program management ensure thoughtful expenditures. ARPA-E Program Directors serve for limited terms to ensure a constant infusion of fresh thinking and new perspectives.

ARPA-E HISTORY

In 2005, leaders from both parties in Congress asked the National Academies to identify concrete steps that federal policymakers could take to bolster U.S. competitiveness in science and technology to help the U.S. prosper and stay secure in the 21st century. The National Academies recommended that Congress establish an Advanced Research Projects Agency within the U.S. Department of Energy (DOE). In 2007, Congress passed, and President Bush signed into law, the America COMPETES Act, establishing ARPA-E. In 2009, Congress appropriated and President Obama allocated the new agency's first \$400 million in funding.

ARPA-E is modeled after the successful Defense Advanced Research Projects Agency (DARPA) in the Department of Defense (DoD), the agency credited with such innovations as GPS, the stealth fighter, and computer networking.

"Pound for pound, dollar for dollar, it's hard to find a more effective thing government has done than ARPA-E."

—FedEx founder, chairman, president, and CEO Fred Smith

ARPA-E PROJECTS

To date, ARPA-E is investing in over 275 high-potential energy technology projects across 14 distinct program areas. The Agency also issues periodic open funding solicitations to address the full range of energy-related technologies, as well as funding solicitations aimed at supporting America's small business innovators.

Many ARPA-E projects have already demonstrated early indicators of technical success. For example, ARPA-E awardees have doubled the world-record energy density for a rechargeable lithium-ion battery, developed a 1 megawatt silicon carbide transistor the size of a fingernail, engineered microbes that use hydrogen and carbon dioxide to make liquid transportation fuel, and pioneered a near-isothermal compressed-air energy storage system.

Technical achievements like these have spurred millions of dollars in follow-on private-sector funding to a number of ARPA-E awardees. In addition, several ARPA-E awardees have formed start-up and spin-off companies.

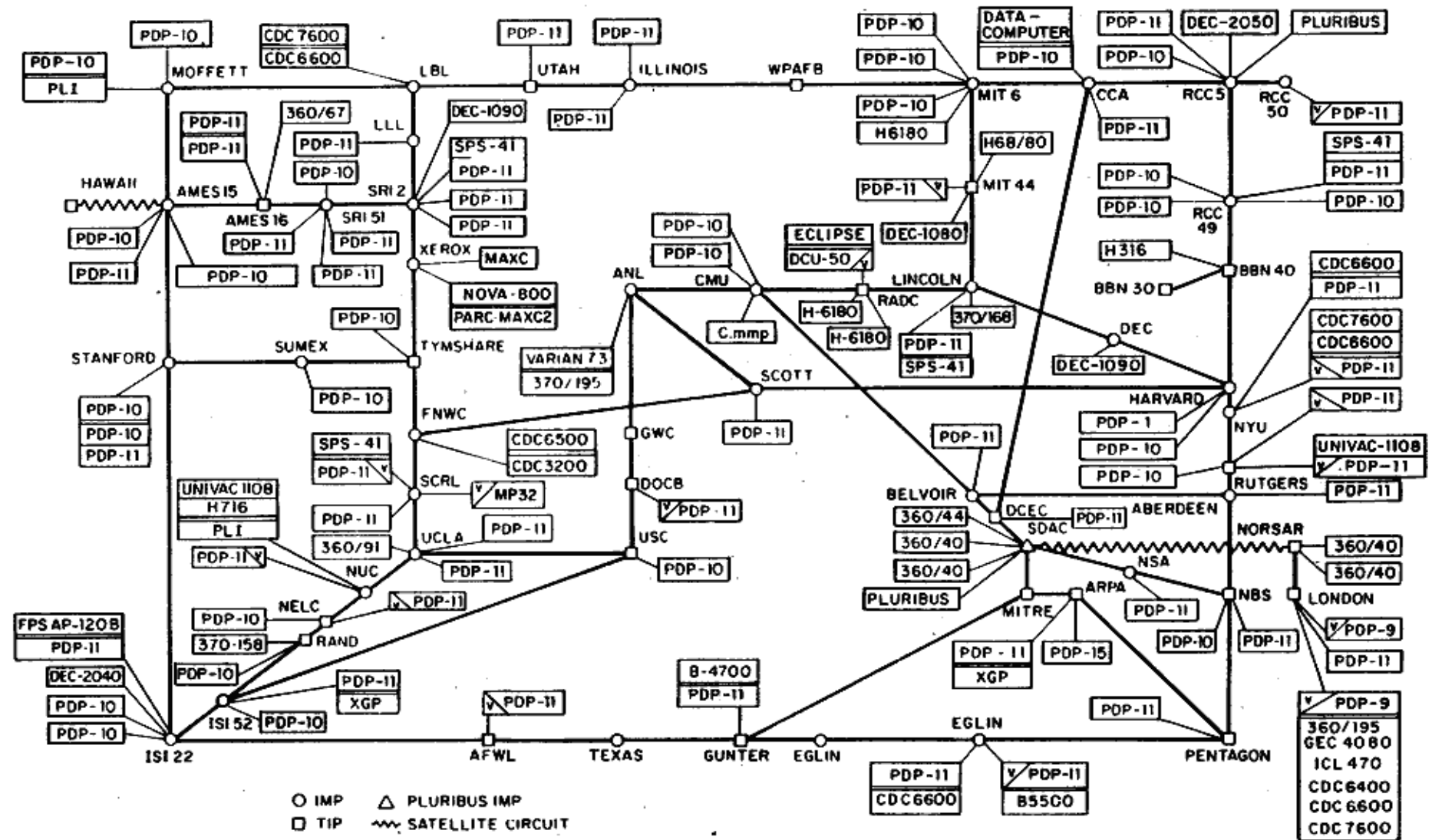
MEASURING SUCCESS

ARPA-E measures its success in a variety of ways, including:

- Breakthrough achievements
 - Patents
 - Publications
- Moving technology to market
 - Partnerships with other government agencies
 - Licensing/acquisition by an established firm
 - Licensing/acquisition resulting in a spinoff
 - Private-sector funding
 - Growth of existing company (e.g. organic growth)
- Operational milestones
 - Award and contracting benchmarks

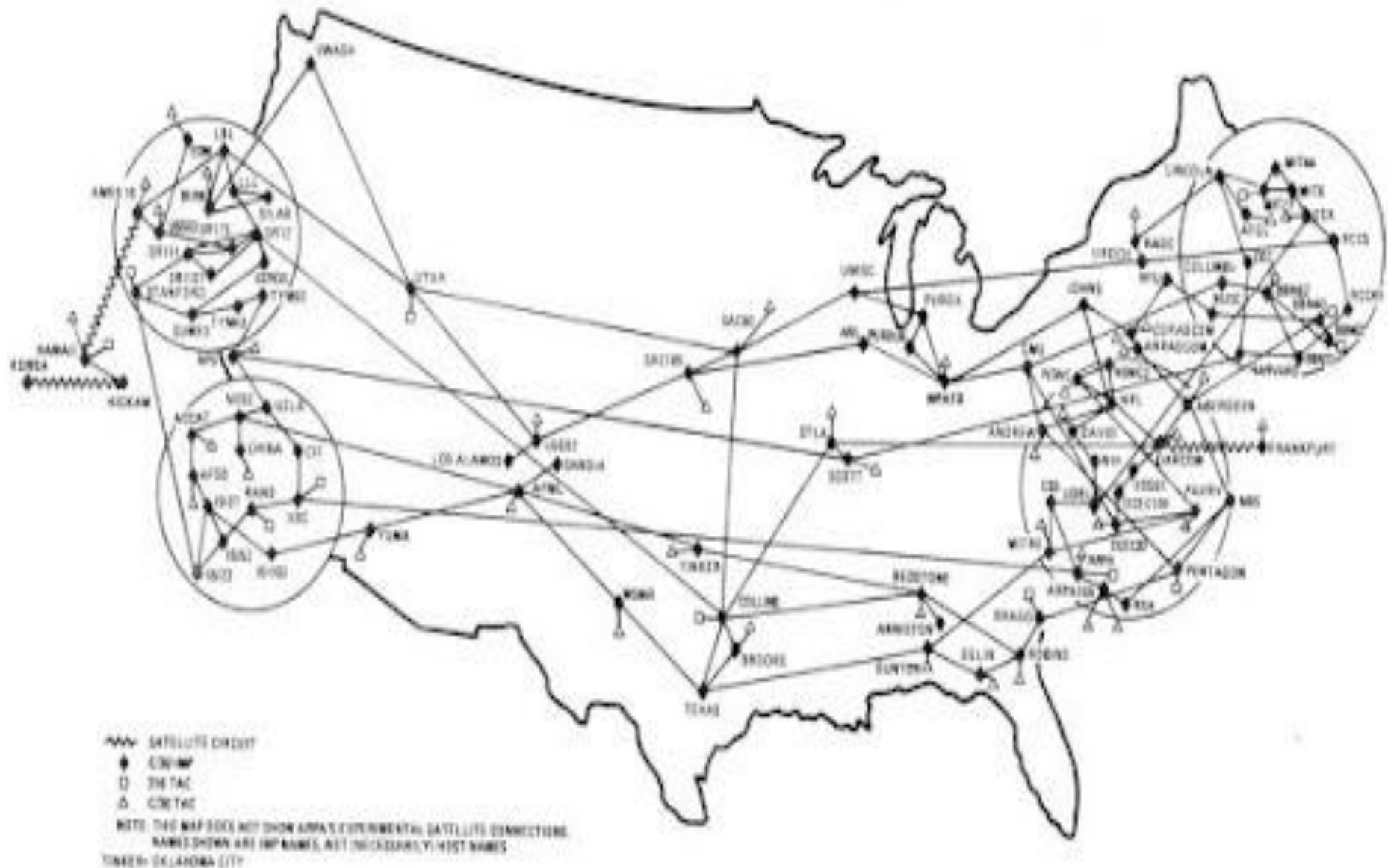
ARPANET ...before it was baptized INTERNET

ARPANET LOGICAL MAP, MARCH 1977

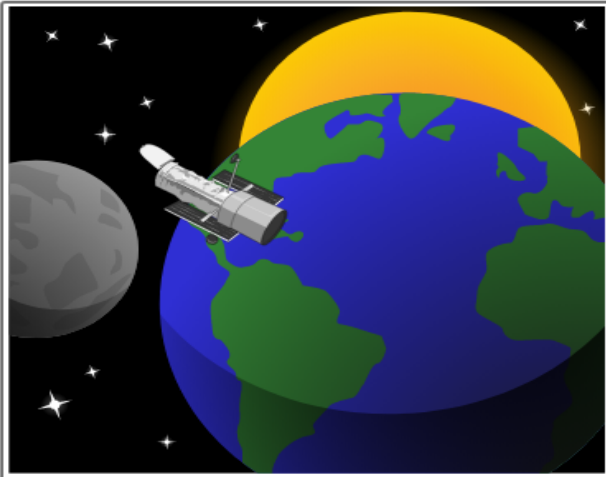


ARPANET ...before it was baptized INTERNET

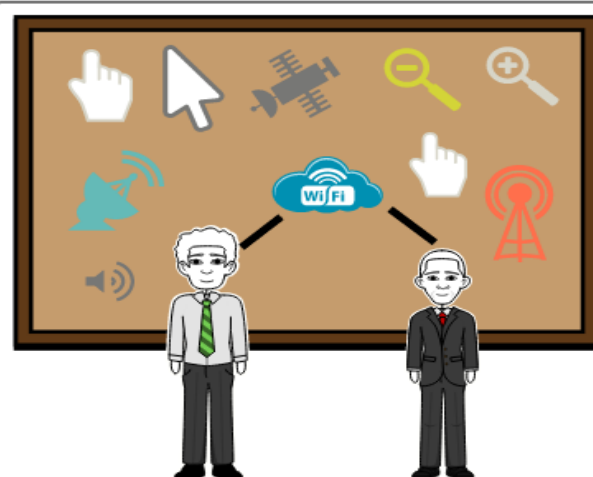
ARPANET/MILNET GEOGRAPHIC MAP, APRIL 1984



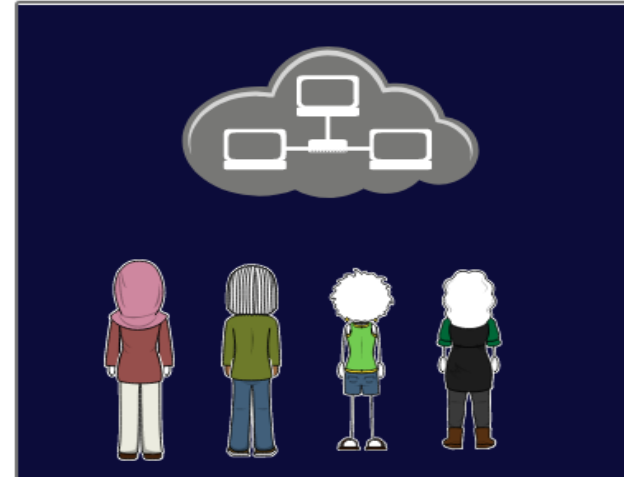
DARPA & ARPA ...Contributions



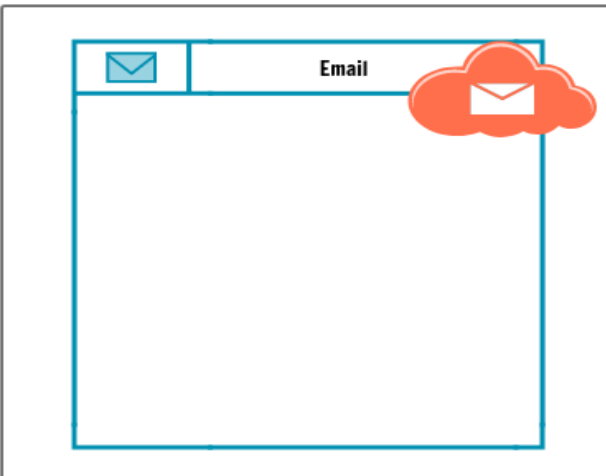
In 1957 the first satellite was launched into space by The Soviet Union. It was called Sputnik. This launch made the US Defence Department think and create ways that important info could be destroyed after a nuclear attack even if they were gone.



In the mid 1960's the original prototype of the internet was created by ARPANET (Advanced Research Projects Agency Network). They used packet switching to allow many different computers to use the same network together at the same time.



In the 1970's scientists Vinton Cerf and Robert Kahn are the original creators of Transmitting control protocol and internet protocol. This communication software proved that data could be transmitted between many networks.



The creation of email was one of ARPANET's greatest inventions. The first email was created by Ray Tomlinson in 1971 while he was working for ARPANET. Then email was the first type of fast, efficient, global communication that the world had seen. In 1978 a 14 year old boy called Shiva Ayyadurai was asked by the University Of Medicine and Dentistry to try and update email so it was easier and clearer to use.



The world wide web enables everyone to have the ability to contact people from all over the globe in a matter of seconds. This fast communication has benefited the world to help us stay connected and informed.



The evolution of the start of the internet has provided us with the social media, and internet we have today.

ARPA ...Commercialization up to now ...

Since 2009
ARPA-E has
provided

\$1.8 billion

in R&D funding to
more than **660 projects**



71 projects

have formed
**new
companies**



109 projects

have **partnered**
with other
government
agencies
to further
development



136 Projects have
attracted more than

\$2.6 billion

in private-sector follow-on funding

*Does not include \$338.5M from 3 acquisitions with
strong links to ARPA-E supported technology



1,634

peer-reviewed
journal articles
from ARPA-E
projects

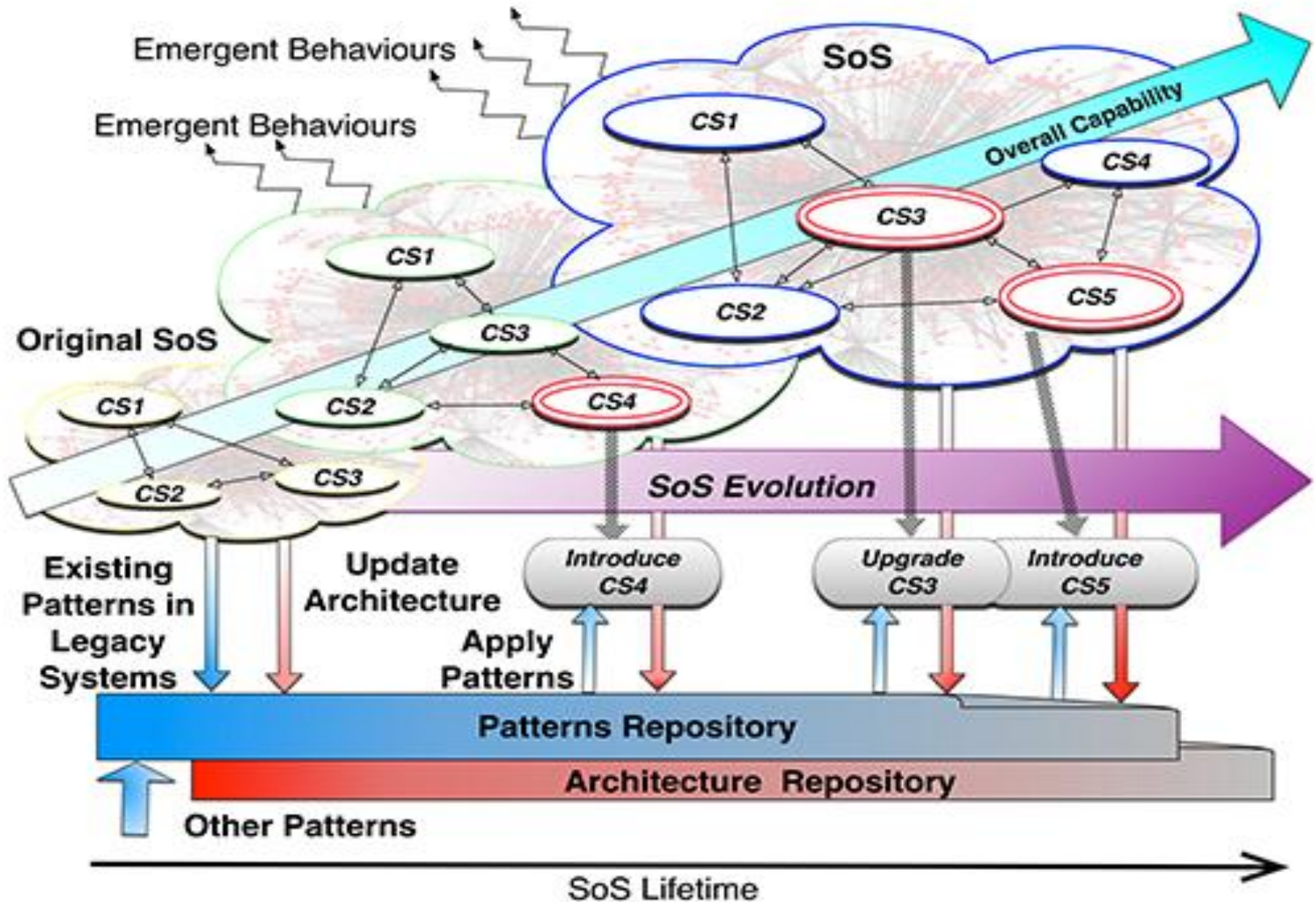


248 patents

issued by U.S.
Patent and
Trademark Office

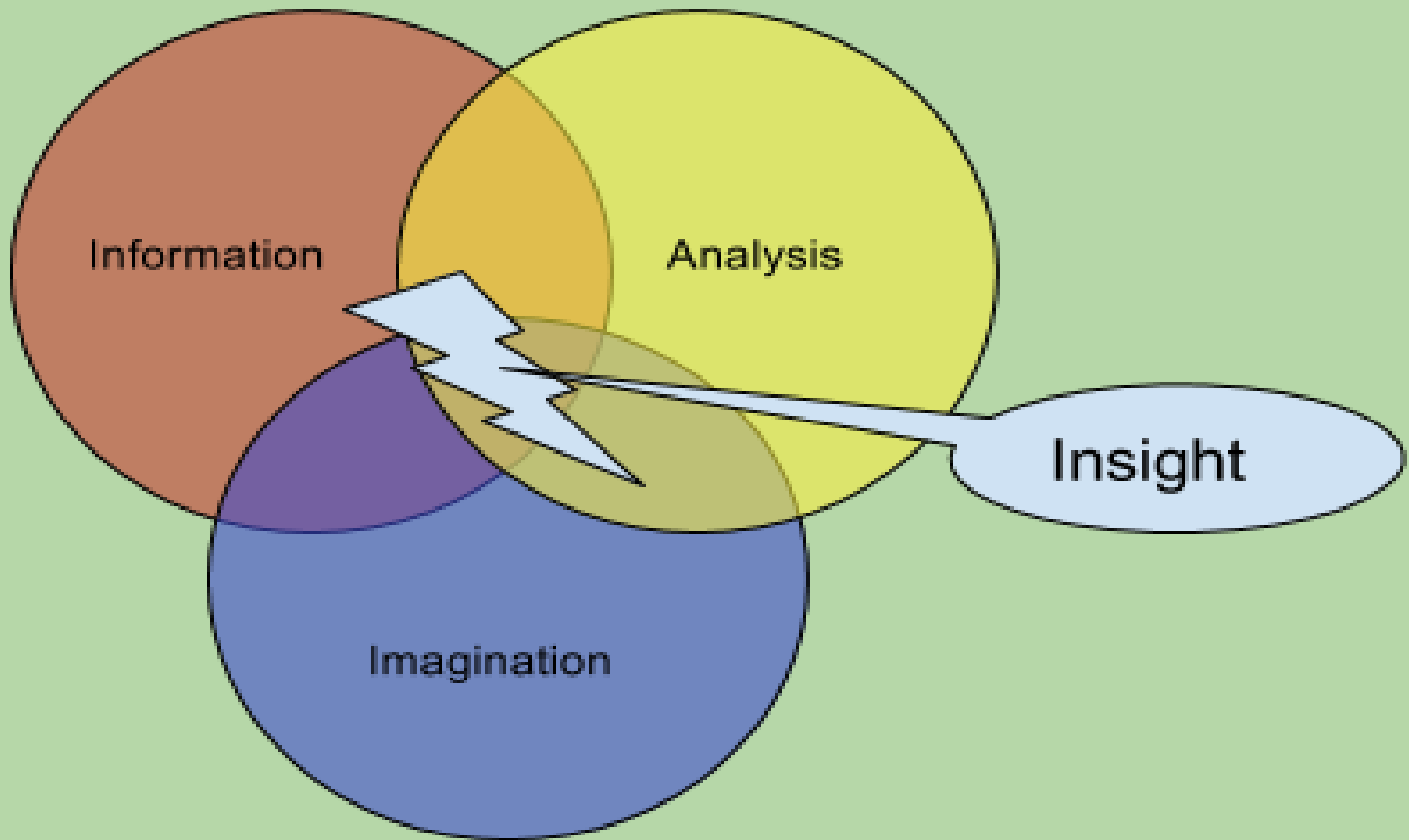


ARPA ...taps Patterns & Behaviours ...



ARPA ...uses **MIND** capabilities ...

the Enterprise futurist's toolset



DARPA & ARPA-Mind & Psychology

DARPA

OPTIMISING PERFORMANCE OF THE HUMAN BODY AND MIND

Dr. Eric Van Gieson, Program Manager in the Biological Technologies Office (BTO) at DARPA, Defense Advanced Research Projects Agency, interviewed by Ira Pastor, ideaXme life sciences ambassador.



Move the human story forward! www.radioideaxme.com



DARPA & ARPA-Mind ...

BRAIN INITIATIVE TIMELINE

- 2013:**
 - Obama announces BRAIN Initiative.
 - NIH, NSF, and DARPA commit \$100M for 2014.
- 2014:**
 - FDA and IARPA join.
 - Initiative establishes long-term vision and research priorities.
- 2016 – 2020:**
 - \$400M per year funding period dedicated to the development of new tools and technologies
- 2021 – 2025:**
 - \$500M per year funding period for application of new tools to study of the brain

FEDERAL PARTNERS

NIH Development of new tools and techniques

DARPA Rehabilitation of warfighters and civilians

ARPA-Mind Cognition and computation in the brain



NSF Fundamental biology and technology development



FDA Regulation of neurological medical devices

RESEARCH PRIORITY AREAS

1) Brain Cell Types

- Identify the many different cells that comprise the brain and determine their functions

2) Tools for Circuit Diagrams

- Map connections between nerve cells to define neural circuits within the brain

3) Technology to Monitor Neural Activity

- Monitor activity of individual nerve cells and neural circuits over the breadth of the entire brain simultaneously

4) Precise Interventional Tools

- Determine the role of different neural circuits in behavior by targeted manipulation

7) Integrated Approaches

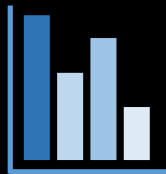
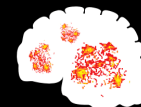
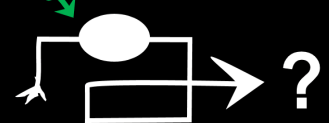
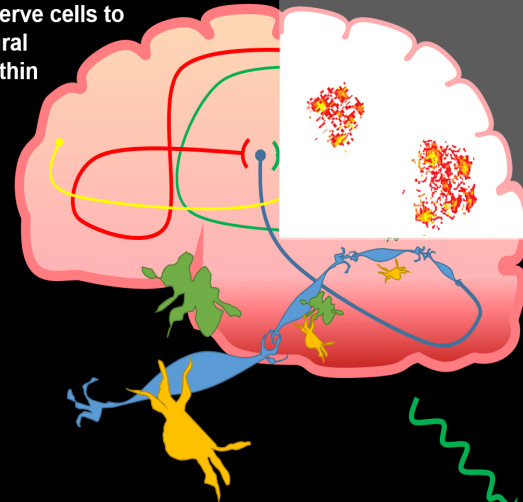
- Combine the tools and findings of other priority areas for a comprehensive understanding of brain function

6) Human Neuroscience

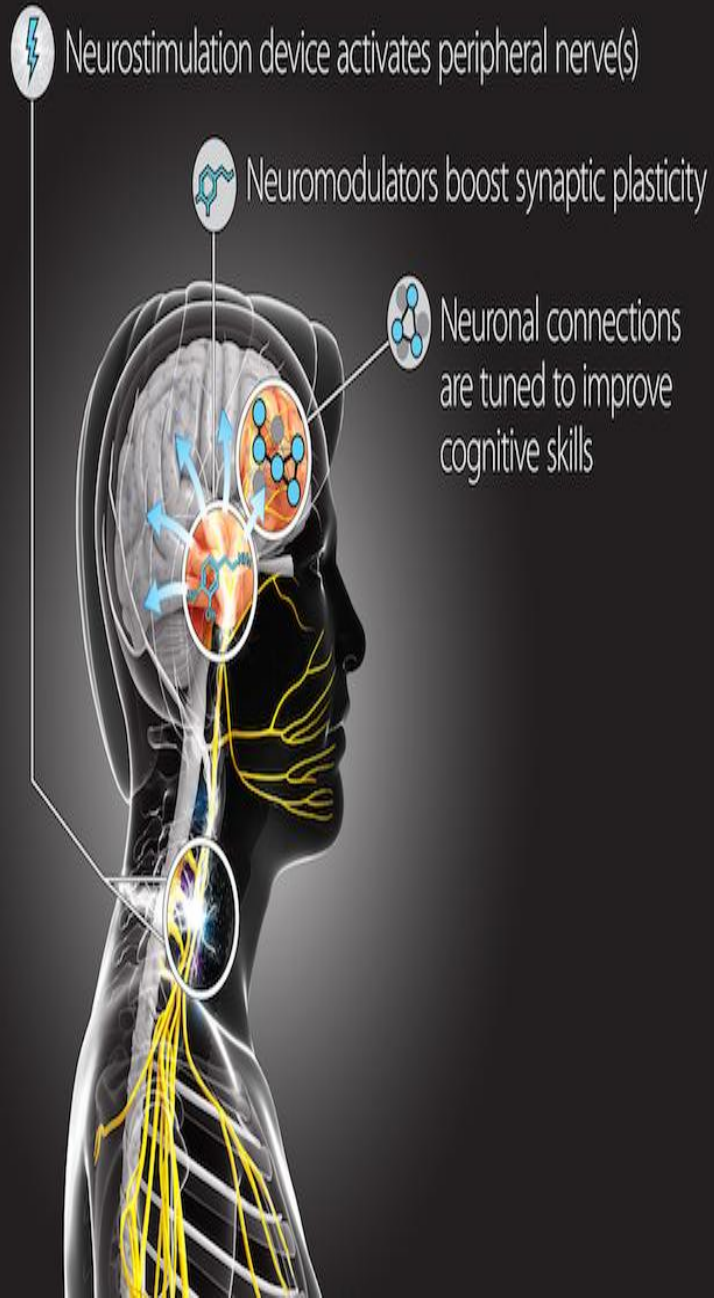
- Study the human brain and work toward treatments for disorders

5) Theory and Data Analysis Tools

- Develop new methods to work with data acquired during study of the brain



DARPA & ARPA-Mind & Psychology



BRAIN INITIATIVE

BRAIN RESEARCH
THROUGH ADVANCING
INNOVATIVE
NEUROTECHNOLOGIES



**\$100
MILLION**

Approximate investment to give scientists the tools they need to get a dynamic picture of the brain and better understand how we think, learn, and remember.

Next Battlefield ...AI

AI NEXT CAMPAIGN



AI Exploration

DARPA investments in research that lead to prototype development resulting in new, game-changing AI technologies for U.S. national Security. Researchers will work to establish the feasibility of new AI concepts within 18 months of award.



Ongoing AI Programs

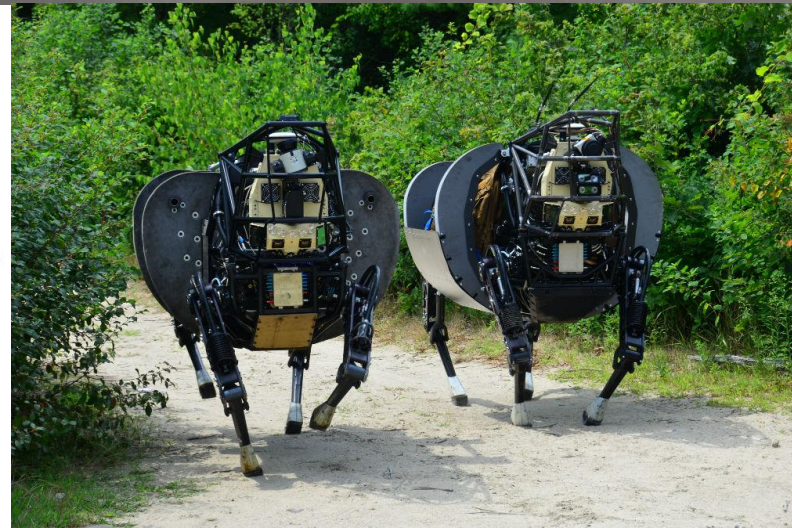
Larger and longer term DARPA technology efforts in A.I. that range from basic research to advanced technology development and are aimed at creating powerful new capabilities for the DoD



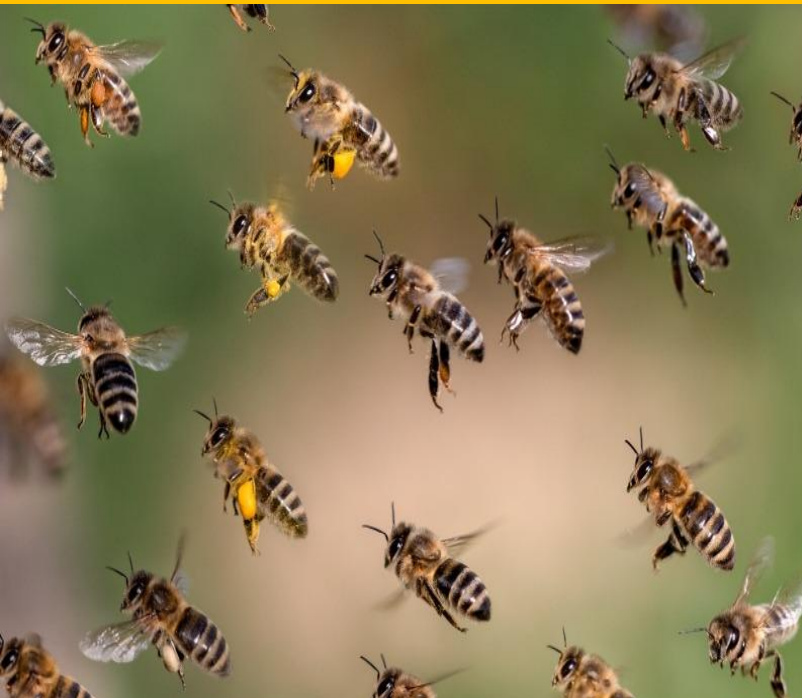
AI Colloquium

DARPA hosted event in March 2019 bringing together the DoD research community and stakeholders to learn more about DARPA's current and emerging AI programs, and discover how the technologies in development could apply to diverse missions.

Last Decade's products ...



The Edge of Tomorrow - *Swarm Technology* ...



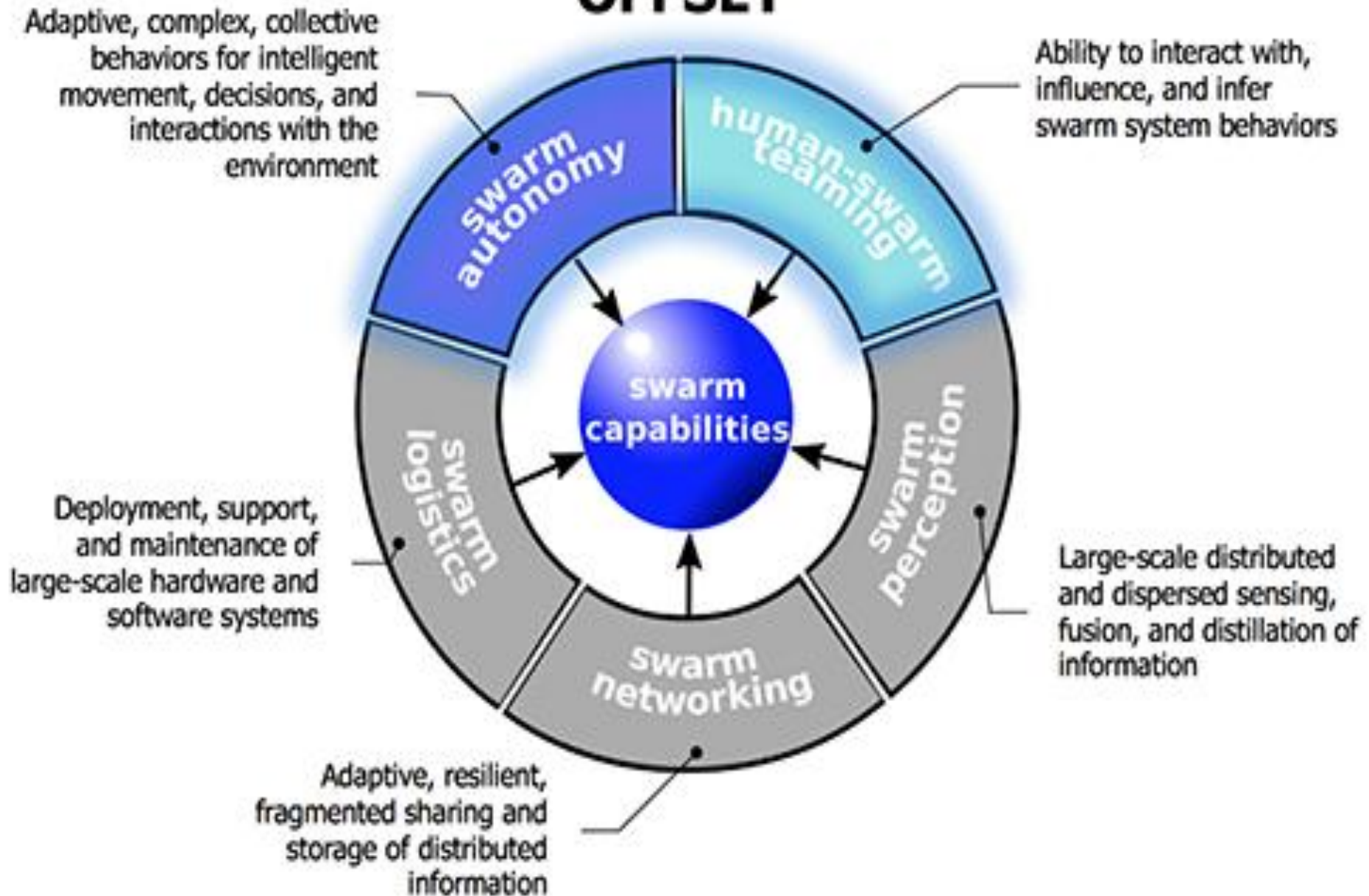
Indian Army's drone swarm of mass destruction



UK MoD Invests £2.5m in Drone Swarm Tech

The Edge of Tomorrow - *Swarm Technology* ...

OFFSET



DARPA ... flying up ...



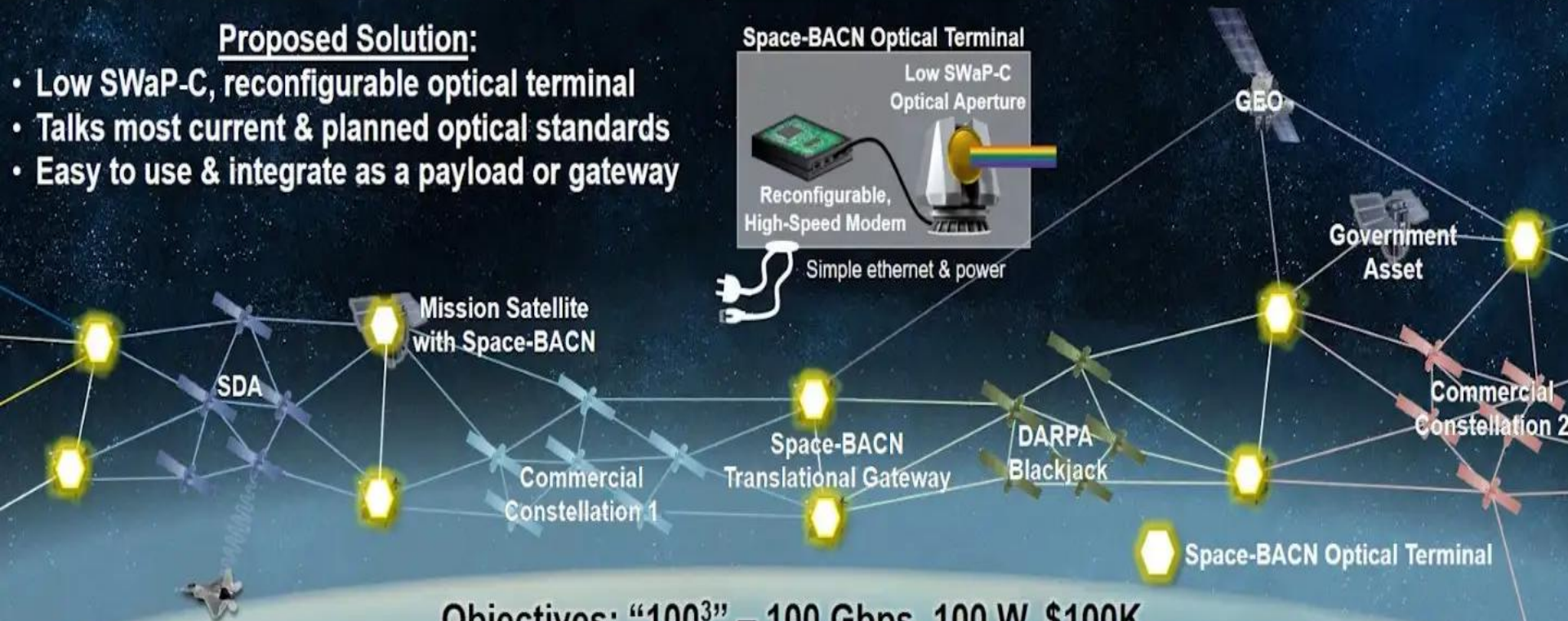
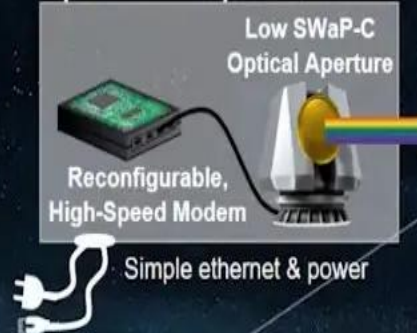
Space-Based Adaptive Communications Node (Space-BACN)



Proposed Solution:

- Low SWaP-C, reconfigurable optical terminal
- Talks most current & planned optical standards
- Easy to use & integrate as a payload or gateway

Space-BACN Optical Terminal



Objectives: “100³” – 100 Gbps, 100 W, \$100K

100 Gbps

Support most optical standards
to easily connect users

100 W

Fit most satellite platforms
Weight target of 10 kg

\$100K

Proliferate optical comms by
making it affordable

“Swiss-Army Knife” optical terminal to connect space and enable the Joint All-Domain fight

DARPA ... SPACE operations ...



DARPA space portfolio



Artist's concept



Phoenix
Mr. David Barnhart

Normalize and simplify space

Technical goals

- Affordable routine access
- Reduce escalating systems cost
- New capabilities
- Survivability / resilience / reconstitution / autonomy
- Disaggregation/simplification
- Space situational awareness

Artist's concept



Experimental Spaceplane (XS-1)
Mr. Jess Spornale

Artist's concept



ALASA
Mr. Mitchell Burnside Capp

Artist's concept



OrbitOutlook
Lt Col Larry Gunn

Artist's concept



Space Surveillance Telescope
Lt Col Travis Blake

DARPA ... SPACE children ...



DARPA ... SPACE paradigms...



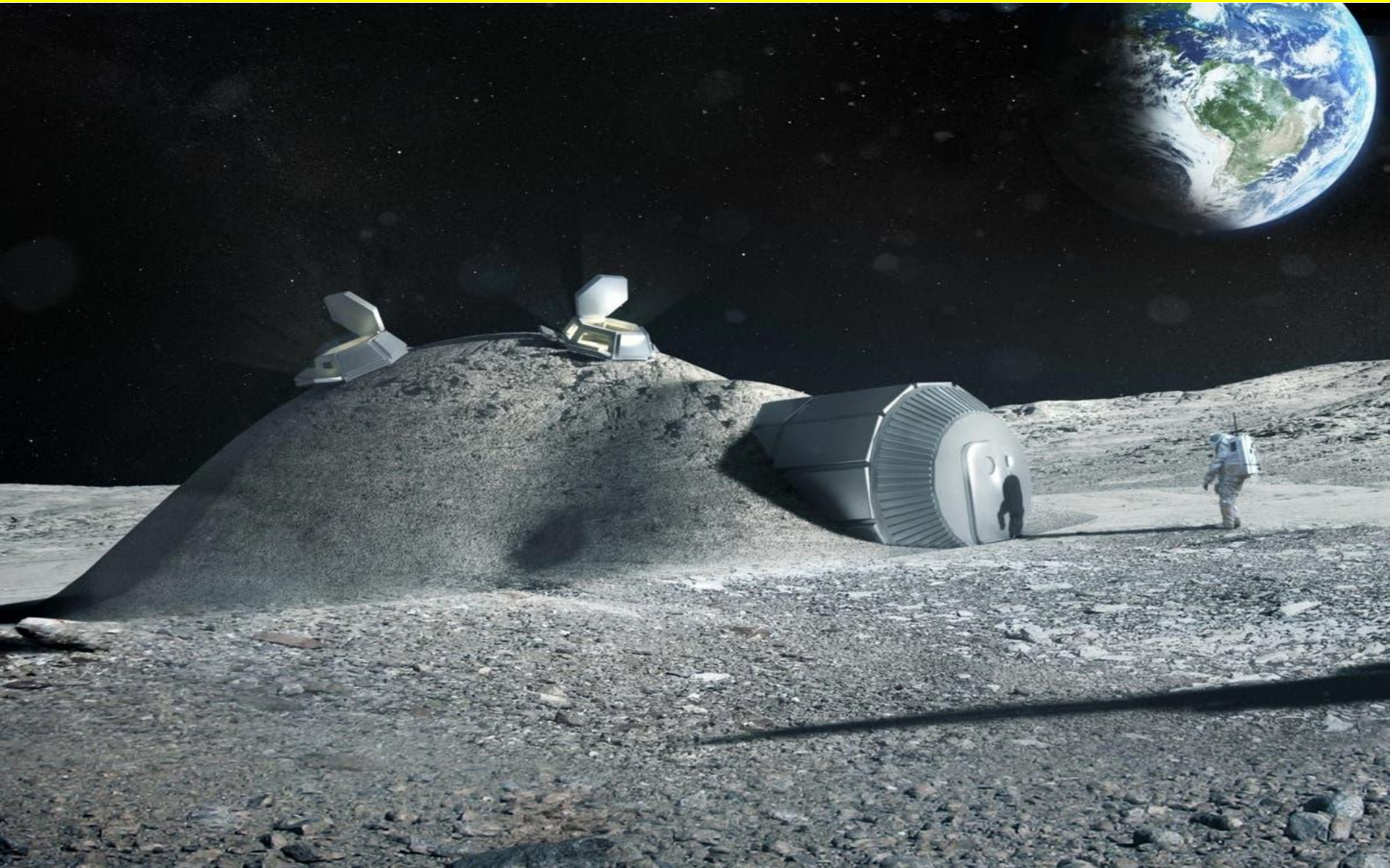
5. Next Decade

Space AIMS

and

Social Challenges

1) ... next... to colonize ... AVATAR



2) ... Intelligence Surveillance & Reconnaissance (ISR)

Raytheon

Evolving ISR Capabilities



Existing

- **Stove-piped Platforms**
 - Sensors
 - Processing
 - Ground Stations
 - U2, JSTARS



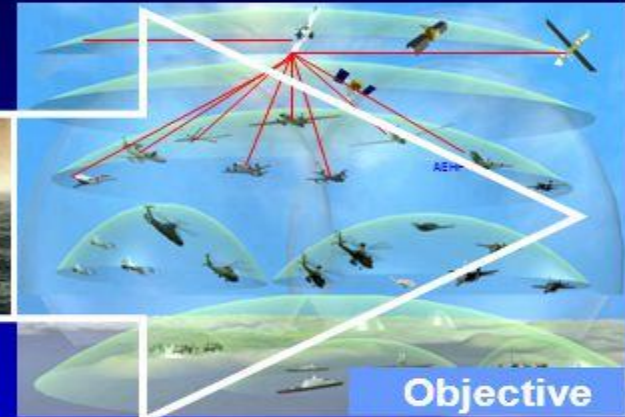
Today

- **Integrated Sensor Systems**
 - Integrated Sensors & Processing
 - Integrated Ground Stations
 - Unmanned Platforms



Tomorrow

- **Multi-Mission Systems**
 - E-10A/MC2A
 - Space Based Radar
 - USAF C2C
 - Multi-INT
 - Information Fusion
 - Multi-Mission aircraft (MMA)
 - DD(X)



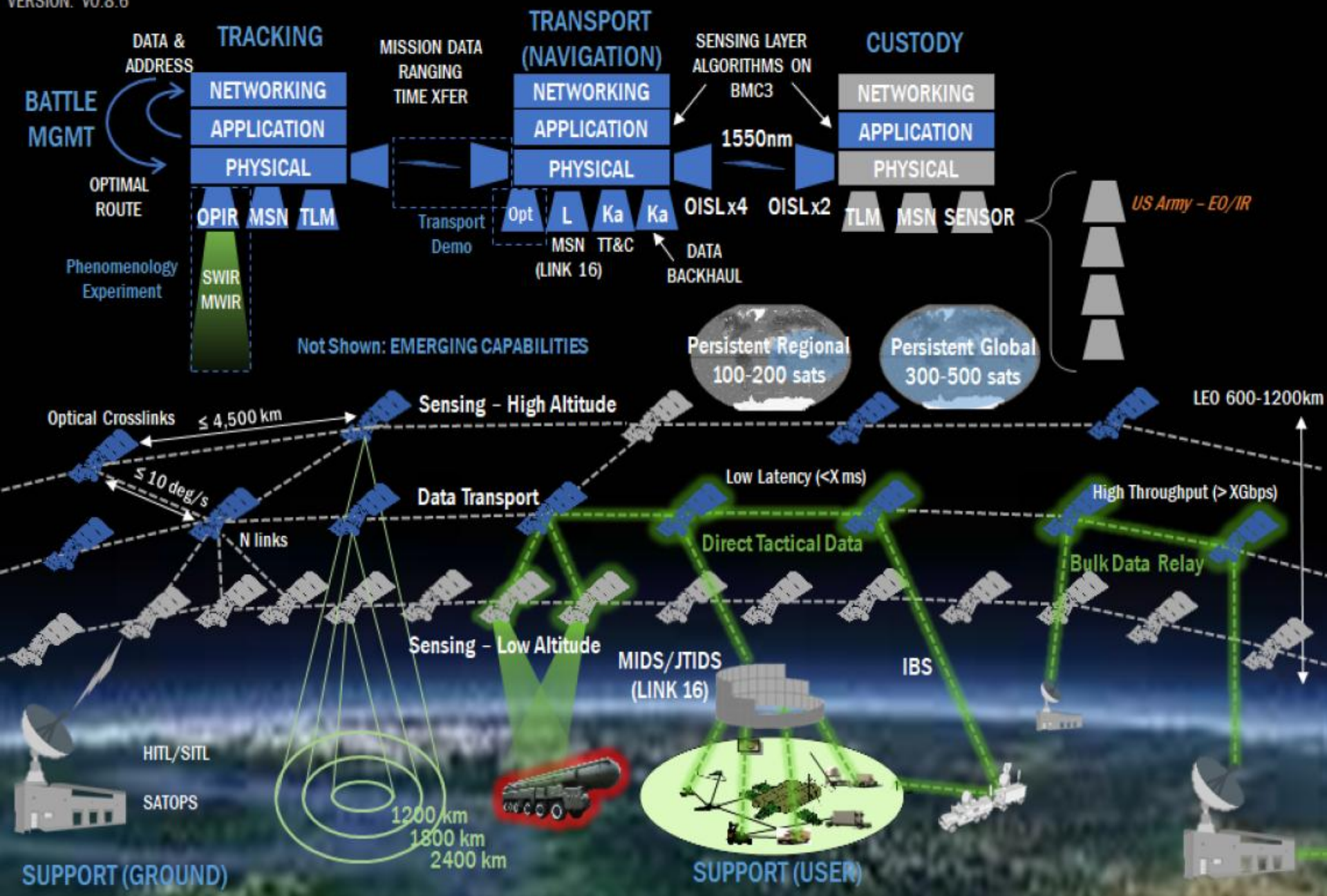
Objective

- **Network Centric Warfare**
 - Fully Interoperable Global Grid
 - Real-Time, Interactive Multi-INT
 - Achieve Rapid Global Engagement of strategic targets

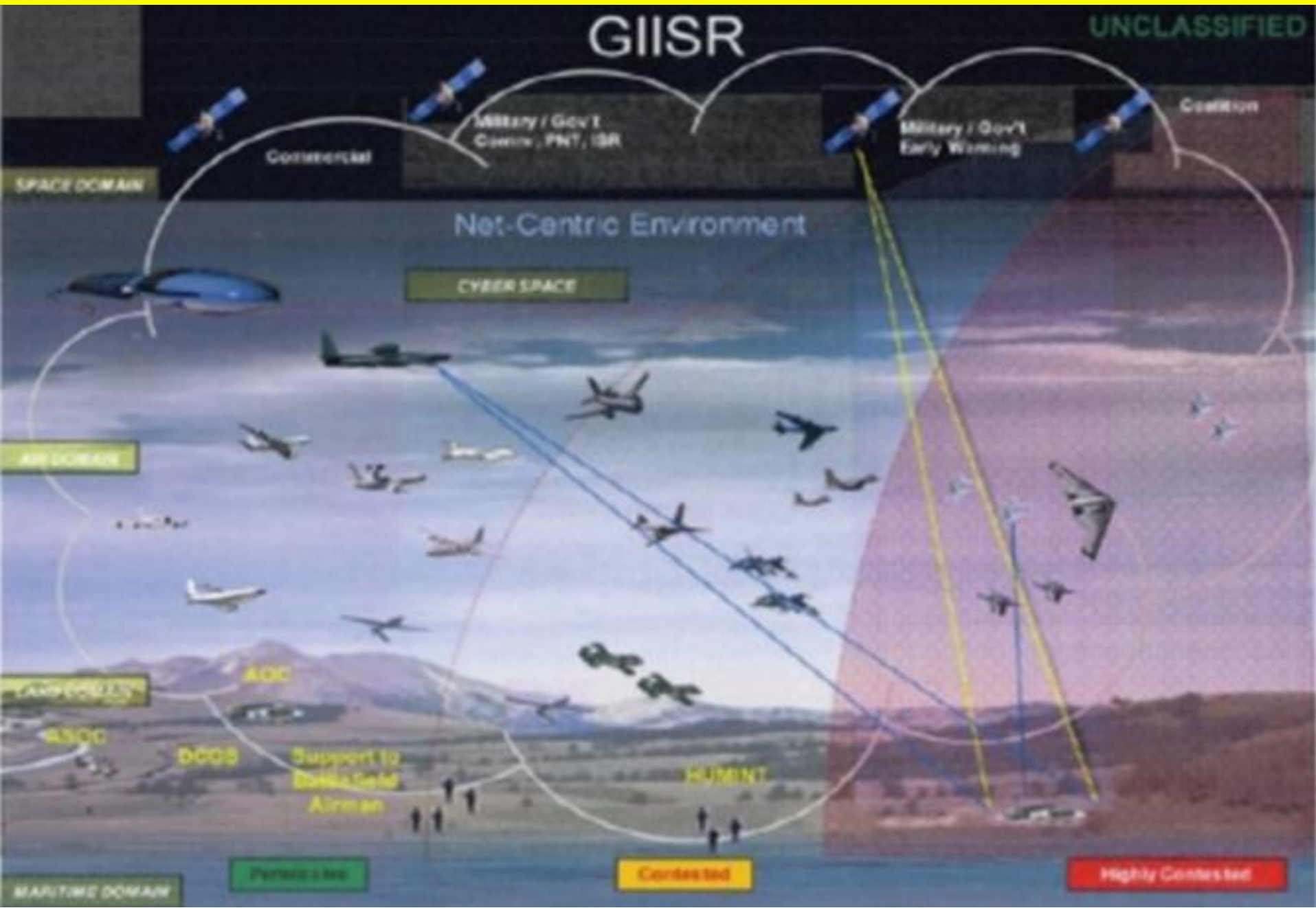
Goal – Integrated Air, Space, and Ground C2ISR

ISR for Military ...

VERSION: v0.8.6



ISR for Military ...





SAVE THE DATE!

Next Generation ISR

Intelligence Surveillance and Reconnaissance

April 7-8-9, 2021 (Virtual)

Mission Capabilities – New Opportunities – Emerging Threats

ISR in action above Cyprus...



U.S. AIR FORCE

Air Force ISR Surge



Integrity - Service - Excellence

3) ... Space-Based Adaptive Communications



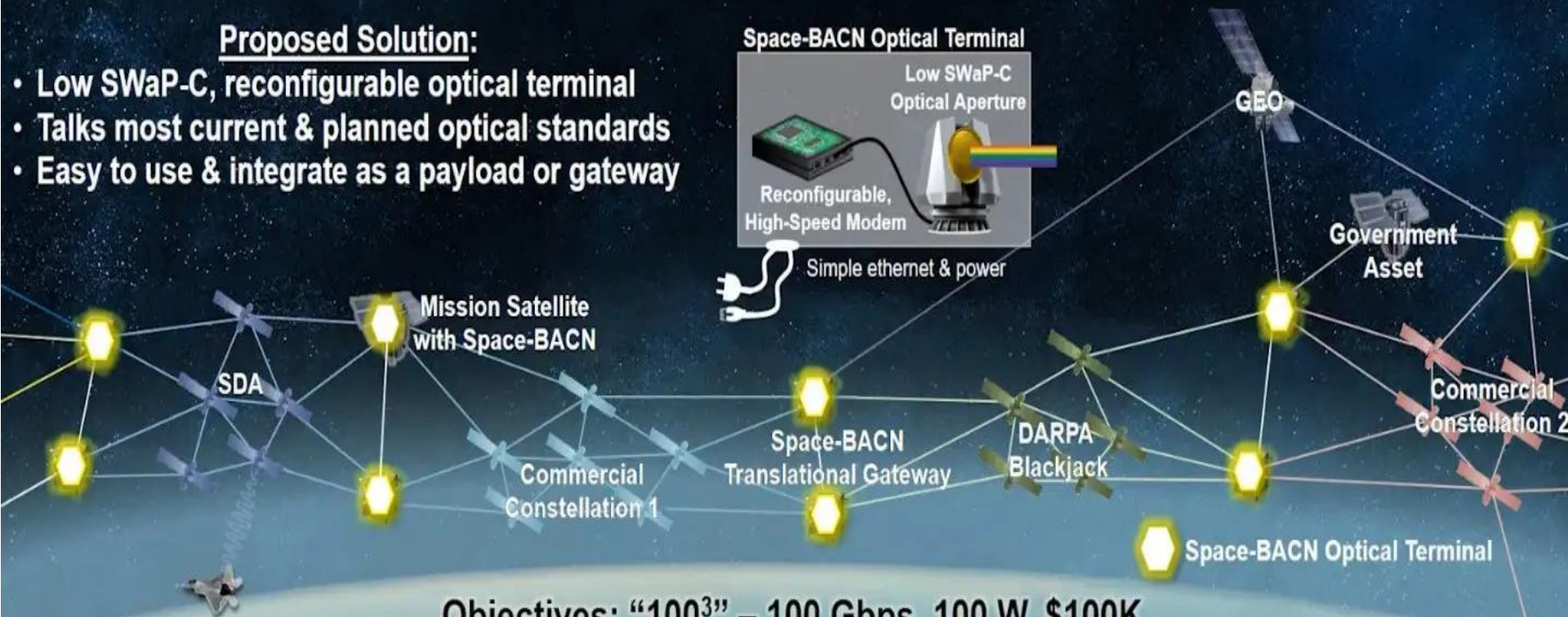
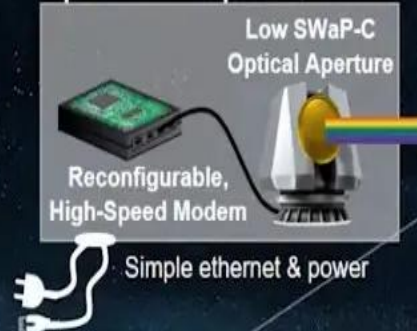
Space-Based Adaptive Communications Node (Space-BACN)



Proposed Solution:

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Space-BACN Optical Terminal



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Support most optical standards to easily connect users

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Fit most satellite platforms
Weight target of 10 kg

\$100K

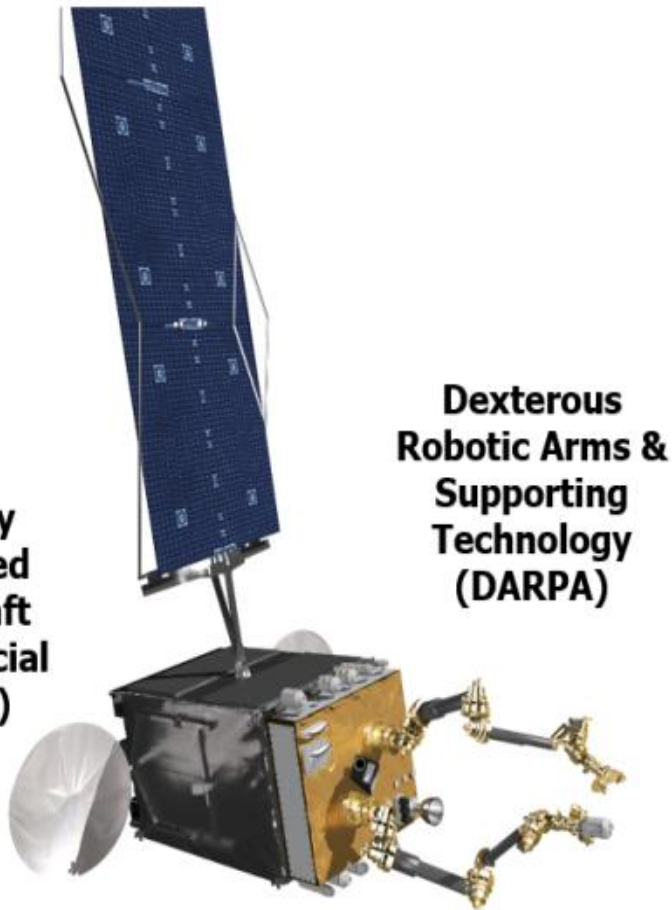
Proliferate optical comms by making it affordable

“Swiss-Army Knife” optical terminal to connect space and enable the Joint All-Domain fight

4) ... Space-Robotics

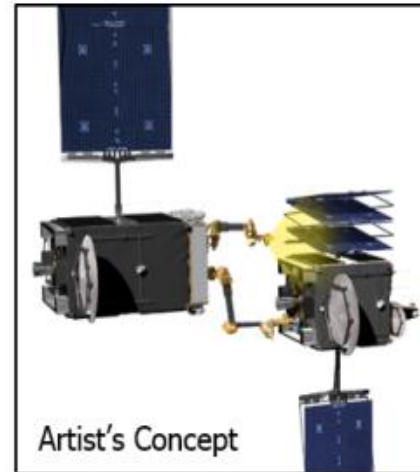
Robotic Servicing Vehicle (RSV) & Envisioned Missions

Privately
Developed
Spacecraft
(Commercial
Partner)



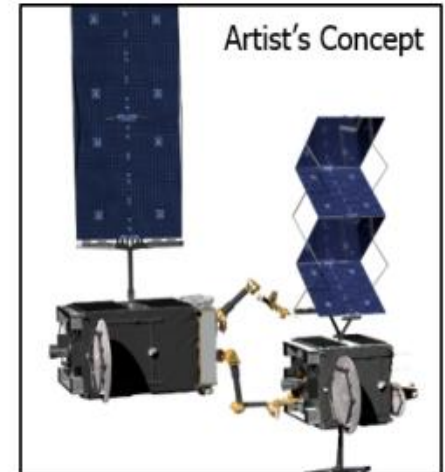
Artist's Concept

Dexterous
Robotic Arms &
Supporting
Technology
(DARPA)



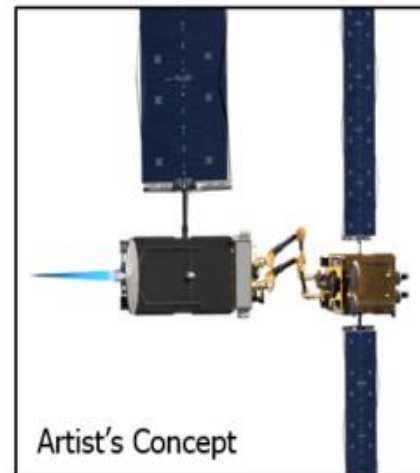
Artist's Concept

High-Resolution
Inspection



Artist's Concept

Anomaly Correction



Artist's Concept

Cooperative Relocation



Artist's
Concept

Upgrade Installation

5) Hypersonic ... vehicles ...plus

THE NEED FOR SPEED

SUBSONIC



Cruise Missile

<Mach 0.8
0.17 miles per second

SUPERSONIC



Air-to-Air Missile

Mach 1 to Mach 5
0.25 to 1 mile per second

HYPERSONIC



Future Missile

Mach 5 and Above
>1 mile per second

RANGE

Thousands of
miles

ACCURACY

Within 6 inches
of target

SPEED

Up to
Mach 17
(3.6 miles per
second)

... American ... Hypersonic ...



Hypersonic missiles are a new class of military threat capable of maneuvering and flying faster than 5,000 kilometers per hour.

And the Chinese plans - Chinese DF-ZF hypersonic glide vehicle



...and the West reacts ... to Chinese moves ...

October 28, 2021 - 2:19 AM EEST [Aerospace & Defense](#)

Top U.S. general confirms 'very concerning' Chinese hypersonic weapons test

By Phil Stewart

© 2021 Reuters. [All rights reserved](#)

October 28, 2021

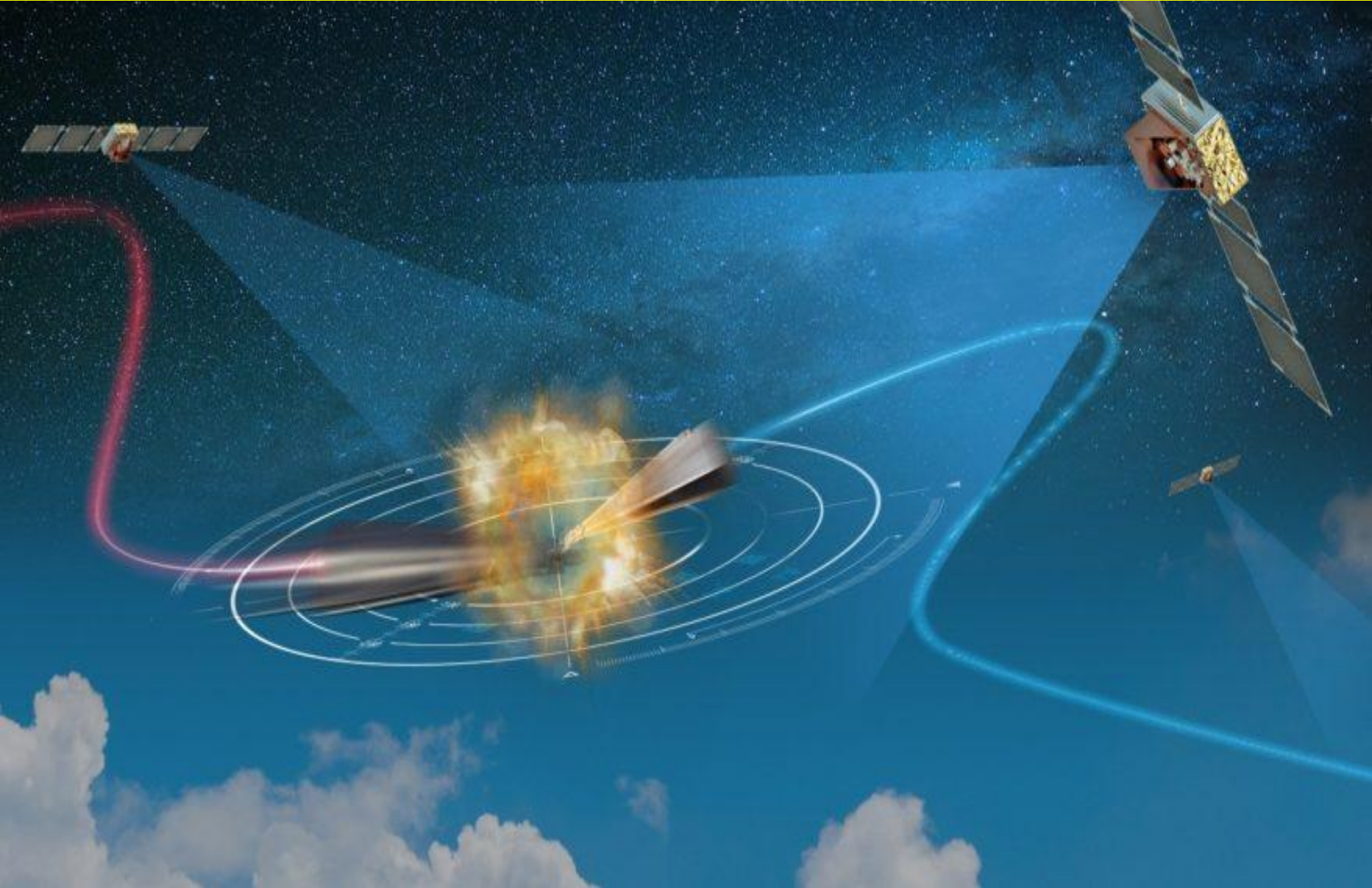
US confirms China's hypersonic missile test with concern, says it's 'close to a Sputnik moment'



Key points:

- Hypersonics move at speeds of more than five times the speed of sound, or about 6,200 kph
- Sources say the test involved a weapon that first orbited the earth, something called 'fractional orbital bombardment'
- China has denied the claims, saying what it tested was a space vehicle

...is confrontation in Space ... coming ?



Hypersonic defense from space artist concept.

Hypersonic planes ...soon ...



Roadmap: Hypersonics

High Speed Strike Weapons



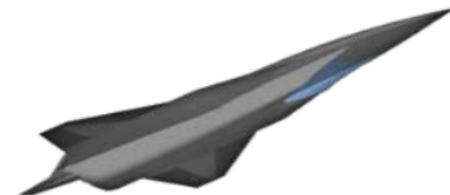
Rapid strike from standoff

Tactical Strike/ISR



Deep strike of high value targets

Reusable/Persistent



Penetrating, persistent reusable ISR & strike

Hypersonics S&T Disciplines

- Aerodynamics
- Aerothermodynamics
- Materials & Structures
- Propulsion
- Guidance, Navigation & Control
- Ordnance & Payloads
- Configuration & Integration

2020+

2030+

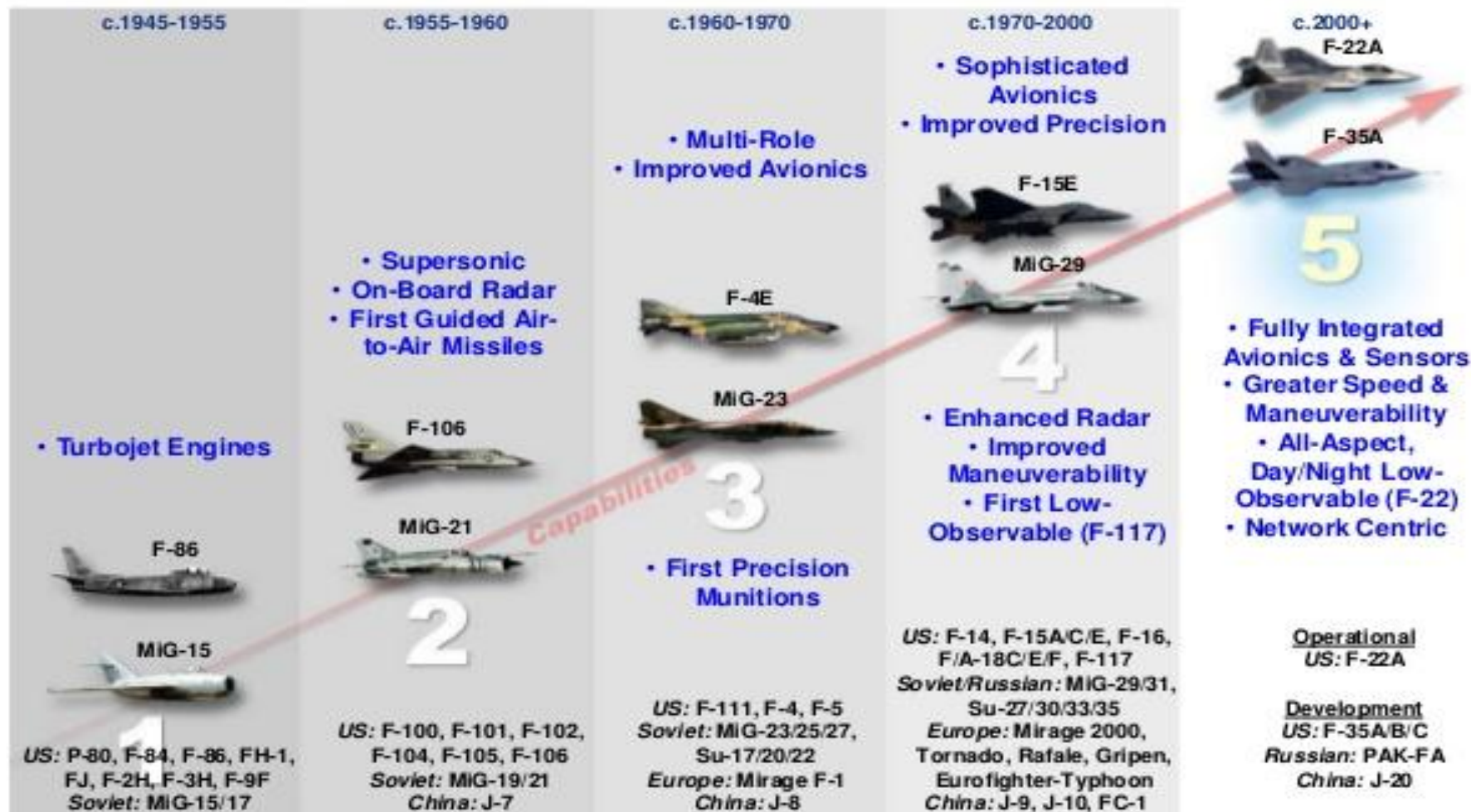
2040+

Ensure rapid and survivable strike in contested environments

5G in combat stealth planes ...



Air Force Generations of Key Fighter Aircraft



HYPERSONIC WEAPONS ALTER THE GLOBAL STRATEGIC BALANCE

Hypersonic weapons can significantly alter the world's strategic balance. It limits the opponent's reaction time to a minimum, while high-precision maneuverable hypersonic ballistic missiles can pass through any missile defense system. Hypersonic speed is 5 to 10 Mach, or 6,174-12,348 km/h

Speed Range Flight ceiling

USA

Lockheed Martin SR-72



A successor of the SR-71 Blackbird spy plane, decommissioned in 1998

6,400 km/h 24,000 m

Boeing X-51 Waverider



Hypersonic cruise missile

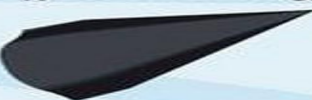
6,200 km/h 740 km 21,300 m

Advanced Hypersonic Weapon (AHW)



Part of the Prompt Global Strike program

Hypersonic Technology Vehicle 2



Developed by DARPA

Passes 17,000 km, the distance from London to Sydney, in 49 minutes

21,000 km/h

HTV-3X



Project Blackswift

Halted in 2008, said to be revived. The HTV-3X is the size of an ordinary fighter jet

Boeing X-37B



Could potentially be used as a hypersonic delivery system. Can spend extended periods time in orbit

28,044 km/h

FRANCE

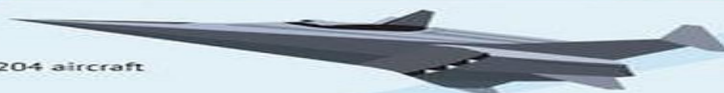
ASN4G

Air-to-surface cruise missile
Development started
No information on when first prototype will be ready

8,496 km/h

RUSSIA

Yu-71



Project 4204 aircraft

11,200 km/h 5,500 km 80,000 m

AS-19 «Koala»

Strategic hypersonic air-to-surface cruise missile

Tu-95 used as delivery vehicle



5,310 km/h 3,000 km 7,000 m (launch altitude)

Zircon 3M22

Sea-based hypersonic missile

50 times stronger kinetic energy at strike than existing air-to-ship or ship-to-ship missile. Will possibly enter service in 2018

6,500 km/h 30,000 m

INDIA

BrahMos-2

Hypersonic cruise missile



Developed in cooperation by NPO Mashinostroyeniya (Reutov, Russia) and India's Defence Research and Development Organization

7,434 km/h 290 km (estimated)

Shaurya

Tactical surface-to-surface hypersonic missile

Nuclear warhead-capable



7,434 km/h 750-1,900 km

CHINA

DF-ZF (American designation Wu-14)

Hypersonic aircraft

Can be used as nuclear warhead delivery vehicle, or for high-precision conventional strikes

6,173-12,359 km/h





01 BRAHMOS



Length: 8.4m/ 28ft
Warhead: 200 kg conventional semi-armour piercing nuclear
Guidance system: INS, Active radar homing, GPS/
GLONASS/GAGAN Satellite guidance
Maximum speed: Mach 3
Operational range: 500 km/ 310 miles



02 3M54 KALIBR



Length: 6.2-8.9m/ 20.3-29.2ft
Warhead: 400-500 kg HE or thermonuclear
Guidance system: Inertial guidance plus terminal active
radar homing, by satellites, DSMAC
Maximum speed: Mach 0.8-2.9
Operational range: 220-4500 km/ 137-2796 miles



03 P-800 ONIKS



Length: 8.9m/ 29.1ft
Warhead: 300 kg semi-armour piercing HE, thermonuclear
Guidance system: midcourse inertial guidance, active radar
homing- passive radar seeker head
Maximum speed: Mach 2.5
Operational range: 300-600 km/ 174 miles



04 TOMAHAWK BLOCK IV



Length: 5.56m/ 18.2ft
Warhead: Penetration, high-explosive blast
Guidance system: GPS, INS, TERCOM, DSMAC, active
radar homing
Maximum speed: Mach 0.74
Operational range: 1700 km/ 1000 miles



05 STORM SHADOW



Length: 5.1m/ 16.9ft
Warhead: 450 kg BROACH
Guidance system: Inertial, GPS and TERPROM, Terminal
guidance using imaging infrared DSMAC
Maximum speed: Mach 0.8-0.9
Operational range: 560 km/ 350 miles

07. DEEPSTRIKE



Role: Hypersonic glide vehicle
Manufacturer: DRDO
Status: Tested



Role: Hypersonic Missile
Manufacturer: Lockheed Martin
Status: underdevelopment

08. HSTDV MISSILE



Role: Hypersonic glide vehicle
Manufacturer: DRDO
Status: Tested

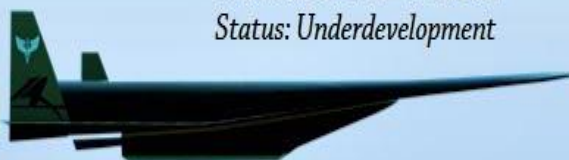


Role: Hypersonic Missile
Manufacturer: Lockheed Martin
Status: underdevelopment

09. ASN4G MISSILE



Role: Hypersonic glide vehicle
Manufacturer: IEAv & BAF
Status: Underdevelopment

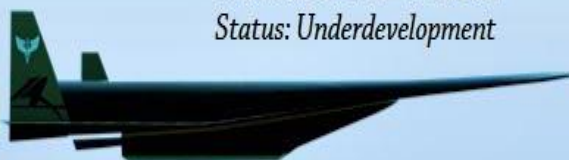


Role: Hypersonic Missile
Manufacturer: ArianeGroup
Status: underdevelopment(expected by 2021)

10. 14-X



Role: Hypersonic glide vehicle
Manufacturer: IEAv & BAF
Status: Underdevelopment



Role: Multi-platform air-launched cruise missile
Manufacturer: MBDA
Status: Design study

11. PERSEUS MISSILE



Role: Hypersonic glide vehicle
Manufacturer: CALT
Status: Initial operating capability



Role: Multi-platform air-launched cruise missile
Manufacturer: MBDA
Status: Design study

12. DF-ZF



Role: Hypersonic glide vehicle
Manufacturer: CALT
Status: Initial operating capability



Role: Multi-platform air-launched cruise missile
Manufacturer: MBDA
Status: Design study

6) ... Multi-Domain Operations (MDO)

MULTI-DOMAIN OPERATIONS (MDO) VISION

To Produce High-velocity, operationally agile operations that present multiple dilemmas for an adversary at an operational tempo they cannot match:

- Interoperability across various mission systems
- Fast-track ability to develop, deploy and field capabilities
- Accelerate sharing of information and decision making

Resilient

Distributed

Multi Domain

Open Architecture

Platform Agnostic

Affordable

Every Node Connects – Shares – Learns Involves Multi-Domain Planning...and Execution

... MDO for the Military ...

Multi-Domain Operations:

Warfare that operates using the integrated capabilities of:

- **Space**
- **Air**
- **Land**
- **Surface**

Today's Battlefield (Capability Perspective)

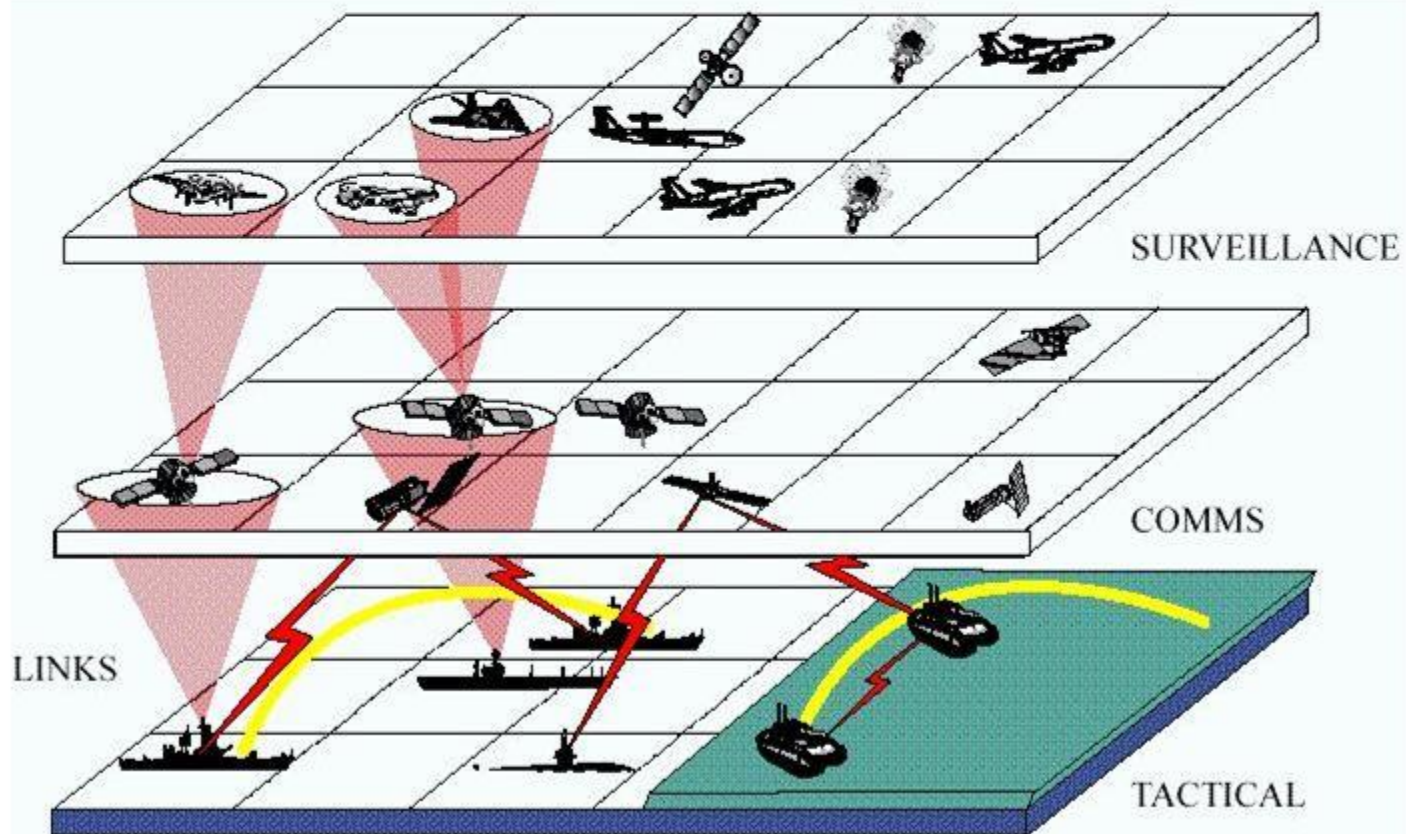
- Group Services by Type (or mission)
 - Surveillance
 - Communications
 - Tactical
- In operations of any nature its essential to ascertain impact of cyber attack by capability
 - What have I lost?

Space
Domain

Airborne
Domain

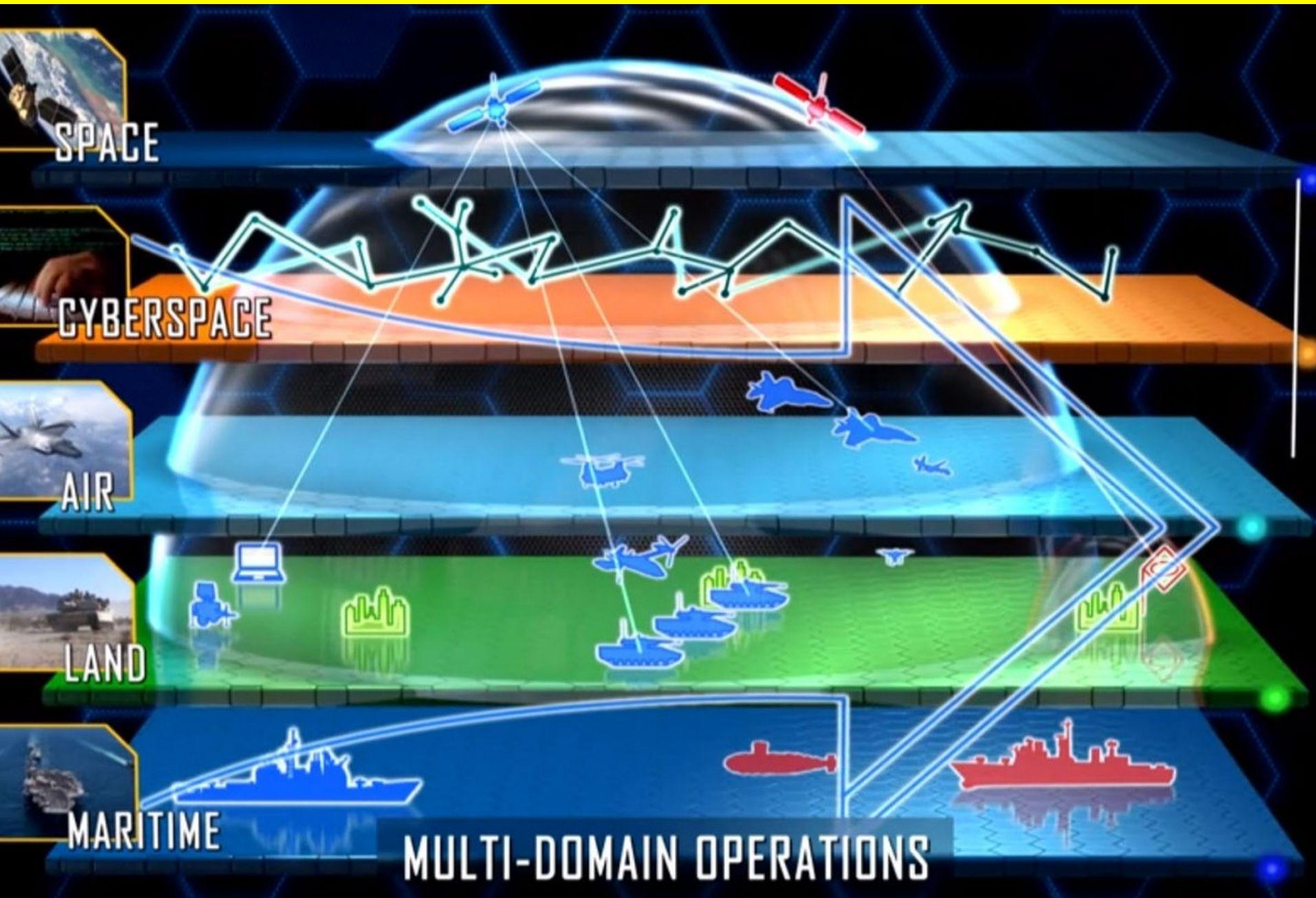
Terrestrial
Domain

Maritime
Domain

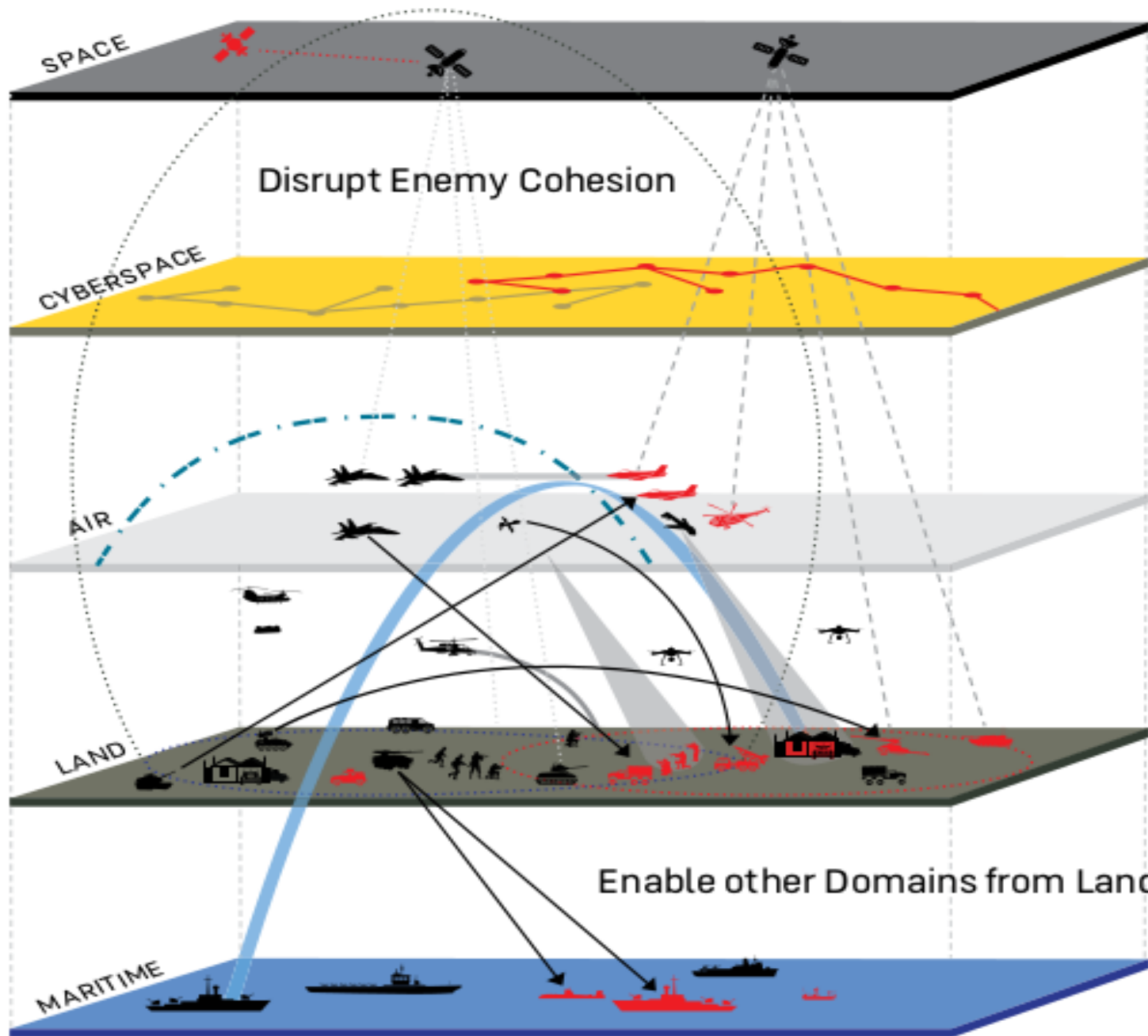


CyberSpace

... CYBERSPACE ...

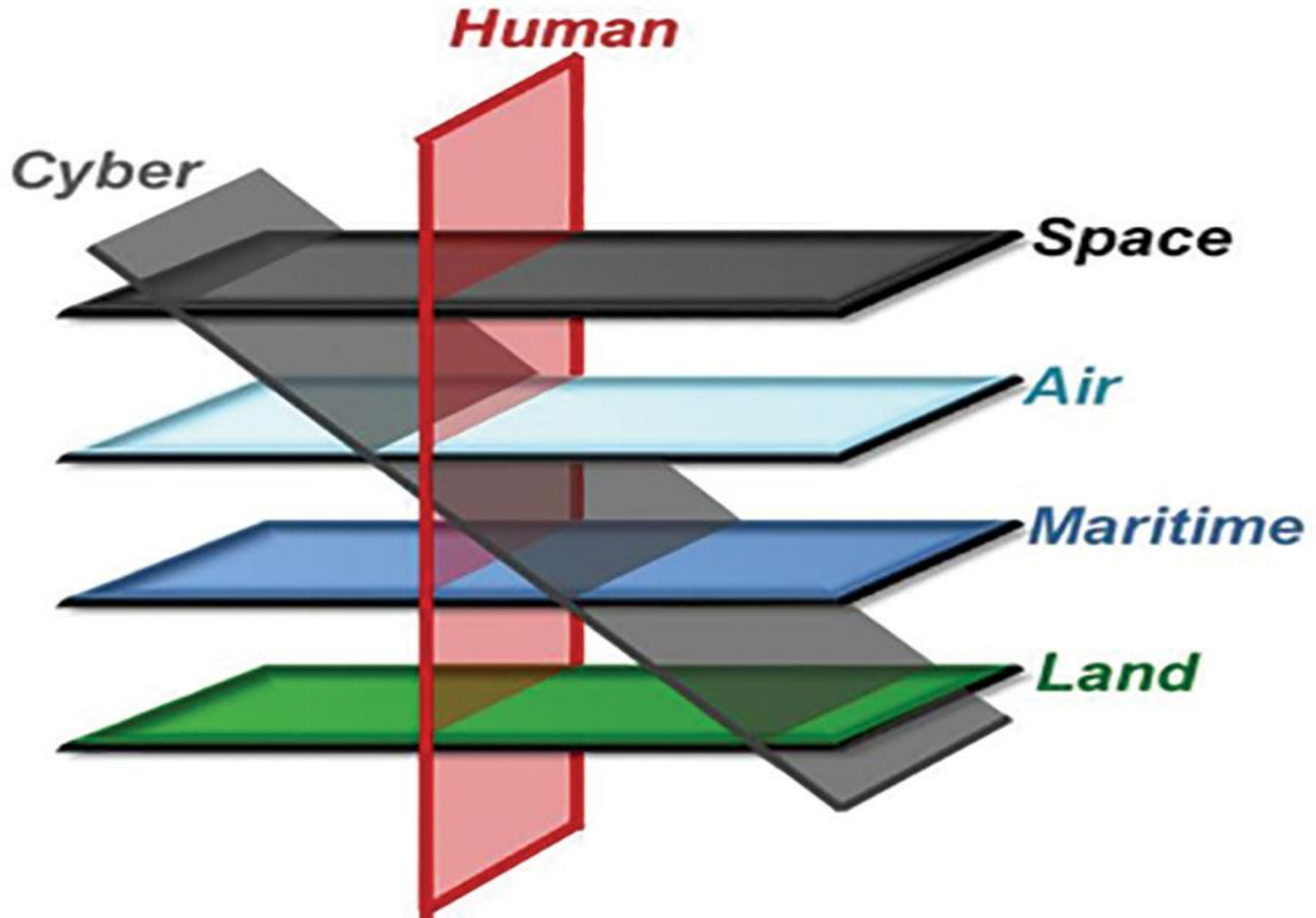


Multi-Domain Operations

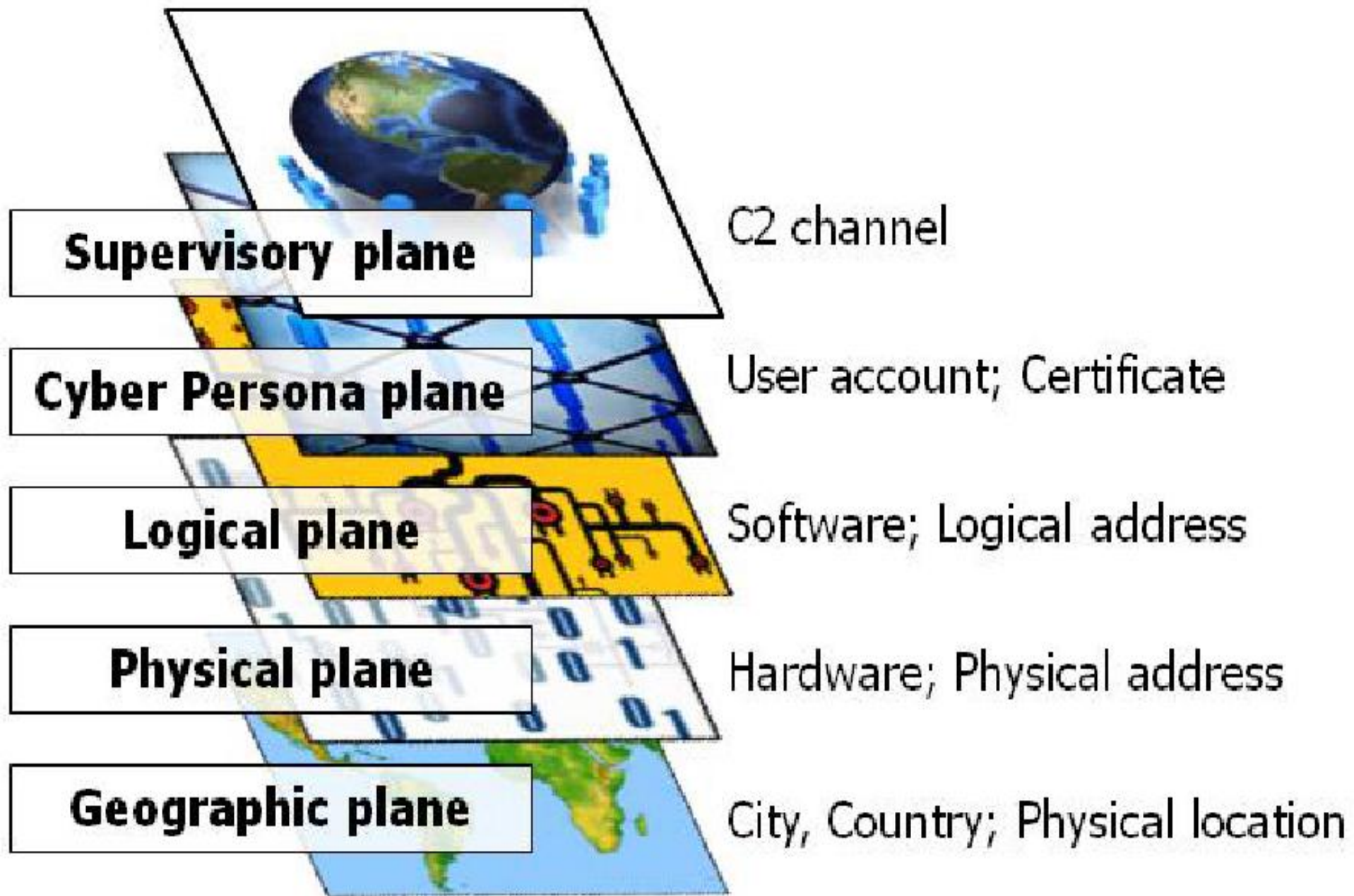


Cross-Domain Integration

... CYBERSPACE & HUMAN touch...



... therefore **Training & Education** is **CRITICAL** ...



... and ends up to **SOCIAL ...& Society**

Physical Layer

Geographic Components

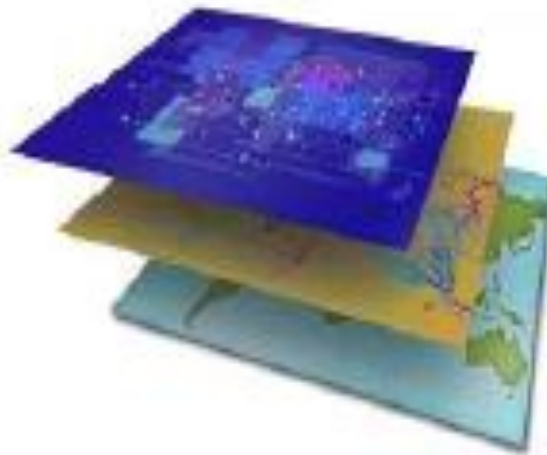


Physical Network Components



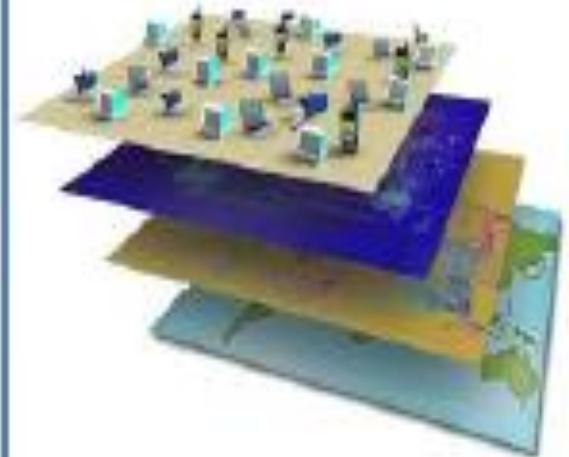
Logical Layer

Logical Network Components

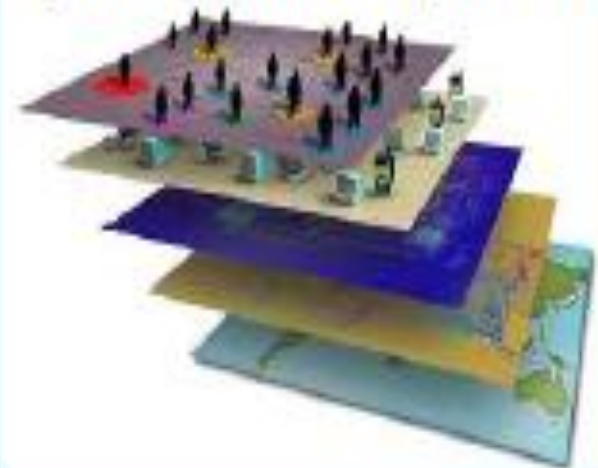


Social Layer

Persona Components



Cyber Persona Components



6. CYBERSPACE

&

CYBERSECURITY

&

Individual SHARED RESPONSIBILITY

&

Social Wellbeing

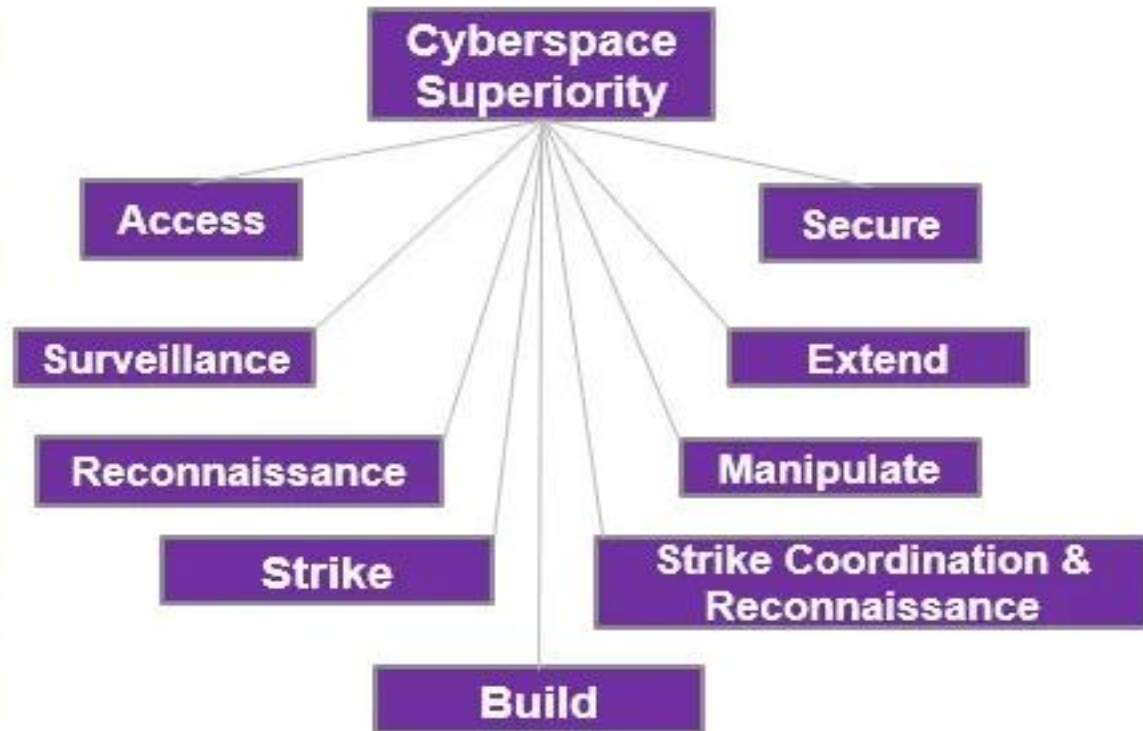
... CYBER Power is more powerful than Air Power...

Why?

Air Power



Cyber Power



Defining Cyberspace Mission Types and associated core activities enables the Joint Force Commander to conceptualize and understand “what” and “how” cyberspace superiority is achieved



WHAT IS CYBER SECURITY?

The body of technologies, processes, and practices designed to protect networks, devices, programs, and data from attack, damage, or unauthorized access. Cybersecurity may also be referred to as information technology security.

COMMON TYPES OF CYBER SECURITY



NETWORK SECURITY

Protect network traffic by controlling incoming and outgoing connections.



DATA LOSS PREVENTION (DLP)

Protects data by focussing on the location, classification and monitoring of information.



CLOUD SECURITY

Provides protection for data used in cloud-based services and applications.



INTRUSION DETECTION SYSTEMS

Identify potentially hostile cyber activity.



ANTIVIRUS/ ANTI-MALWARE SOLUTIONS

Scan computer systems for known threats.

... Voluntary Disclosure ...

SHARING TOO MUCH?

When in doubt, share less. Less is more.



National Cyber Security Awareness Month

#NCSAM

#CyberAware

... Voluntary Information on YOU, Your Loved Ones ...

Cyber Security Awareness Tips

Avoid free downloads.

Use a phrase
as a password.
Example:
!luVf!s^ = I love fish.

**Pause.
Think.
Post.**



Be cautious
when opening
email attachments.

**Reboot your computer
or mobile device
on a regular basis.**

Be careful when accessing
"free" wireless Networks.

**Do not share your passwords with others.
Do not write them on a small piece of paper either.**

... Everybody Individual Responsibility ...

**CYBERSECURITY IS
OUR SHARED RESPONSIBILITY
PROTECT YOUR
INFORMATION**



- ✓ **NEVER** share your password
- ✓ **Run updates regularly**
- ✓ **Use a strong password**
- ✓ **Use anti-virus and anti spyware**
- ✓ **Use encryption**
- ✓ **Follow international TRAVEL guidelines**



CSU Bakersfield
Office of the Provost

www.csub.edu/InfoSecurity
661-654-2835
InformationSecurity@csub.edu

... Voluntary Information and YOUR SAFETY ...

Is your information safe?



Secure your mobile device:

- Use a password/PIN
- Encrypt if you store sensitive data
- Set devices to "ask" before joining networks
- Back it up regularly
- Erase before disposing

For more tips, see:

<https://news.uci.edu/2017/01/cyber-security-week-5.html>

Questions? Need additional information? Contact the ITS Support Center:
help@uci.edu • itsrequest@uci.edu • 949-825-HELP • 24/7

Center for Security at UCI: www.uci.edu/cybersecurity

 **UC IRVINE**  **UNIVERSITY OF CALIFORNIA**

... Your CELL phone ...



CYBER SECURITY IS OUR SHARED RESPONSIBILITY

PROTECT YOUR SMART PHONE

✓ DO'S

- Make sure the OS and software are up to date at all times
- Download apps from reputable sites and closely review permission requests
- Make sure to check the feedback from other users before installing the program from an app store
- Use a strong, complex password
- Use a security app, if available for your device
- Turn off Bluetooth and other connections when not in use



✗ DON'TS

- Jailbreak your phone
- Download apps from third-party app stores and sites
- Leave your mobile device unattended in public places
- Enable your "Wi-Fi ad-hoc mode"

... Social Media ... *(the elephant vs the ant)*

SECURITY AWARENESS ON SOCIAL MEDIA!

STOP | THINK | CONNECT



Make your passwords easy, but **difficult for others** to figure out.



Be cautious when publishing personal information on social media sites.



Educate yourself about **privacy options** about internet and computer.



Double check whatever you post online make sure it would be permanent.



Do research before proceeding with transactions.



PRIVACY

**42% SOCIAL
MEDIA
USERS CONCERNED
ABOUT PRIVACY**

... Is your EMAIL safe?

InfoSec
for KID
CARTOON
STORYBOARD

NATIONAL CYBER SECURITY AWARENESS MONTH
OCTOBER, 2020

E-mail Security



Secure your email accounts from fraudsters. Use strong passwords, 2FA and avoid clicking on suspicious links

... is a MUST ...

InfoSec
POSTER

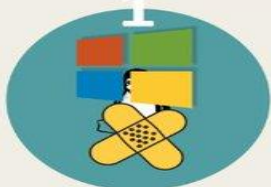
NATIONAL CYBER SECURITY AWARENESS MONTH OCTOBER, 2020

DESKTOP SECURITY

*Secure Yourself
Your System
& Your Network*



1



Always update Operating System with latest patches before using them



Never install unknown or unsolicited software on your computer



Never keep any of your sensitive documents on your tabletop



Secure your Internet Connectivity with strong password



Always keep the desktop firewall ON



Use strong passwords and change regularly



Always maintain regular backup of your critical data



Always lock/logout while leaving your computer

... why: **Community Watch** ...



National Cyber Security
Awareness Month



CyberAware

securing our online lives is a
SHARED RESPONSIBILITY

*Get involved this October and empower our global
digital society to use the Internet **safely and securely.***



... Traps all over ...



Information Security Education & Awareness
Department of Electronics & Information Technology,
Ministry of Communications & Information Technology,
Government of India.



I am aware of social engineering attacks



Like baiting, dumpster diving, vishing etc.

Do You ?

For more details login to: www.infosecawareness.in

For Virus Alerts, Incident & Vulnerability Reporting
certm
Handling Computer Security Incidents

Executed by
सी डैक CDAC

प्रगत संगणन विकास केन्द्र
CENTRE FOR DEVELOPMENT OF ADVANCED COMPUTING
एन.ए. रोड, गुवाहाटी, असम, 781 005, भारत
A Society, Society of the Ministry of Communications and Information Technology, Government of India
AICTE Approved, Government of India, New Delhi, India. Phone: +91-11-261090115.

... Proof from ... Statistics ...

**232 computers are
infected around
the world
EVERY MINUTE.**



**70% of Canadian
adults have
experienced a
cyber crime.**

**156 Million
phishing emails
are sent
EVERY DAY.**



**8 Million
phishing emails
make it through
filters and are
opened.**



**80,000 people
are hooked into
giving vital info.**

... Online ... Scams, Porno and Gambling ...



गृह मंत्रालय
MINISTRY OF
HOME AFFAIRS



Beware of fake job opportunities/appointment letters sent on email or messaging apps. Fraudsters may dupe in the name of registration/interview charges



Some fraudsters are misusing the names of the Government and Corporate Organizations to offer job opportunities online. Verify the authenticity of these websites before applying for jobs

Online Job Scam



... Can we protect ourselves ?



CYBER CREEPS

Every year thousands of boys and girls become victims of cybercriminals. Remember these helpful tips to keep safe.

DON'T BE FOOLED

| Cyber creeps pretend to be someone else to gain trust and get your private information.



BE SMART

NEVER:

- ☐ Agree to meet face-to-face
- ☐ Bend pictures of yourself
- ☐ Respond to troubling E-mail



| ALWAYS let an adult you trust know if you get a threatening or weird E-mail.

ATTENTION PARENTS:

- ☒ Talk to Your Kids
- ☒ Connect with Your Kids Online
- ☒ Observe, Don't Intrude
- ☒ Be Proactive



If need help in any case related to cyber world, contact us at our cyber helpline No:

99 686 00000

... Can we protect ourselves ?

CYBER SAFETY TIPS

- SET STRONG PASSWORDS: DO NOT SHARE THEM AND CHANGE THEM REGULARLY.
- LIMIT THE AMOUNT OF INFORMATION YOU SHARE ON SOCIAL NETWORKS.
- DON'T OPEN EMAILS FROM UNKNOWN SENDERS.
- BACK UP YOUR DATA.
- USE ANTIVIRUS SOFTWARE AND KEEP IT UP TO DATE.
- BE CAUTIOUS ABOUT OFFERS ONLINE.

Website : <https://www.ica.in> | email : cyberarmy@ica.in | Helpline No : 9968600000

PROTECT YOURSELF! Social Networking Systems The Science of Internet Self Defense

Learn about:

- * Spearfishing
- * Ransomware
- * Viruses
- * Cyber-bullying
- * Blogging
- * Dark Net
- * Smartphone Apps
- * Bot Nets
- * Scareware
- * Web Cookies
- * VPNs
- * Firewalls

Fortresses - Tony Blair Center
Mar. Oct. 15 / 0900 - 1000 & 1030 - 1530

Firestorming - KRC Brooke Thayer / Walter
Feb. Oct. 17 / 0900 - 1000 & 1130 - 1530

Avast!ville - Popcorn Fleet Theater
Jan. Oct. 18 / 0900 - 1000 & 1030 - 1530

Shogun - KRC Brooke Thayer
Mar. Oct. 19 / 0900 - 1000 & 1030 - 1530

Veritas - Tony Blair Center
Jan. Oct. 23 / 0900 - 1000 & 1130 - 1530

Warfare - KRC Brooke Thayer
Mar. Oct. 24 / 0900 - 1000 & 1130 - 1530

Avast!ville - KRC Brooke Thayer
Mar. Oct. 25 / 0900 - 1000 & 1130 - 1530

Shogun - Tony Blair Center
Mar. Oct. 26 / 0900 - 1000 - 1530

Veritas - Tony Blair Center
Mar. Oct. 27 / 0900 - 1000 - 1530

Bruce Grantham
Cyber Security Expert



A PUBLIC SERVICE MESSAGE BROUGHT TO YOU BY
U.S. Army Europe and AF-ITP

Free to the military community - All ages welcome!

Contact us at: usarmy.wiesbaden.usarmymba.seitt@helpdesk@mail.mil

... Even our face is not ..Safe ... and Ours ...

CYBER SECURITY INSIGHT FOR BOARDROOM AND C-SUITE EXECUTIVES

CSEUROPE.INFO

EXCLUSIVE INTERVIEW: ARNE SCHÖNBÖHM
President of Germany's Federal Office for Information Security explains why secure systems now hold "existential meaning" for all organisations.
Page 70

THE BAD-BOT GUIDE
Malicious bot swarms are eating your business; and they're getting hungrier.
Page 44

PRESSURES OF THE JOB
Over-stressed European security chiefs must avoid burn-out.
Page 92

CYBERSECURITY

EUROPE

THE MAGAZINE OF CYBERSECURITY FOR C-SUITE AND BOARDROOM EXECUTIVES

WIRTSCHAFTSPREMIERE
Sonderausgabe

GESICHTSERKENNUNG

Wenden Ihre Mitarbeiter diese Technologie akzeptieren um einen sichereren Arbeitsplatz zu haben? Seite 58

FACIAL RECOGNITION

THE FUTURE OF DIGITAL ID
WILL YOUR WORKFORCE COUNTENANCE IT?



EXPO AND CONGRESS | NUREMBERG EXHIBITION CENTRE | 8-10 OCTOBER 2018 | IT-SA.DE

Which is more dangerous? Covid Vaccinations or Cyber Vaccinations ?

A blue, pixelated hooded figure is centered in the image. The interior of the hood is filled with glowing orange and yellow binary code (0s and 1s). The background is dark blue with faint, scattered binary code.

**ARE YOU
SAFE?**

CYBERSECURITY'S HUMAN FACTOR COMES AT A COST

Thank You

Sources

- 1) Copyright © 2021-2026 Visual Capitalist, All rights reserved.
- 2) Wikipedia
- 3) References at Slides

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