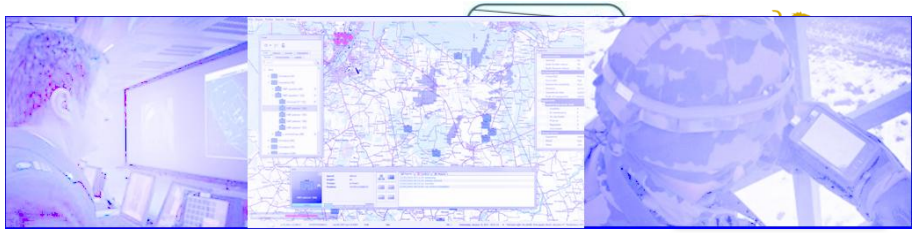

CAXs of Degraded Operational Environments:

How a Social Network Infrastructure Concept Adoption in C2 can Make the Difference?

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NATO CAX Forum, September 30-October 4, 2013), *Roma, Italy*

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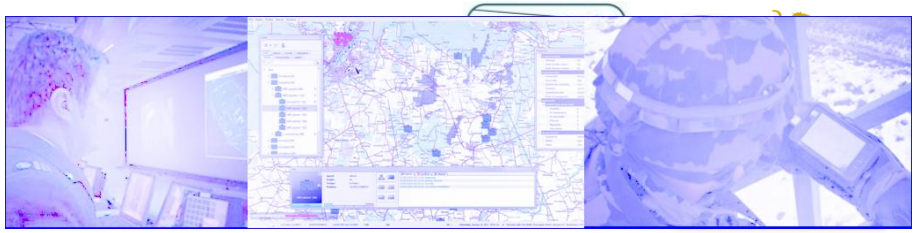
CAXs Computer Assisted Exercises



AGENDA:

- Current Military OPS
- Parameters
- C2
- Decentralization
- New Requirements
- Possible Solutions
- Security
- Simulation
- Conclusions

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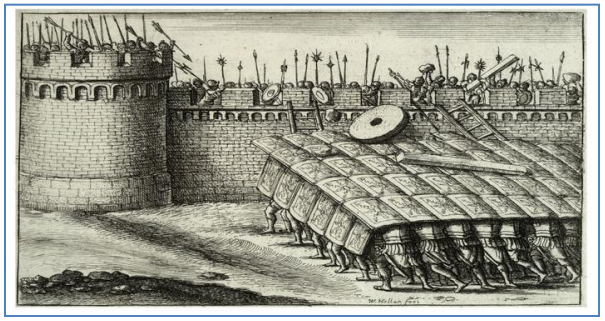
Current Military OPS

Military organizations are usually to plan the use of Armed Forces in a space battle, using rules inherited from our recent past: the Cold War.



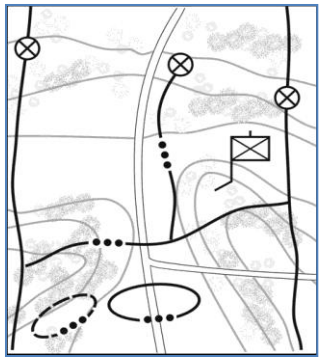
Move on the ground moving troops, vehicles and equipments that need to be guided and managed through the key function of a military force: **Command & Control**.

Where this function is not sufficient the risk is not handle own resources, driving through a failure

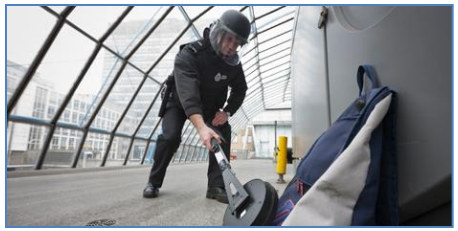
Opposing forces must has a semblance of "**sustainable conceptual equality**" in order to compare two or more sides, to manage benchmarks, analyze power relations, product plans and predict opponent's tactics.

Parameters

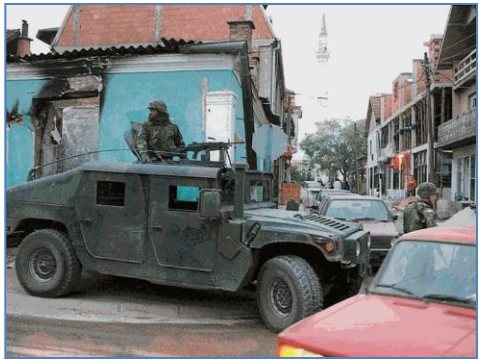
Current military operations and scenarios are changed from the past, transforming them from open combat areas to "patchy" domains



Terrorist actions are not only for environmental or cultural conditions.



Doctrinal evolution leads to consider towns as center of gravity for stabilization operation and where develop military operations.



Urban terrain
- Artificial obstacles
- contrast
- achieve concentration of power
- maneuver in tight space
- monitoring activities
-Mapping territory
- absorb huge time, resources
- diverting attention from other ops
- **degrading C2 capabilities**

"Humint" will allow forces gravitation and the use surgical weapon systems

Humint Human Intelligence

Command & Control

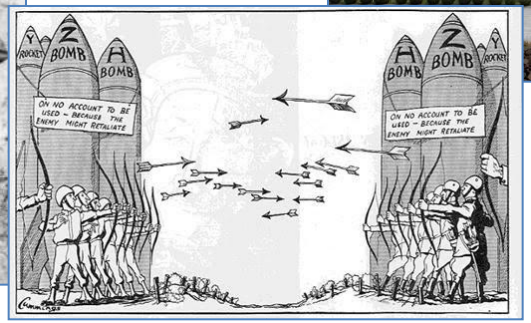
Conceptual need for soldiers to identify a way to be connected to his C2 network

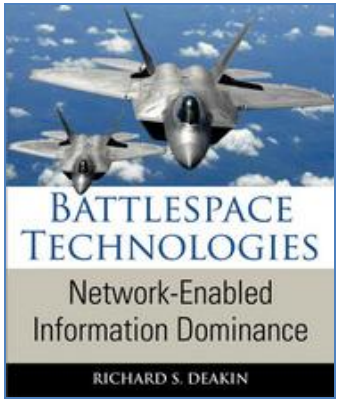
Considering the possibility that network services could be unavailable, unreliable or having degraded performance

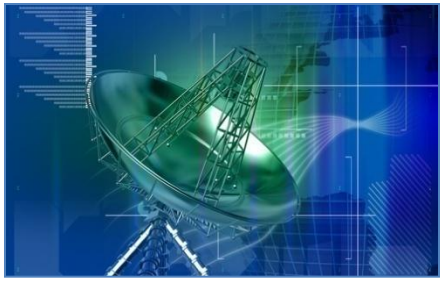
Identify possible new communications and information capabilities to allow a sufficient orders/data transmission.

INFORMATION DOMINANCE

C2 system makes sense when we consider a standard military forces confrontation, with strategic denies of cyber space to the adversary.







Adoption of innovative information technologies that would enable information dominance.

NEW INTEGRATED COMMUNICATIONS

Satellite communications and GPS today are force multipliers, providing wide coverage and enabling control over battlefields, supporting most of warfighting functions.

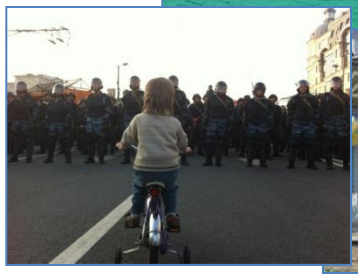
These capabilities can reduce uncertainty and suppress threats, but they must be integrated in such a way as the adversaries find new ways to deny, disrupt, and degrade resources, satellite-based intelligence functions;

GPS Ground Positioning System

ASYMMETRIC C2 CONFRONTANTION

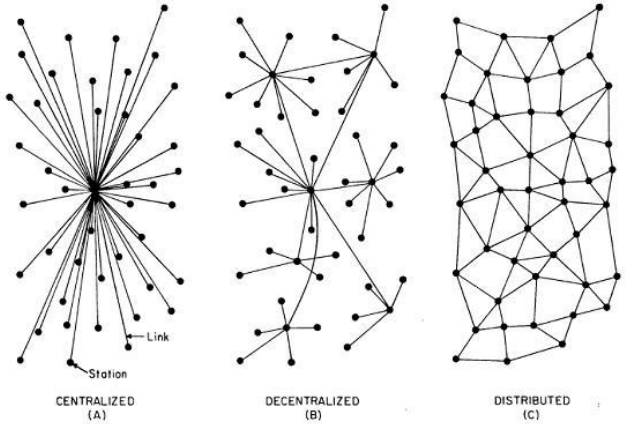
Over reliance on SatCom should be considered a critical vulnerability, independently from the C2 in use.

The strongly asymmetric C2 confrontation exceeds all conventional stages, trying to "dislocate" the capacity of a conventional force until it becomes irrelevant, falling in the paradox of "David and Goliath".



Decentralization

A classic hierarchical system of C2 is not designed to efficiently decentralize a decision-making process in a modern Support Operation.



Decentralization: all leaders are most responsible; achieve local management and tactical missions.
Difficult in synchronization of actions at the operational level and difficult to achieve strategic targets.

Decentralization means physical, technical and operational isolation for certain missions and also isolation of chain C2.

C2 system oriented to decentralization and coalition activities tends to share faster more information with more users.

ASYMMETRIC ENVIRONMENT REQUIRES QUICK RESPONSE

Last crisis teach what happen in a confrontation of two o more parties in a complete asymmetric environment

(i.e. Syria, Egypt, Libya crisis)

Vs

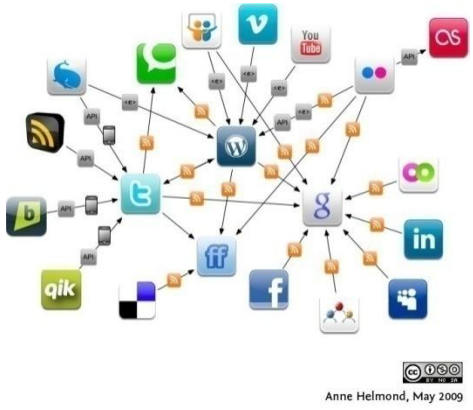
Emphasis of Asymmetric Environment

BUSINESS FRAMEWORK RELIABILITY IN ASYMMETRIC WARFARE

Enemy can destroy networks, but cannot disrupt his own vital networks or exercise a global control over public networks.

In Afghanistan telecommunications sector have created in the last 5 years more than 60,000 jobs and one billion dollars of investment.

The deployment of standard military communication systems cannot be sufficient.



Mass of people can react to simple inputs using some networks “social”.

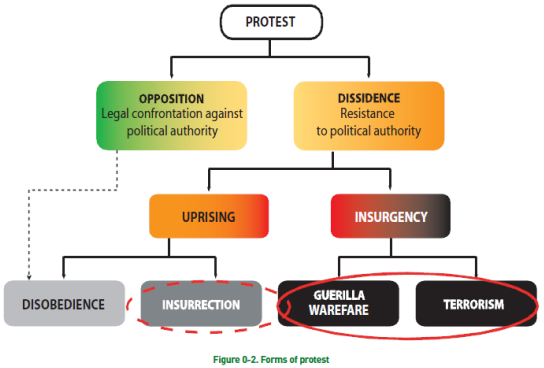


Figure 0-2. Forms of protest

NEW MULTIPLE BANDS AND FLEXIBLE ARCHITECTURES

Latest generation of smart phones can use multiple frequencies bands.

Next operating environments will answer to a centralization and decentralization of commanders needs that should be able to use the best method that suits the operating situation

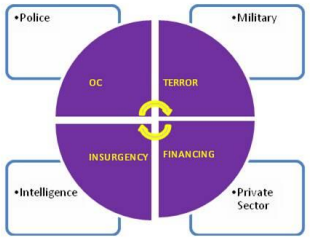
New technologies will make it easy to parallelize and integrate different architectures as C2 network and a social network-based.

Information flow, info access, type of mission, size and nature of the operation areas, capacity and training of personnel influence the achievement of mission and the degree of de/centralization of C2

C2 Need to adapt to Network & CIS Degraded

Future operating environment is characterized by hybrid threats in which networks and information systems may be degraded generating implications for the Commander.

1990s – emerging hybrid threat



2012 – developing hybrid threat

To ensure success in an information degraded environment, its needs to adapt doctrine, training, education, and command organization to enable a C2 process capable of coping with uncertainty.

This can be realized improving :

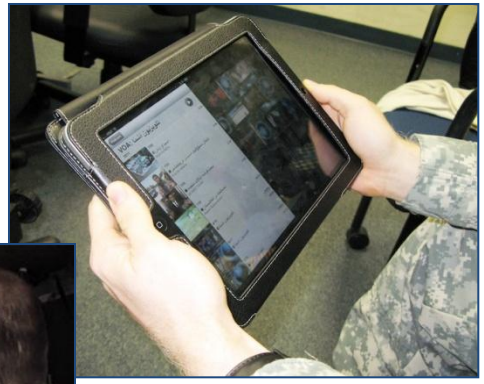
- More responsibility to the low level units
- Explores C2 theory in context with the future operational environment, specifically, information domain
- Provide the Joint Force with the flexibility to operate effectively in information degraded environments.

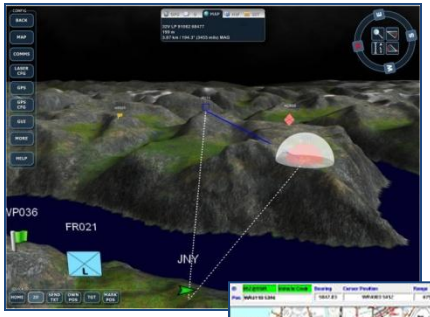
CIS Computer and Information Systems

New Requirements

The requirements for these needs can be identified in:

- Put the information in time;
- The sources of information must be controlled;
- Security of information;
- Absence of conflicts in information.



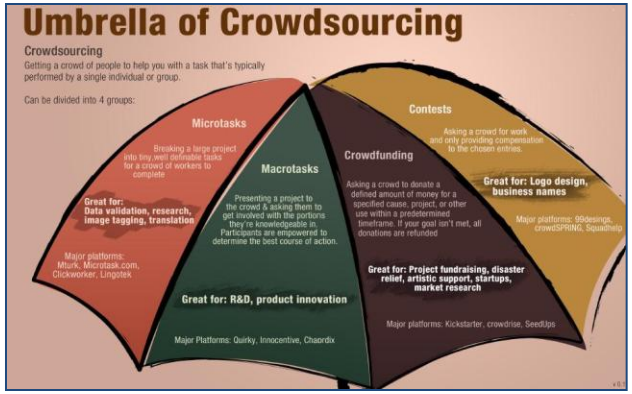


Information management will assure:
- Capacity to bring the information quality in time;
- Knowledge, access and use of information;
- Tracking information and its origin;
- Use of common protocols for the exchange of information;
- Synchronization and scalability of information and data mining.

Possible Solutions

The answer can come from the integration of a traditional C2 system with:

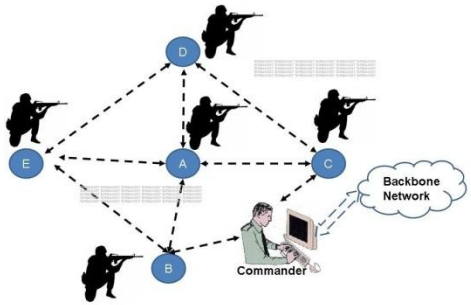
- A Social network infrastructure concept;
- A Simplify C2 system “applet” applied to COTS devices;
- A Supporting concept like crowdsourcing philosophy but in a protected environment



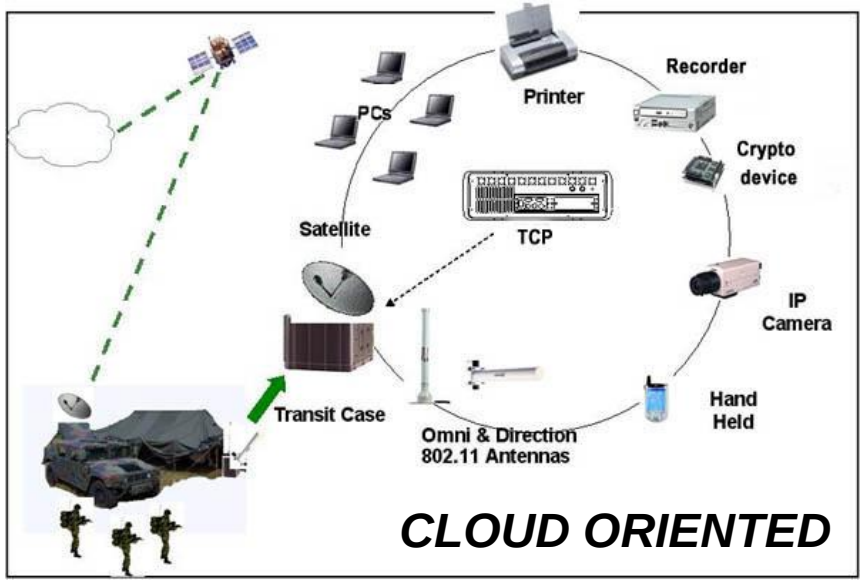
Crowdsourcing

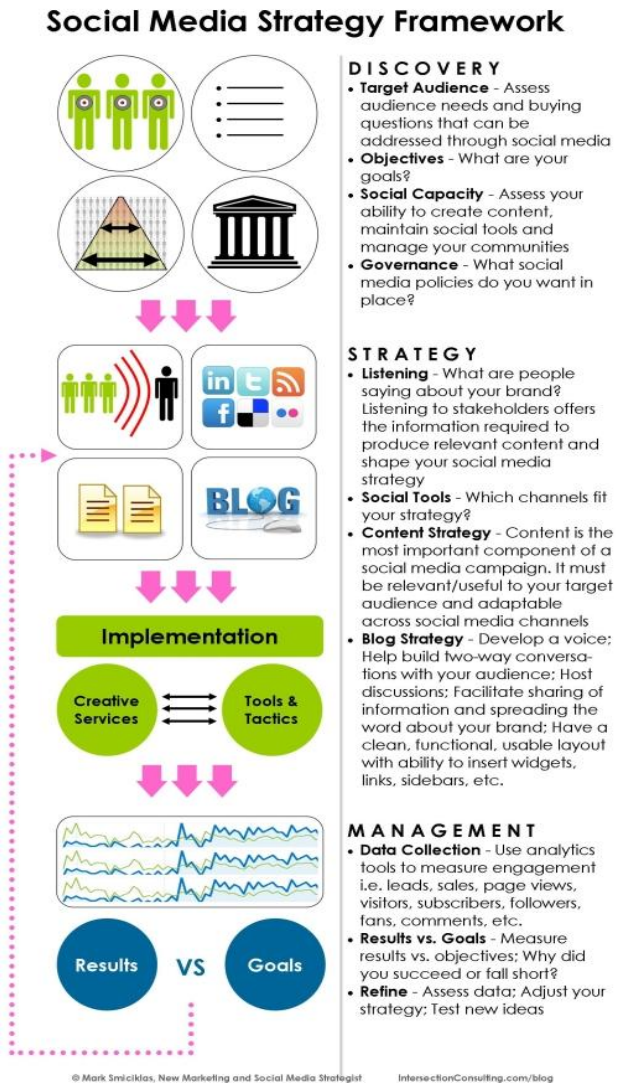
Other Possibilities of Crowdsourcing Oriented Solutions

Ushaidi initiative



Military Ad-hoc Network





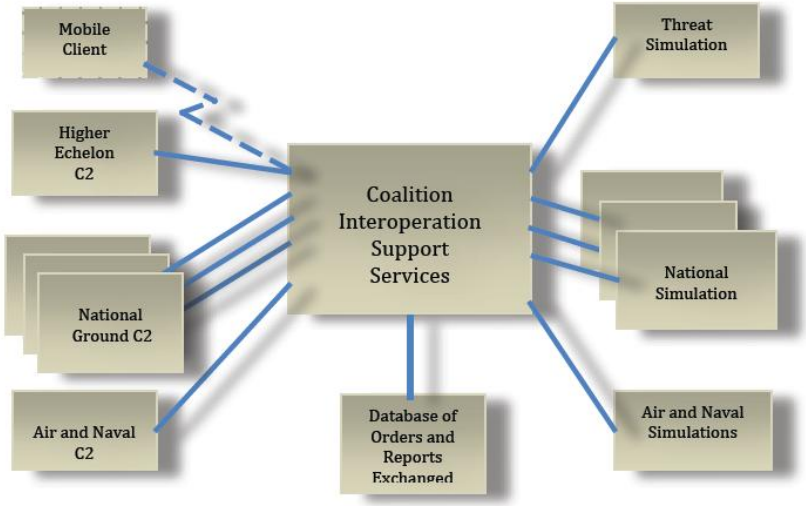
CPX-CAX

How to develop a CPX-CAX in a degraded operational environment , integrating a social network infrastructure in a standard military C2 network?

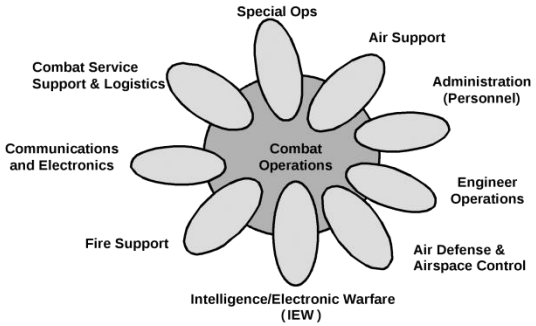
Examples:

There are **two important standards** for C2-simulation interoperation, both developed by the Simulation Interoperability Standards Organization (SISO):

- The Military Scenario Definition Language (MSDL) deals with initialization issues
- the Coalition Battle Management Language (C-BML) deals with tasking and situational awareness issues.



Both aligned it with the Joint Consultation, Command and Control Information Exchange Data Model (JC3IEDM).



CPX Command Post Excercis

COTS HW AND COMMNICATIONS vs. C2

HOW TO INTEGRATE MOBILE COMMUNICATION TECHNOLOGIES AND BUSINESS NETWORKS IN TACTICS C2

We will define a type of COTS HW smart phone that meets certain requirements with regard to safety (i.e. crypto devices) and resistance to shock and weathering and a set of software to use.

COTS HW Commercial Off The Shelves Hardware

THE CONCEPTUAL MODEL TAKES INTO ACCOUNT THE NEEDS OF BOTH NETWORKS

Coalition Military C2 environment

Military C2 environment

Government Agencies C2 environment

Other International Agencies C2 environments

Social/military information Exchange and data correlation

INSS
(Information Negotiation Service Server)
IP number xxx.xxx.xxx.xxx

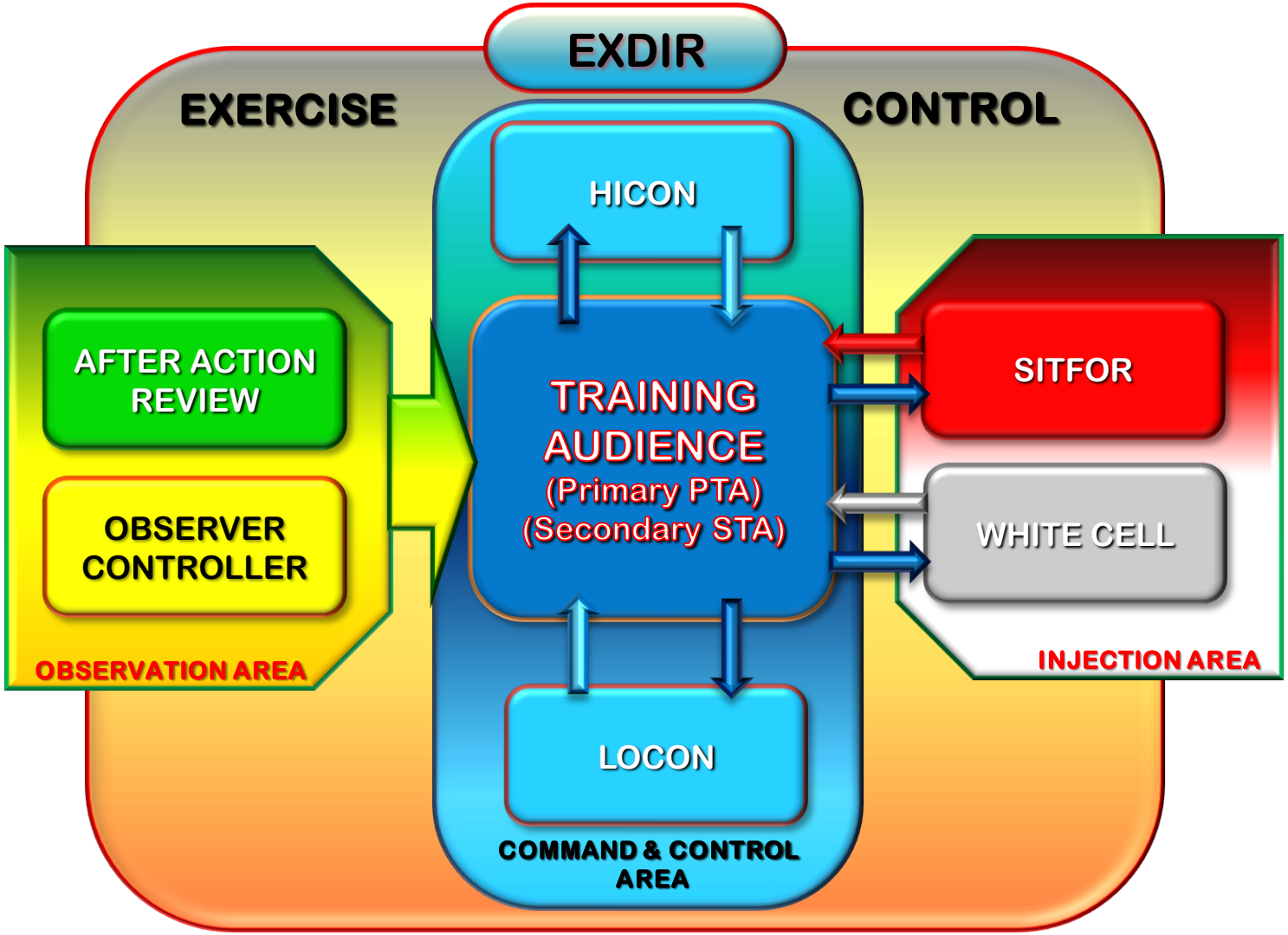
Sending/receiving SEFL
(Simple Exchange Formatted Language)

Portable COTS Devices
ACA - C24U
(Android Communication Applet)

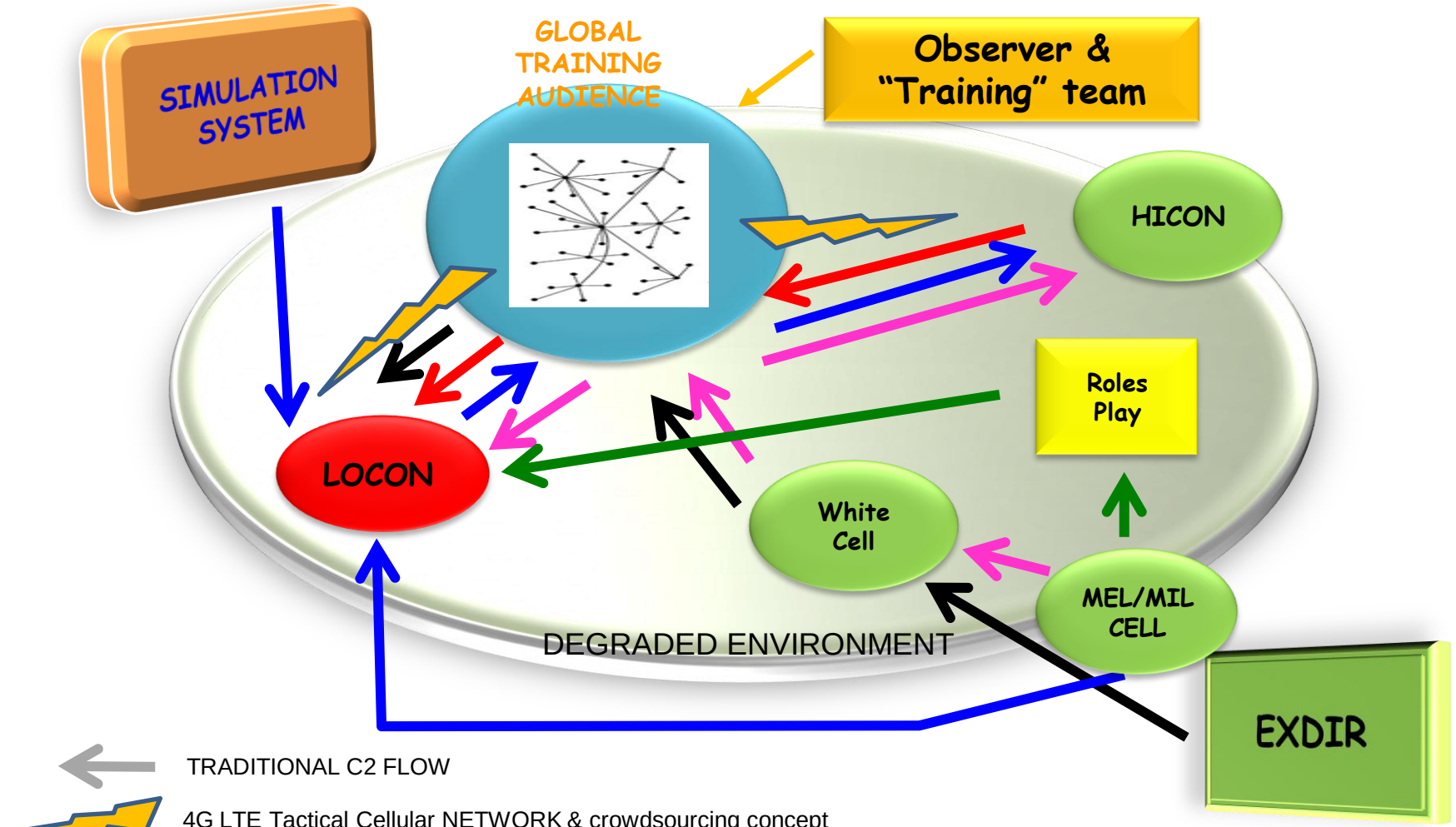
Fusion Data base

C24U Command and Control For You

Current CPX
CAX Organization

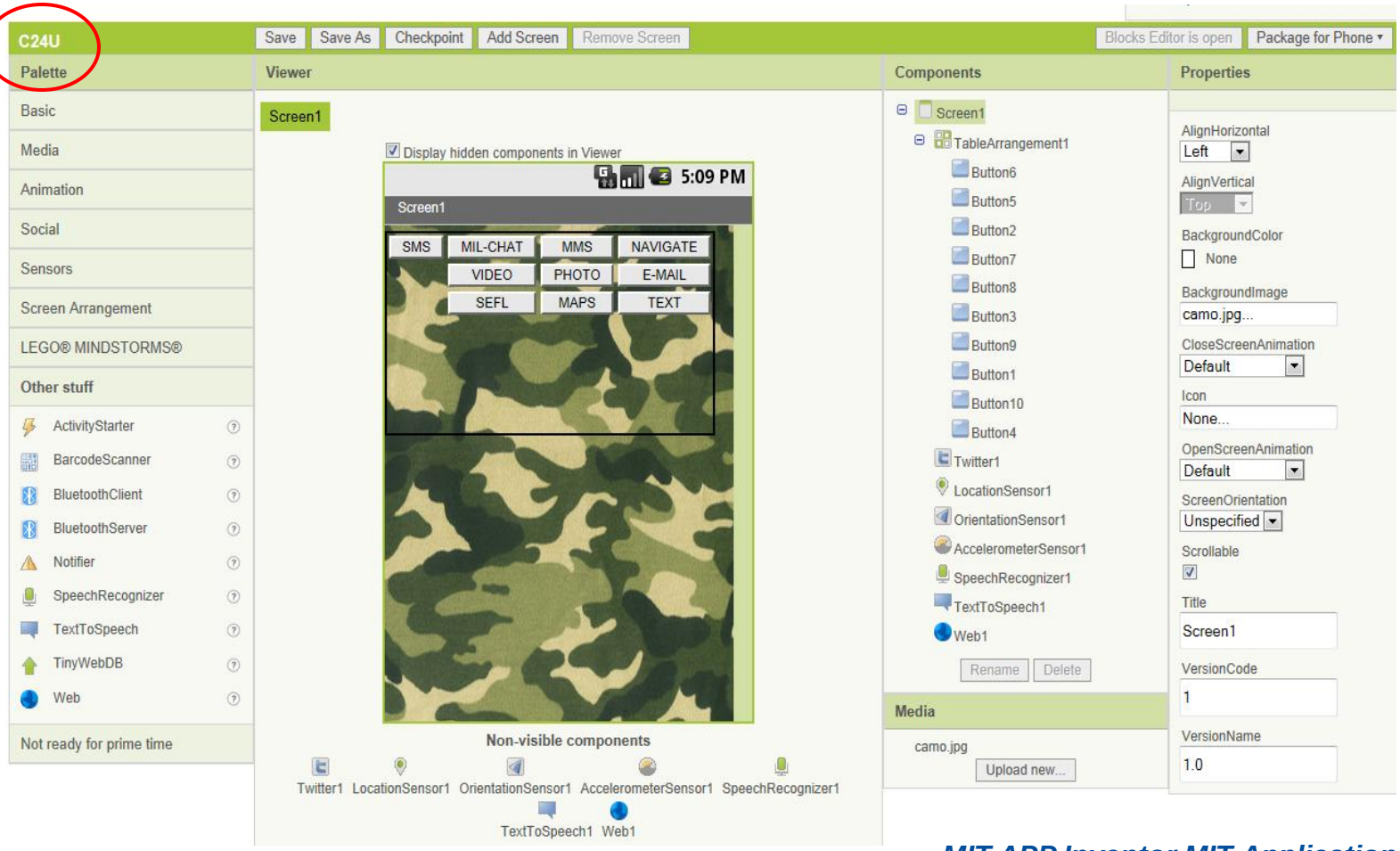


Proposed CPX – CAX Organization



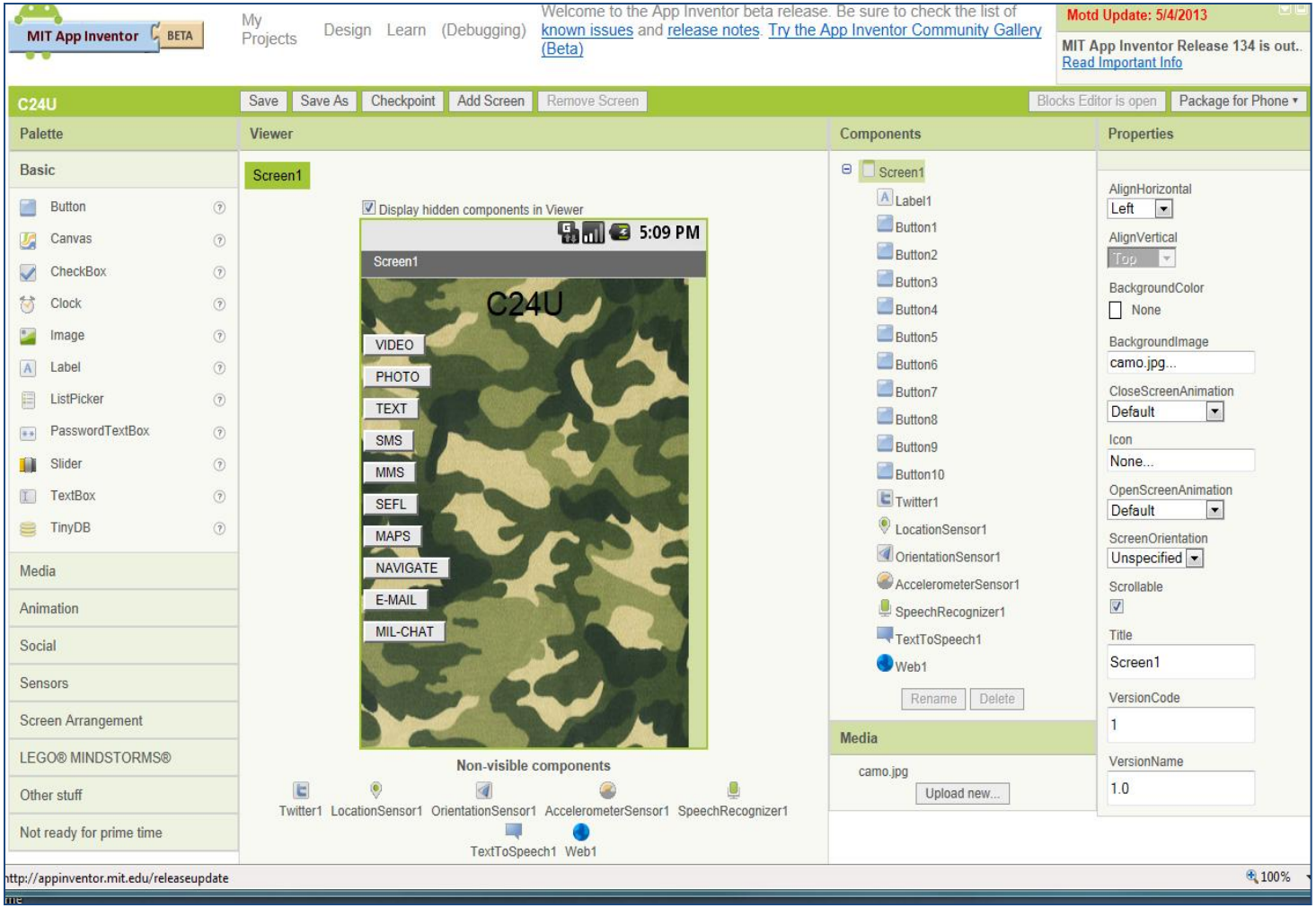
DEVELOPMENT OF ACA
Android Communication Applet

Using a free application as “MIT APP Inventor” Android Software Development Kit

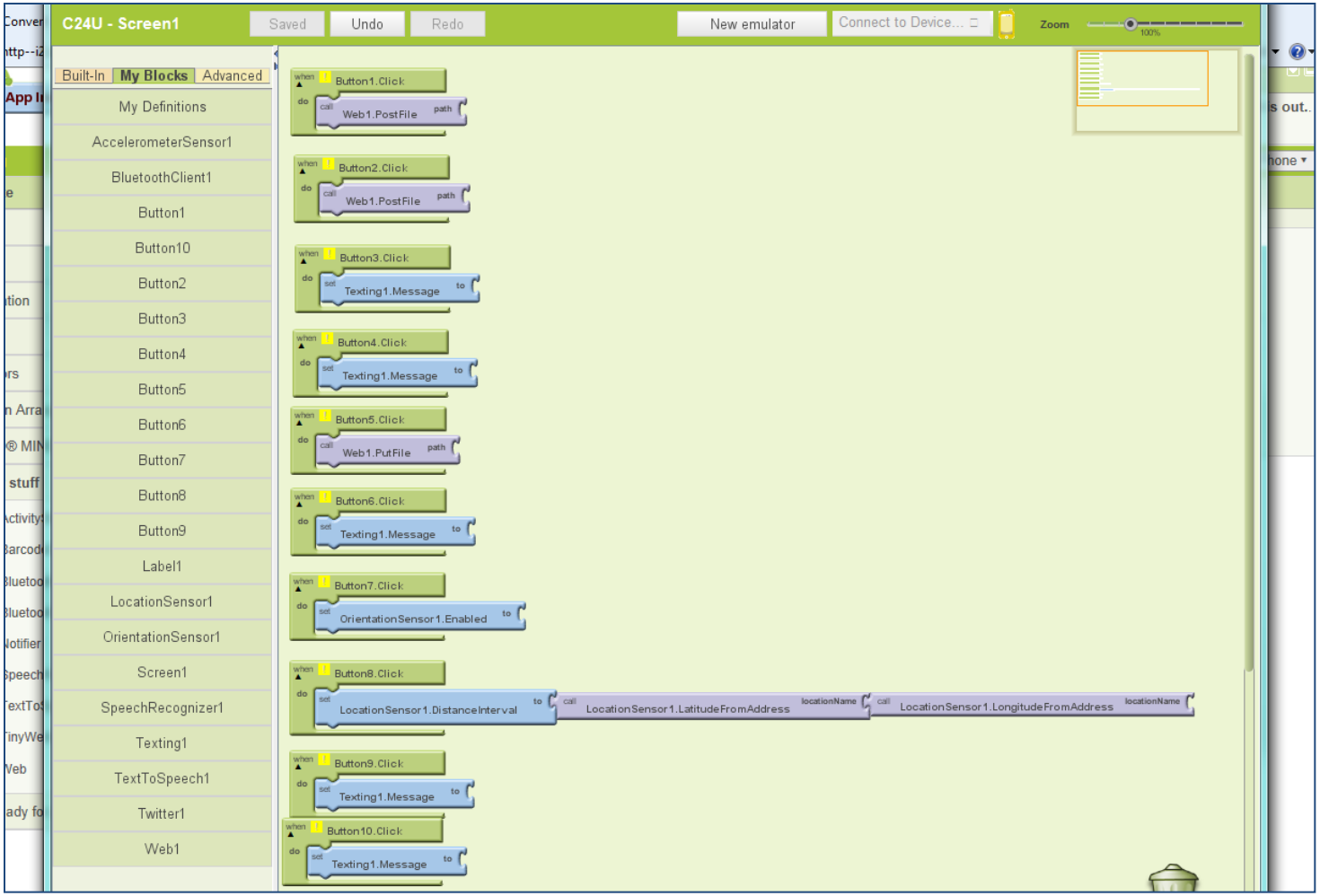


MIT APP Inventor MIT Application Inventor

DEVELOPMENT OF C24U APPLET COMMAND & CONTROL FOR YOU



ASSOCIATING FUNCTIONS…….



APPLET ACTIVATION IN NSIS CELL PHONE EMULATOR

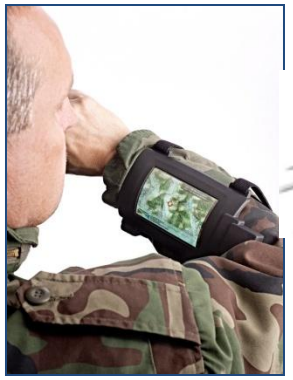
NSIS ***Next Steps in Signaling***

STRUCTURED MILITARY MESSAGING

Starting from a formatted text language (i.e. like *IRIS FORM & IRIS Web FORM TOOLs from Systematic)* will be possible develop a simplified formatted language based on specific information, tailored for lower level units and up to Battalion where all info and data will be parallel integrated in a classical C2 military system.

```
GDO 21051245Z 13//
FM DOG1/SQUAD 3/PLT 2//
TO HAWK CP 3/INF BN 34//
BT
UNCLAS/ENEMY/MOVE/PLT /ARM/ 5 VEH/DIR NW-SE/ 7 KMH/GRAVEL//
COORD/ ME 33TCD 94567324 Q 460/ ENEMY COORD 33TCD 913456956 Q 150 //
ASK/WAITING ORD//
BT
```

SEFL (Simple Exchange Formatted Language) Standardization of certain semantic elements, using few selected key elements and words from ADATP-3 protocol to receive information, evaluate, correlate and integrate them into a Data Base of fusion with other information.

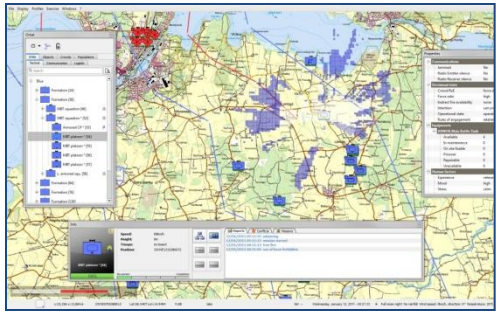


ADATP-3 Allied Data Publication No 3

Integrated Risk Information System (IRIS)

CHEAP, QUICK AND DIFFUSED NETWORKS COUPLED TO C2

The primary exchange its intended between tactical military and commercial networks to facilitate the flow of information and ensure a communication simple system.
Mediation System INSS, could exchange data and other information between C2 others environments and hierarchical levels.

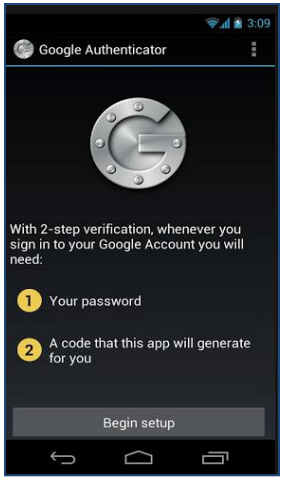


Using 4G LTE Tactical Cellular transceiver that support simultaneous users, voice, SMS/MMS data and video capability.

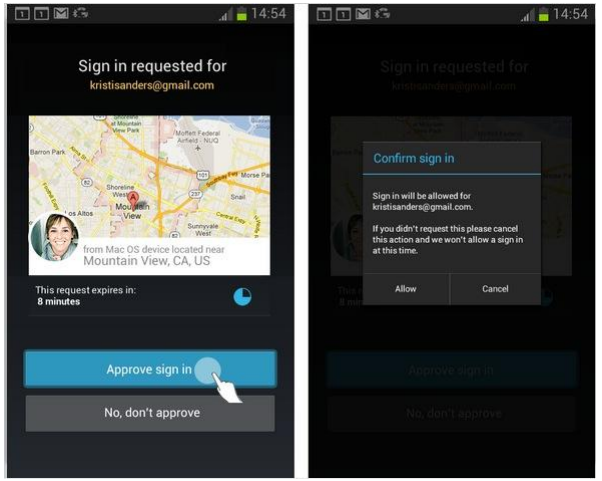
Fusion Networking System

INSS InterNeg Support System

Security



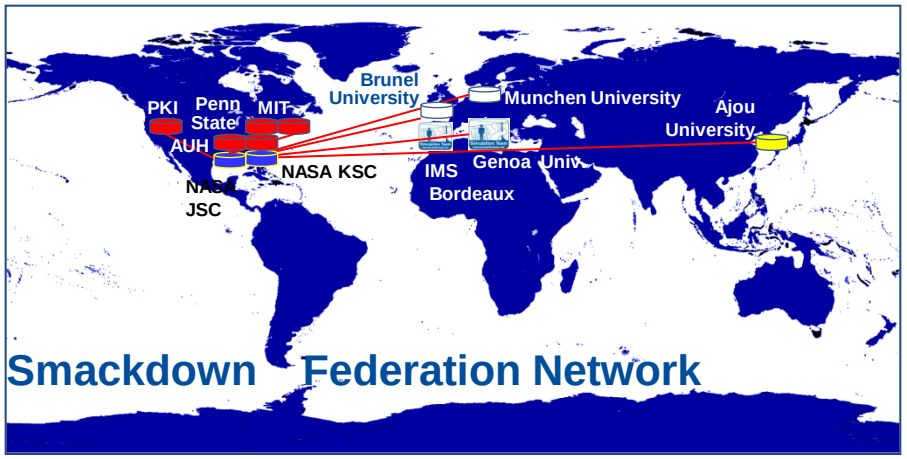
Integration of different dedicated networks will expose to a security problems.
We can't solve this trouble but there are many different possibilities to mitigate and realize the best connections as possible.

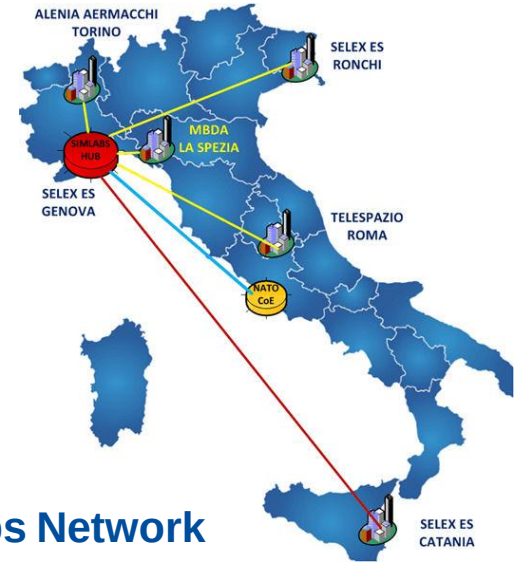


- Keeping a low level of information classification
- Accreditation of individual devices
- Personalize access to the applet with password
- Possibility to deny access from servers to devices and viceversa
- Security Labels and Digital Signatures
- Scanning of attachments
- Reliable message transfer protocols
- End to end acknowledgements provide reliability and tracking (delivery & read receipts)
- Optimized protocols for constrained links
- Flexible precedence handling (priority)
- Personalization and interoperability of directories

Simulation

- The validation (CD&E) of this concept as interaction through military and business network will be possible through simulation
- Simulation Team is active in developing innovative solutions based on Intelligent Agents, Web Technologies and reproducing complex Heterogeneous Networks (i.e. IA-CGF, Smackdown, CRYSTAL)
- SimLabs asset from Finmeccanica, as integrator of different realties (Armed Forces, Industry and Academia) is able to support the virtual System of Systems environment to test different interactions among actors, networks, and devices. SimLabs has been already used in a operational scenario with the NATO M&S COE in Rome.





SimLabs Network

Conclusions

Technology is not a universal remedy but, can became an enabler for commander's decision process and help to decentralize C2

Technology would always enhance capabilities of forces on the ground and make simple apply special TTP, especially in the urban environments.

Using COTS available will reduce cost of development of new tools, implementing current technologies and make simple choose the best C2 method to implement on a specific operational situation, maintaining control and cohesion among more dispersed units.

To have success in a COIN environment will be also necessary innovate, learn and to adapt the equipment to the close operational environment.

TTP Time Trigger Protocol
COIN Counter Insurgency

Questions?