

# FUTURE OF THE COMMAND POST

Technologies affecting C2 | Dr. J.W. Streefkerk

**TNO** innovation  
for life

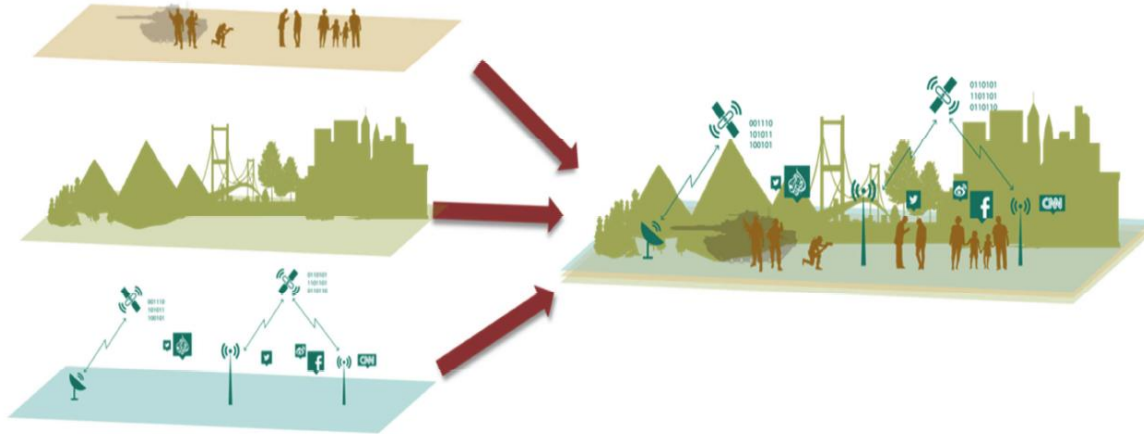
# EVERYDAY, WE GENERATE MORE AND MORE DATA



# DATA & HYPERCONNECTIVITY



# THIS DATA INFLUX IS CHANGING CONFLICTS...



أعماق الإخبارية  
تحميل الآن  
أصبح بإمكانكم الآن متابعة آخر الأخبار ومقاطع الفيديو عبر تطبيق وكالة أعماق الإخبارية على أندرويد  
رابط التحميل: [HTTPS://ARCHIVE.ORG/DOWNLOAD/AMAO\\_200/AMAO.APK](https://archive.org/download/AMAO_200/AMAO.APK)



## ... AND SO C2 MUST ADAPT AS WELL

Focus on best  
coverage and  
fast delivery



Centralised control:

- › Algorithm tells rider when to start shift and where to wait for orders

Technology enables flexibility in  
C2 approaches

Focus on  
largest number  
of orders for  
riders.



High level of autonomy for rider:

- › Rider decides where to wait for order
- › Rider tells algorithm when he is available to accept orders

# TECHNOLOGIES AFFECTING C2

Promise of these technologies:

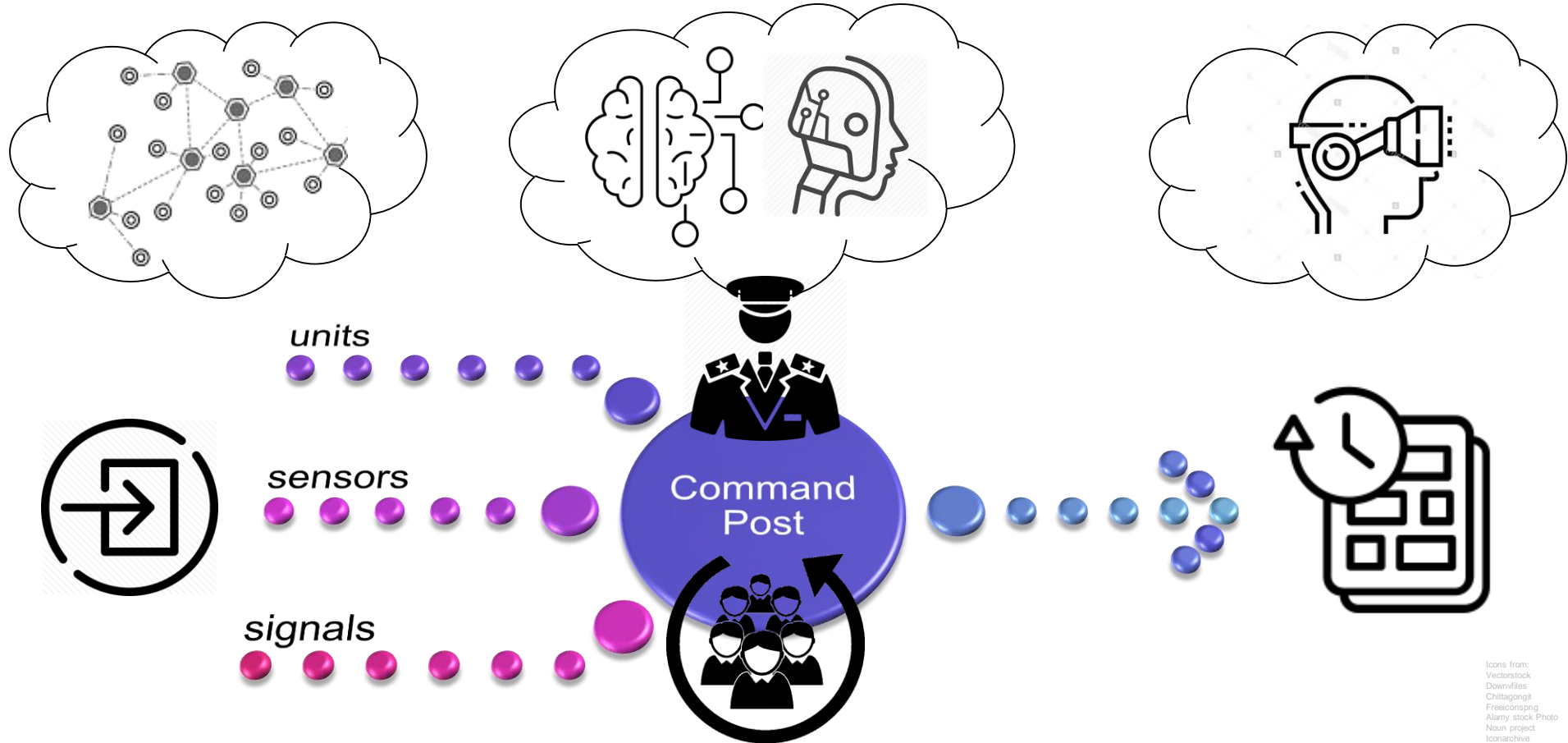
- › Helping commanders and staff to receive information better and faster, process it efficiently and helping to reach effective decisions based on this information and monitor the outcomes of those decisions.

Scope and focus:

- › Limit discussion to **digital technologies** to improve input-processing-output cycle.
- › Now - 2035 timeframe



# CP AS CENTRAL HUB



# INPUT

## › Connectivity

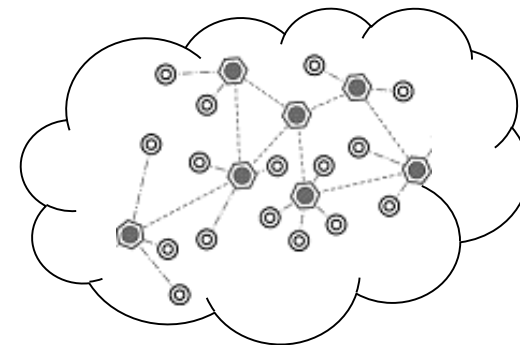
- › Data from distributed sensors
- › Ad-hoc networking (MANETS)

## › Security

- › Encryption (post-quantum crypto)
- › Access control (RADAC)

## › Dual-use

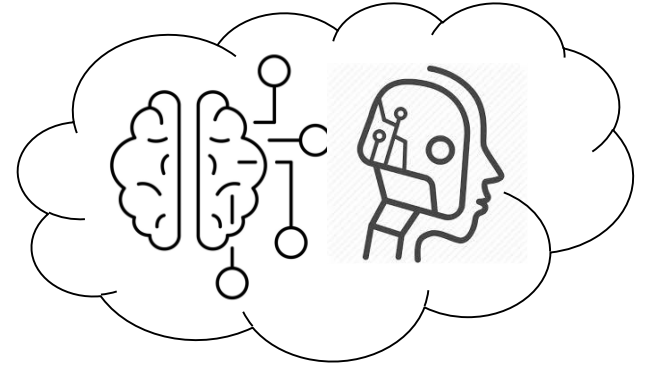
- › Military use of commercial networks





# PROCESSING

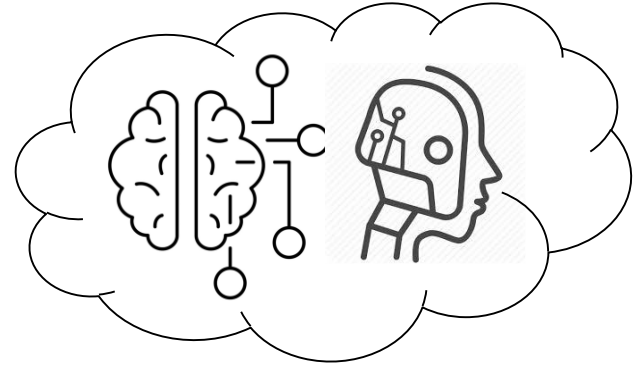
- › **Artificial intelligence (AI)**
  - › Descriptive, predictive, prescriptive analysis
  - › Machine learning / Reinforcement learning
  - › Scenario / COA generation
  
- › **Human – AI teaming**
  - › Levels of automation in collaboration
  - › Autonomous decision making by AI tooling



# PROCESSING

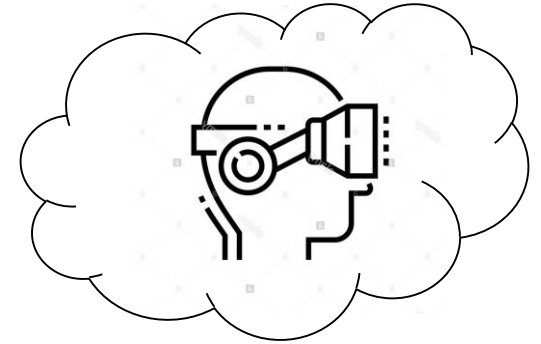
## Limitations

- › Data quality: garbage in is garbage out.
- › Imperfect analysis: biases
- › Transparency of AI decision making



# OUTPUT

- › **Virtual and augmented reality applications**
  - › Improved (wearable) displays
  - › Customizable displays
  - › Simulation / big data analysis results



## SUMMARY / CONCLUSION

- › Large role for AI, automation and VAR technologies
- › Technological developments are hard to predict in this timeframe
- › Effects of introducing new technologies

A nighttime photograph of a city street. On the left is a brick building with lit windows. On the right is a modern building with a curved facade and lit windows. A road with a metal railing runs across the middle. Green light trails from a moving object are visible in the upper right. A white horizontal line with arrowheads at both ends is positioned below the railing.

› **THANK YOU FOR YOUR  
ATTENTION**

Voor meer inspiratie:  
**TIME.TNO.NL**

**TNO** innovation  
for life