Brain-be 2.0
Belgian Research Action through Interdisciplinary Networks
POLICY BRIEF

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BE-FORINTEL - BUILDING THE FOUNDATIONS OF A FORENSIC INTELLIGENCE TOOL IN BELGIUM: How Forensic Intelligence Transforms Criminal Network Disruption

Criminal network disruption is usually assessed using police-recorded data, but these data provide only a partial view of the underlying criminal structure. This study examined whether forensic intelligence (FI), including DNA, fingerprint, and ballistics linkages, changes how disruption outcomes are measured. Using 1,000 simulated police networks and forensic-enhanced variants, the study tested whether identical disruption strategies appear more or less effective when additional forensic connections are visible. The central finding is clear: FI does not substantially change baseline communication efficiency, but it reveals additional connectivity and redundancy that police-only networks miss. As a result, disruption appears more effective in police-only networks than it does in FI-enhanced networks. This means that police-based disruption assessments may overestimate how much an intervention fragments a criminal network.

Context and question(s) of research

Criminal networks are difficult to disrupt because they are both adaptive and partially hidden. Law enforcement strategies often target central actors, brokers, or communication pathways, assuming that these points represent structural vulnerabilities. However, these decisions are usually based on police-recorded data, which reflect detected offences, known suspects, and documented investigative links. Such data may omit hidden actors, cross-case connections, and alternative pathways that remain outside police visibility.

Forensic intelligence offers a way to expand this visibility. By linking cases through DNA, fingerprints, ballistics, or other traces, FI can reveal relationships between cases that are not visible through police records alone. This does not mean that FI changes how criminal networks behave. Instead, FI changes what analysts can observe. This distinction matters because disruption strategies are designed and evaluated using observed networks. If the observed network is incomplete, the measured impact of disruption may be misleading. This study therefore asked whether disruption outcomes depend on the level of network observability. More specifically, it examined whether FI-enhanced networks respond differently to disruption than police-only networks when the same intervention strategies are applied.

Main findings

The first finding is that forensic intelligence changes the observed structure of criminal networks, but not necessarily their baseline communication efficiency. Before disruption, police-only and FI-enhanced networks had similar average shortest path length values. This suggests that FI does not radically alter the overall efficiency of communication at baseline. However, FI-enhanced networks showed greater structural variation, meaning that forensic data reveal additional forms of connectivity that are not captured in police-only representations. The second finding is that targeted disruption strategies remain the most effective across all network types. High-degree, high-betweenness, and high-closeness targeting produced the largest increases in average shortest path length, meaning that removing structurally central actors still has the strongest effect on communication efficiency. Random targeting and communication-edge targeting produced much smaller effects. FI therefore does not change which strategies appear most effective; rather, it changes how large their effects appear. The third and most important finding is that police-only networks overestimate the apparent impact of disruption. When disruption was applied to police-only networks, targeted strategies produced large increases in average shortest path length, suggesting substantial fragmentation. However, when FI-derived connections were added back into the disrupted networks, this communication slowdown was reduced. In other words, forensic linkages revealed that the network retained more alternative pathways than police-only data suggested.

The added-value gap confirms this pattern. Across targeted disruption strategies, FI-enhanced networks retained shorter communication paths than corrected police networks. The largest gaps appeared under high-degree and high-betweenness targeting, especially in DNA-enhanced networks. This indicates that FI is most valuable when disruption focuses on structurally central actors, because it reveals hidden redundancy around precisely the parts of the network that police strategies are most likely to target. A final finding concerns uncertainty. FI-enhanced networks produced more stable and predictable disruption outcomes than police-only networks. This suggests that forensic intelligence does not only reveal more connections; it also reduces uncertainty in how disruption effects are measured. For intelligence-led policing, this is important because operational decisions depend not only on identifying targets, but also on estimating the likely consequences of intervention.

Conclusion and recommendations

The core policy message is that forensic intelligence should be understood as an observability tool. It does not make criminal networks more resilient; rather, it reveals that they may already be more connected and redundant than police-only data suggest. If disruption is assessed only through police-recorded data, intervention effects may therefore appear stronger than they really are. For policymakers and practitioners, FI should be incorporated into strategic network analysis, not treated only as case-level evidence. DNA, fingerprint, and ballistics linkages can reveal hidden relationships across cases and support more accurate assessments of vulnerability, target prioritisation, and disruption outcomes. Disruption planning should also account for the possibility that police-only networks underestimate redundancy. Central-actor targeting may remain useful, but its expected impact should be interpreted cautiously when based only on police-visible data. FI can help determine whether removing a central actor is likely to fragment the network or whether alternative pathways will preserve communication. Agencies should therefore invest in systems that allow forensic and police-derived linkages to be compared without assuming that either source provides a complete picture. This requires interoperable data structures, clear case identifiers, and procedures for translating forensic matches into network-relevant intelligence. Overall, the study shows that disruption effectiveness depends on what is visible. By expanding observability, forensic intelligence provides a more accurate basis for understanding criminal network vulnerability and for designing disruption strategies that reflect the true complexity of the network.

Read more

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Information

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