The Open Source Frontline: A Functional Categorisation of Open Source Intelligence by Civil Society Organisations in the Israel- Hamas War (October 2023 - June 2024)

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A Functional Categorisation of Open Source Intelligence by Civil Society Organisations in the Israel-Hamas War (October 2023 - June 2024)

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Content Warning

The following thesis discusses subjects and material that could be sensitive to some readers, including physical and graphic violence, hateful language, and death.

Introduction

On 7 October, 2023, the Palestinian Islamist organisation Hamas carried out a terrorist attack from the Gaza Strip targeting nearby Israeli settlements and a music festival. In the immediate aftermath, videos and images of the attack were rapidly uploaded to social media platforms such as X (formerly Twitter) and Telegram. These images were promptly analysed by individuals and organisations seeking to understand the situation in real time. For instance, the X account *AuroraIntel* shared an image with the caption: 'Images being released on social media of militants in an Israel Defense Forces (IDF) post show the involvement of other factions in today's operation.'[1] This is just one example of how a plethora of openly available sources was utilised by non-governmental parties to track and comprehend the evolving conflict.

The recent escalation of the Russia-Ukraine war has led to a notable increase in the utilisation of open source intelligence (OSINT), particularly by civil society organisations and individuals. OSINT is defined as publicly accessible information deemed to have intelligence value that has been identified, analysed, and disseminated.[2] OSINT is produced by researchers through crowdsourcing, openly accessible sources and social media with the primary function to inform the public about current events. Although traditionally a government domain, a non-governmental OSINT community has been emerging and expanding on the internet and social media, with the objective of documenting and analysing ongoing wars and conflicts. Academic literature increasingly acknowledges these developments, with some noting a shift in the OSINT community from a fragmented entity to a more organised network, spurred by the Russian invasion of Ukraine in 2022.[3] This significant transformation highlights the need for further research to understand the evolving role and influence of this field, particularly regarding the impact of non-state actors.

A substantial part of the academic focus on OSINT in modern warfare centres on the Russia-Ukraine war, resulting in several publications, including the work of Hannah van Beek and Sebastiaan Rietjens. In their article, Van Beek and Rietjens identify four key

[1] Aurora Intel, "Images being released."
[2] Millett, "Open-Source Intelligence," 2.
[3] Perrot, "L'Open Source Intelligence," 66.

functions of OSINT through a case study analysis of the conflict. These are: debunking false narratives, reshaping perceptions, informing military personnel, and documenting war crimes and human rights violations.[4] However, the current Israel-Hamas war, despite being the subject of many OSINT investigations, is largely absent from academic analysis. This thesis investigates how OSINT, produced by civil society organisations, functions within the context of the Israel-Hamas war during its first nine months (October 2023 - June 2024). Specifically, it researches how the four functions of OSINT proposed by Van Beek and Rietjens manifest in this conflict and how these functions are operationalised in practice through the publications of such organisations. This research will highlight how the Israel-Hamas war reveals particular focal points in OSINT functions and suggests an addition to the conceptual framework of Van Beek and Rietjens.

Relevance

The conflict in Gaza is deeply embedded in ideological tensions, making it not only a physical struggle, but also a war of words and narratives. From a poststructuralist perspective this becomes even more pronounced. Poststructuralist theory in international relations draws the relationship between foreign policy and identity, revealing a rhetoric that creates a divide between 'us and them'. This rhetoric, which can change over time, is often used to justify policy decisions and military actions.[5] Following the events of 7 October, the whole world was pulled into this rhetoric, split between supporting Israel's right to defend itself and the Palestinian cause. This split became even greater because of the tensions and debates surrounding it on the international stage.[6] The polarisation affected international actors and public opinion almost as much as the people in Israel and Palestine themselves.[7] Media coverage has reflected these deep divisions, resulting in highly subjective and emotionally charged reporting.[8] This thesis proposes that OSINT, by its nature, can challenge the notion of a single, objective truth in the Israel-Hamas conflict. While OSINT generated by civil society actors is characterised by transparency and its openness to public scrutiny, this thesis also acknowledges that open source research is both dependent on and conducted through

[4] Van Beek and Rietjens, "Open-Source Intelligence," 57-75, 60-64.
[5] Zehfuss, "Critical theory," 151-152.
[6] "World reacts to ICC prosecutor," *Al Jazeera*.
[7] Bontea, "Gaza War."
[8] Al Jazeera Journalism Review, "In-Depth Analysis Reveals Distortion."

subjective lenses. Although a source may be openly accessible and be objective in itself, it is ultimately the researcher who selects that source and potentially integrates it into a specific narrative. Nevertheless, the transparency of OSINT and its methodologies facilitates the deconstruction of dominant or biased narratives. Furthermore, the research process is open, thereby exposing it to continuous public examination. This public scrutiny ensures that any biases or subjective choices made by researchers can be challenged and reassessed. In this way, OSINT is uniquely positioned to reveal the complexities, contradictions, and power dynamics inherent in any conflict, especially one as ideologically charged as the one in Gaza.

In this thesis, the term 'Israel-Hamas war' is employed in order to reflect the specific nature of the conflict under study. In the used timeframe the ongoing war is primarily between Israel and Hamas rather than the entirety of Palestine, and it is taking place primarily in the Gaza Strip. The research focuses on the reporting of the conflict in the Gaza Strip and does not extend to the West Bank, where the dynamics differ. Aside from its social relevance, this thesis also addresses a significant gap in the academic literature. The relevant literature and this specific gap will be discussed in detail in the following chapter.

This thesis commences with a review of the existing academic discourse on OSINT. Following this, the methodology is outlined, detailing the development of observable indicators and the selection of two case studies involving civil society organisations: Bellingcat and Forensic Architecture. Subsequently, the result of the operationalisation is presented, organised according to each OSINT function. Next, a functional categorisation of OSINT is presented, based on the aforementioned indicators. Finally, an additional function is introduced, which highlights the significance of collaboration within the OSINT field.

Literature Review

This literature review starts with an examination of OSINT's place in intelligence studies. The existing methods and terminology are discussed, followed by an examination of OSINT's relationship with state actors in conflict situations. It also looks at how social media and the internet have become prominent in monitoring wars and conflicts, which demonstrates the close connection between these developments and OSINT practices. The review further explores the emergence of non-state actors as key players in OSINT, contributing to the democratisation of intelligence. Special focus is placed on the rise of OSINT during the Russia-Ukraine war, which marked a turning point in its visibility and impact. Additionally, this review delves into the article by Van Beek and Rietjens that underpins this thesis. Finally, the review addresses the notable absence of literature on OSINT in the context of the Israel-Hamas conflict, positioning this research within that gap.

Intelligence studies

Historically, intelligence gathering has been the responsibility of government agencies. These agencies collect crucial information about threats and opportunities to serve state interests. Academics have always been interested in their work. Traditionally, they conduct research either from the 'outside,' without official access to classified records, or from the 'inside,' where some receive limited, sanctioned access to sensitive documents. Research from the inside often produces straightforward organisational or operational accounts. In contrast, external researchers tend to create more compelling narratives, offering richer and more nuanced insights.[9] The increased use of OSINT has led to a blurring of this distinction, as intelligence is no longer solely in the hands of governments. Researchers now have the opportunity to operate both within and outside the traditional intelligence framework, leading to new views and frameworks in academic literature.

Terms and methods

The term 'open source intelligence' is just one among several terminologies used to characterise a field that is still not fully defined. While many definitions exist, Edward Millet, Heather J. Williams, Ilana Blum, and the United States Public Law define OSINT as publicly

[9] Johnson, *Handbook of Intelligence Studies*, 17-23.

available information that has been discovered, analysed, and disseminated.[10] The last two sources both emphasise that this information must be determined to hold intelligence value. This characteristic underscores the transformation of raw, unprocessed data into intelligence through analysis. It distinguishes OSINT from related concepts like 'open source information' (OSIF) or Publicly Available Information (PAI). Williams and Blum clarify this difference, describing OSIF as 'unclassified data accessible to the public,' while OSINT is the outcome of processing and exploiting this data for analytical purposes.[11] Within academic literature, another term that surfaces is Open Source Journalism (OSJ). Dominik Bär et al. describe OSJ as "a new journalistic practice whereby crowdsourcing and open source information are used to create intelligence."[12] Although this aptly characterises some major, published articles by civil society organisations, OSJ inadvertently narrows its scope by implying that this practice is exclusive to journalism oriented individuals. Whereas in reality, OSINT organisations involve amateurs with various backgrounds, often operating on a voluntary basis.[13]

Actual OSINT analysis uses various research methods, all publicly accessible. In theory, anyone can conduct open source research from home. This research can include everything from satellite imagery to flight tracking websites and ground-level footage. One key tool is geolocation, which involves verifying the location of an image or video by using resources like Google Maps, Google Earth, and other footage from the same area.[14] Geolocation is not only useful for authenticating footage but also for verifying claims. For instance, in Bellingcat's article 'A Beginner's Guide to Geolocating Videos,' geolocation was used to confirm whether the Libyan opposition had actually captured a small town in 2011.[15] For a comprehensive overview of different OSINT research methods, *The Tao of Open Source Intelligence* is an excellent resource.[16]

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[10] Millett, "Open-Source Intelligence," 2; Williams and Blum, *Defining Second Generation Open Source Intelligence*, 8; National Defense Authorization Act.
[11] Williams and Blum, *Defining Second Generation Open Source Intelligence,* 8.
[12] Bär, et al., "Analyzing Social Media Activities at Bellingcat," 1-2.
[13] Fiorella, "First Steps to Getting Started."
[14] Higgins, "A Beginner's Guide to Geolocating Videos."
[15] Ibidem.
[16] Betram, *The Tao of Open Source Intelligence.*

OSINT in conflict and war

History reveals that OSINT is not a recent concept, having its origin as a supplement to traditional intelligence practices. Governments continue to leverage openly accessible data, particularly with the advent of the internet, for intelligence objectives. This practice has been a focal point in diverse academic studies, as evidenced in works by Illia Varzhanskyi and Javier Pastor-Galindo et al.[17] These articles span from offering guidance on a wider application of OSINT to analysing the impact of disinformation, sourced from open channels, on governmental decision-making. Older sources often focus on the relationship between OSINT and states, but recent views suggest a new wave in OSINT use has emerged.[18] This new view of OSINT stems from the rise and increasing use of the internet in everyday life. As argued by Michael Glassman and Min Ju Kang, this evolution has fostered the creation of collaborative, open and problem-solving communities.[19] As a result, OSINT has extended its relevance to fields beyond government intelligence agencies. This development went hand-in-hand with the development of social media. Many scholars have explored the role of social media in social movements and public protests, often highlighting the Arab Spring as a key moment in its development. During these protests, social media was used to share information and rally support for the movement, all within a highly hybrid media environment.[20] Both social media and the internet have significantly increased the amount of available information, especially in the context of war and conflict. However, they also allow conflict parties to turn the internet into a battleground, using it for propaganda and disinformation.[21] The growing prominence of social media in conflict has also facilitated the rise of non-governmental OSINT practitioners, as it provides abundant raw data.

Russia-Ukraine War

Some studies have written about OSINT and war from the perspective of civil society organisations. These studies predominantly centre around the Russia-Ukraine war, mostly after the 2022 invasion. Sohail Ahmed Khan et al. and Sophie Perrot, for example, wrote

[17] Varzhanskyi, "Reflexive Control as a Risk Factor"; Pastor-Galindo, et al. "The Not Yet Exploited Goldmine of OSINT."
[18] Perrot, "L'Open Source Intelligence," 66.
[19] Glassman and Kang, "Intelligence in the Internet Age," 676-677.
[20] Bruns, Highfield, Burgess, "The Arab Spring and Social Media Audiences"; Wolfsfeld, Segev, Sheafer, "Social Media and the Arab Spring."
[21] Hauter, "Forensic conflict studies," 153-172, 153-154.

about the significance of OSINT and outlined concrete or potential contributions of the OSINT community to warfare studies.[22] Perrot argued that OSINT communities can render war traceable, combat disinformation, and identify and document war crimes, offering potential insights consistent with Van Beek and Rietjens' study.[23] Her article highlights the transformative impact OSINT communities can have on conflicts and underscores the need for greater academic engagement with the subject.[24] However, the efficacy of her proposed functions remained to be tested in real-world cases on a bigger scale. Khan et al., explore this gap with a case study of a civil society OSINT called FATISK VERIFISERBAR. This is a Norwegian organisation that analyses and debunks disinformation about the Russia-Ukraine war. Over nine months, the study examined their use of various open source resources and tools to analyse and combat disinformation. Their findings indicate that OSINT techniques and multimedia verification empower analysts to produce and share reliable, accurate information with the public, thereby enhancing the credibility of conflict reporting.[25] Bär et al. also use a case study approach, focusing on Bellingcat's social media activities on X. Their analysis looked at how Bellingcat used X and how the platform's role changed following Russia's invasion of Ukraine.[26] Notably, the study observes an increase in negative sentiment in replies to Bellingcat's posts following the invasion.[27] While they do not establish a direct correlation, the findings suggest that Bellingcat's work may influence public perceptions of the war, potentially fostering more negative attitudes. Both Bär et al. and Khan et al. demonstrate the value of case studies in exploring the role and functions of OSINT in conflict situations.

Van Beek and Rietjens

Van Beek and Rietjens' article, "Open-Source Intelligence in the Russia-Ukraine War," forms the foundation of this thesis. This article is notable for being one of the first to categorise OSINT into various functions, based on a case study to test and apply these functions in practice. Their framework, developed through a case study, provides a structured approach to analysing OSINT, making it a valuable tool for testing in a different context.

[22] Khan, et. al, "Online Multimedia Verification"; Perrot, "L'Open Source Intelligence."
[23] Perrot, "L'Open Source Intelligence," 64.
[24] Ibidem, 63-74.
[25] Khan, et. al, "Online Multimedia Verification."
[26] Bär, "Analyzing Social Media Activities at Bellingcat," 1-2.
[27] Ibidem, 9.

Van Beek and Rietjens propose four main OSINT functions: debunking false narratives, reshaping perceptions, informing military troops, and documenting war crimes and human rights violations.[28] These functions provide a framework for understanding how civil society organisations and amateur analysts use OSINT to interpret real-time events in conflict zones. One of the article's strengths is its detailed exploration of OSINT's role in the Russia-Ukraine war, particularly in how it highlights the growing importance of non-governmental actors in intelligence gathering. By showing that OSINT practices can rival or even surpass traditional intelligence methods, the article exemplifies the democratisation of intelligence. However, the article also has limitations. Its focus on the Russia-Ukraine conflict means that it does not address the nuances of OSINT in other geopolitical contexts, such as the Israel-Hamas conflict. The Russia-Ukraine war presents a unique scenario with high levels of internet access and civilian participation, which may not be replicable in other regions. In addition to this, the article occasionally lacks clarity regarding the identity of the producers of OSINT and their intended audience. Although the authors primarily focus on civil society organisations and individual researchers, they sometimes shift to discussing governmental perspectives without clarifying why. Similarly, their description of the intended audience is inconsistent. While much of the discussion suggests the audience are external observers, certain parts discuss the application for the conflict parties themselves.[29] Clarifying the roles of the producers and the audiences would enhance the article's focus and make the functions more solid.

While Van Beek and Rietjens establish OSINT's prominence in the Russia-Ukraine war, its application in the recent escalation of the Israel-Hamas war remains underexplored. Nevertheless, a few articles reveal that OSINT is not unfamiliar in this context. Netanel Flamer's analysis reveals how Hamas, as a violent non-state actor, employs OSINT in intelligence warfare against Israel. He shows how a weaker party in asymmetric warfare can leverage low-cost intelligence like OSINT.[30] Additionally, Tariq Kenney-Shawa highlights the dual nature of OSINT for Palestinians, serving as a low-cost means to collect and share conflict information, yet subjecting them to a 'digital occupation' by Israel.[31] However,

[28] Van Beek, Rietjens, "Open-Source Intelligence", 60-64.
[29] Ibidem, 62-63.
[30] Flamer, "'The Enemy Teaches Us How to Operate,' 2-3.
[31] Kenney-Shawa, "Will Open-Source Intelligence Liberate."

research into the functional categorisation of OSINT in this particular conflict is yet to be undertaken. This thesis seeks to fill that gap, applying Van Beek and Rietjens' framework to test its applicability in this new conflict setting.

Methodology

This thesis explores the functional categorisation of OSINT through a mixed-methods approach, grounded in the four OSINT functions proposed by Van Beek and Rietjens. Each function was operationalised to assess how they manifest in the Israel-Hamas conflict.[32] This means that the abstract theoretical functions have been turned into measurable, observable actions in the real world. These real-world indicators have been developed through a review of the article by Van Beek and Rietjens and adapted to the specific dynamics of the Israel-Hamas war. The review first examined the definitions given by Van Beek and Rietjens for each function. The next step was to examine the examples provided by Van Beek and Rietjens for each function, focusing on the actual OSINT evidence or tactics used in these examples. This approach enabled the identification of specific actions and uses of OSINT to look for in the case studies. In some cases, Van Beek and Rietjens gave clear examples of how OSINT contributed to a particular function. For example, the Bucha massacre was surrounded by misinformation, with OSINT playing a key role in debunking these false narratives.[33] For some functions, however, such clear examples were lacking, requiring a deeper analysis of how the article justified the function. Once the indicators were identified, they were adapted to the context of the Israel-Hamas war. This adaptation was necessary because some of the indicators proposed by Van Beek and Rietjens were too specific to the Russia-Ukraine conflict. As a result, they were difficult to apply to articles on other conflicts. In most cases, the adaptation involved generalising the indicators, thereby broadening their scope and making them more widely applicable. In some cases, however, the indicators did not require any changes and could be applied directly.

The research used a case study approach of two prominent civil society organisations: Bellingcat and Forensic Architecture (FA). These organisations were chosen for their influential roles in the production of OSINT through detailed investigations, and for their established reputation in analysing conflicts globally. The analysis includes comparative elements, as no two civil society organisations operate in the same way. This distinction is crucial when attempting to establish a generalised functional categorisation. By examining

[32] Bhandari, "Operationalization."
[33] Van Beek, Rietjens, "Open-Source Intelligence", 61.

two case studies a more nuanced understanding of how the OSINT functions are applied in practice emerges, reflecting the diversity in organisational approaches and methodologies.

A textual analysis was conducted on the selected reports to identify whether the four OSINT functions were evident and to analyse the methodologies and tools to understand how these organisations operationalised OSINT in practice. Based on this categorisation, the data from these sources was evaluated to determine whether it aligned with the operationalisation of the OSINT functions, and whether additional categories were needed to accommodate new insights. Assessing the fit of the operationalisation involved considering not only the presence of observable indicators, but also their relevance. While the quantity of indicators available can provide some insight, it is the combination with the qualitative analysis of these indicators that ultimately determines whether a function is discernible in a particular article. This process is further discussed in the analysis section of the thesis.

Bellingcat is the leading civil society organisation in the OSINT field, having evolved from an amateur network into a professional entity. Its core team conducts in-depth investigations, often in collaboration with followers who provide feedback and assistance through various channels. Bellingcat publishes comprehensive reports on its website and shares findings via X. Forensic Architecture (FA), though similar to Bellingcat in its investigative approach, is a research agency based at Goldsmiths University. It consists of a multidisciplinary team, including architects, lawyers, scientists, and journalists. While some of FA's projects are commissioned, the majority are self-initiated. In addition, FA often publishes both a webpage with their findings and a more formal report intended for policy-making institutions. In these instances, the analysis focused on the report rather than the web article, as they did not differ in content but in interactivity and professionalism. Articles and reports published by both organisations between October 2023 and June 2024 were included in this study. This chosen timeframe of roughly nine months ensured a reasonable distance from the published material while keeping the scope of the research manageable. It is important to note that these two organisations do not publish articles on a daily basis like news agencies, but rather publish reports approximately every one to two weeks or even less. Moreover, the war between Israel and Hamas is not their sole focus. The

number of sources is therefore neither extensive nor minimal. Some FA reports, for example, run to around 80 pages. Furthermore, these articles provide numerous examples and serve as comprehensive summaries of the research conducted, so even with a relatively small sample size, the actual content is far from limited.

Operationalisation: Observable Indicators

This chapter presents the results of operationalising the conceptual framework for the functions of OSINT proposed by Van Beek and Rietjens. For each function the observable indicators identified are discussed, along with their adaptation to the context of the Israel-Hamas war.

Debunking False Narratives

The first function of OSINT identified by Van Beek and Rietjens in the context of the Russia-Ukraine conflict is the debunking of false narratives (*Debunking*). They argue that OSINT assists analysts in determining 'what did and what did not really happen,' which involves targeting misinformation and fact-checking propaganda claims from both sides of the conflict.[34] One example they provided is the massacre in the town of Bucha, where numerous photographs had surfaced to show the widespread scattering of corpses.[35] Russia claimed these images to be false, accusing Ukraine of staging the scene. However, through satellite photos and cross-referencing the footage, OSINT analysts proved that the bodies had been present long before Ukrainian troops arrived.[36] From this analysis a couple of observable indicators can be determined: identifiable claims or counterclaims, and the use of OSINT techniques for authentication or debunking. The methods employed include cross-referencing sources and analysing satellite imagery.

A similar pattern can be expected in the Israel-Hamas context, where disinformation and propaganda claims by both Hamas and the Israeli government are subject to verification. These verification efforts are particularly important given the limited journalistic presence in Gaza. In addition, efforts to debunk misinformation circulating, for example, on social media, are indications of this function. Misinformation on social media is particularly prevalent in this conflict, driven by the significant ideological tensions. As a result, it is highly likely that much of the debunked mis- and disinformation originated on social media platforms.

[34] Van Beek, Rietjens, "Open-Source Intelligence", 60.
[35] Lopis,"*Bucha. Two years ago.*"
[36] Higgins, "Russia's Bucha."

Reshaping Perceptions

As a second function, Van Beek and Rietjens asserted that OSINT has the capacity to influence the decisions and beliefs of both individual citizens and foreign political leaders (*Reshaping*). This capability signifies a 'new chapter' in the 'political and diplomatic use of intelligence'.[37] In the Russia-Ukraine war, various revelations have been made through OSINT that shifted the international opinion in Western society in favour of Ukraine. This has consequently pressured Western governments to impose sanctions on Russia and provide military support to Ukraine. While this function entails some analysis of the effects of OSINT publications, the Van Beek and Rietjens framework provides some observable indicators to be found in the OSINT publications themselves. First, OSINT serves to expose the atrocities committed during the war, with notable examples including investigations into the Bucha massacre and the use of unguided munitions against civilian targets. These investigations effectively illustrate both the scale of the atrocities and the destructive nature of military operations to the international community. Additionally, OSINT investigations amplify incidents by highlighting major issues, human rights violations, and war crimes, providing the evidence necessary to substantiate these claims. Lastly, the use of OSINT to specifically refute official Russian government narratives is an indicator, as these revelations have contributed to the swaying of Western public opinion to the Ukrainian cause.

In the context of the Israel-Hamas war, OSINT can be expected to be instrumental in highlighting the atrocities of the conflict, revealing the human toll and destruction it entails. Secondly, publications will address both the direct and indirect consequences of the war, leading to humanitarian crises or, for example, an ecological crisis. Methods such as analysing satellite imagery and ground reports can provide a clearer picture of the conditions on the ground. The refuting of Russian narratives is difficult to adapt to the Israel-Hamas context, as it is specifically focused on countering one government's narratives and often framed within efforts to sway Western opinion in support of Ukraine. Since the Israel-Hamas conflict does not have a clear, binary divide in terms of international opinion, where one side is widely supported over the other, this thesis opts to exclude this specific indicator from the analysis.

[37] Van Beek, Rietjens, "Open-Source Intelligence", 61.

Informing Military Troops

Unlike the other OSINT functions, the proposed function of informing military troops (*Informing*) stands out because civil society organisations do not actively direct military operations, but rather focus on documenting them. Van Beek and Rietjens slightly adjust their framework here, concentrating on OSINT generated by individuals within active combat zones, rather than by external observers as with the other functions. However, they also admit that few reports show the use of OSINT for military purposes in the Russia-Ukraine war. They define this function as the utilisation of civilian information infrastructures and social media information to generate OSINT for military purposes. For example, the Ukrainian government asked citizens to assist in locating Russian troop movements. A government app, *Diia*, provided a chatbot and allowed the uploading of geotagged photos and videos of Russian forces. This initiative effectively transformed citizen reports into tactical intelligence assets.[38] In another instance, a pro-Russian OSINT organisation utilised video footage from a Ukrainian news channel to identify a munitions factory in Kyiv via geo-location. It subsequently became the target of a bombing.[39] From these examples, the following observable indicators can be discerned: crowdsourced intelligence collection, such as the sharing of coordinates and movements of military troops; direct information flow from civilian devices, often through social media posts to gain situational awareness; and targeted killing and destruction through the use of OSINT.

This research focuses on the functions of OSINT as published by civil society organisations, whose purpose is to monitor and document conflicts, not to support military operations. The observable indicators for the Israel-Hamas context are therefore adjusted accordingly. While the military application of OSINT as such does not fit within the parameters of this study, OSINT can still play an important role in monitoring military activities. In this context, the function of informing military troops can be reinterpreted as monitoring the military and military engagements. In the Israel-Hamas conflict, one expected indicator includes the documentation of military presence, troop movements, and actions. This can include tracking troop deployments through satellite imagery, geotagging, and pattern analysis, which together form a type of crowdsourced intelligence collection.

[38] Ibidem, 63.
[39] Ibidem.

Additionally, updates on conflict zones can provide situational awareness, particularly during active engagements, by establishing timelines and analysing live feeds. Finally, civil society organisations can monitor and verify official military claims, thereby contributing to a clearer and more accurate understanding of military actions for their audiences.

Documenting War Crimes and Human Rights Violations

The final function Van Beek and Rietjens outline is the use of OSINT to gather evidence of potential war crimes and human rights violations, where possible to support legal processes (*Documenting*). They indicate that it is 'highly likely that open source investigation methods and evidence may fill in crucial gaps' in war crime trials.[40] Therefore the evidence 'needs to be gathered, documented, and made accessible to accountability.'[41] Van Beek and Rietjens do not explicitly distinguish between the *Documenting* and *Reshaping* functions, which may result in overlap. Based on the analysis, *Reshaping* appears to focus on showcasing the broader horrors and their impact on society. In contrast, *Documenting* seems more centred on recording specific conduct, highlighting instances that could be classified as a human rights violation or war crime. However, such violations can also contribute to the *Reshaping* function.

To effectively determine whether OSINT publications are documenting war crimes and human rights violations, several observable indicators emerge. First, there is a focus on the verification of targeted civilian infrastructure. This involves using OSINT to confirm whether attacks were carried out on civilian structures, such as hospitals or schools, and assessing the legitimacy of these targets within the context of international law. Secondly, the collection of evidence of civilian casualties can be essential. This may include analyses of social media posts, videos, and photographs that document an attack and its aftermath. This evidence may determine whether civilian casualties were intentional or avoidable. Another indicator involves the identification of weapon types and usage. OSINT can help identify what munitions were employed in specific incidents, contributing to understanding whether prohibited or indiscriminate weapons were used against civilians, but also who the perpetrator was. Lastly, mapping incidents and creating timelines plays a crucial role in this

[40] Ibidem, 64.
[41] Ibidem.

function. Analysts may compile verified incidents to create detailed accounts that illustrate patterns of behaviour or highlight potential violations. In the context of the Israel-Hamas war, the observable indicators are likely to closely mirror those identified in Van Beek and Rietjens' framework.

Functional Categorisation

This chapter applies the observable indicators outlined in the operationalisation. It presents an analysis of the Bellingcat and FA articles, examining the presence of these indicators and how they manifest. Some examples are highlighted, often supported by the visual evidence used in the reports.

Debunking False Narratives

Bellingcat

Bellingcat's first article published after the 7 October attacks primarily focused on debunking various forms of mis- and disinformation. It aligns closely with the identified indicators, although the focus is not directed towards claims made by either Hamas or the Israeli government. Using geolocation, satellite imagery analysis, and cross-referencing footage, Bellingcat disproved several social media claims made by supporters of both Israel and Palestine. For instance, footage alleged to show events from the Israel-Hamas war were, in fact, reused from the Syrian conflict. A notable example includes a video posted by an IDF spokesperson claiming to depict a recent strike on Gaza. However, Bellingcat's cross-referencing revealed that this same footage had been shared in 2021 and displayed a Syrian city, thereby proving its inaccuracy.[42]

[42] Bellingcat, "Hamas Attacks."

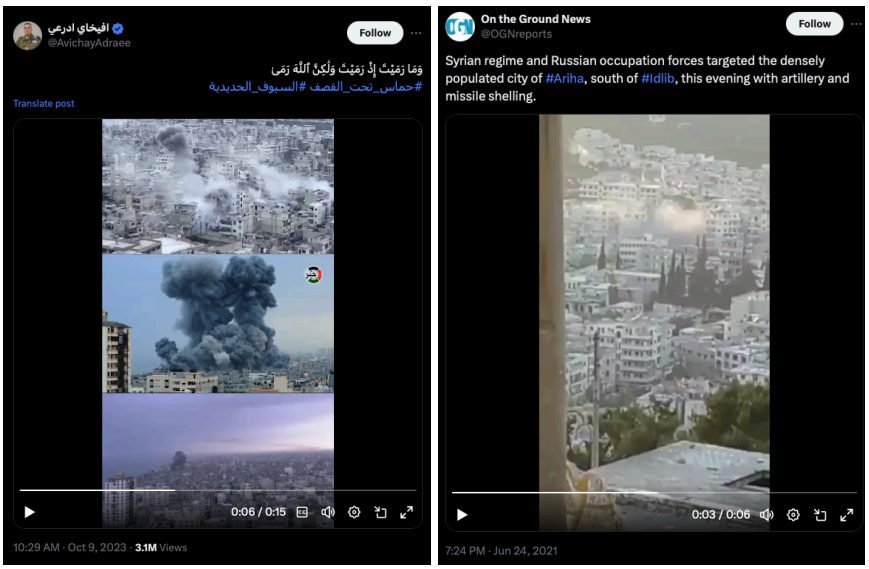

Figure 1. Screenshots of the IDF spokesperson (Achivay Adraee) (left) claiming a recent attack on Gaza and a video depicting the same attack posted in 2021 (right) by *On the Ground News*. (Bellingcat, "Hamas Attacks")

In December, Bellingcat published an article entirely focused on this reuse of footage from the Syrian civil war. A pro-Palestinian journalist misrepresented images of a Syrian refugee camp in northern Lebanon, claiming they depicted children in Gaza. Verification was straightforward in this case: by tracing the original creator's TikTok account, which was visible in the posted video, the true source of the footage could be confirmed.[43]

Figure 2. X Post by journalist Sulaiman Ahmed claiming to depict children in Gaza. (Bellingcat, "Hamas Attacks")

[43] Bellingcat, "Images of Syrian Civil War."

In addition to debunking conflict-related footage, Bellingcat examined misinformation concerning the bodyguard of the popular celebrity Taylor Swift.[44] Israeli sources had reported that this individual had returned to Israel to serve as a reservist in the IDF to fight in Gaza. X Community Notes is a feature on the platform that allows contributors to leave remarks on posts. If enough contributors rate a remark as helpful, it is displayed publicly on the post itself.[45] In this instance, Community Notes indicated that the bodyguard was not part of Taylor Swift's security team. By analysing images from Swift's previous concerts, Bellingcat demonstrated the bodyguard's presence at events over several years, easily disproving these claims. This incident highlights how easily misinformation about all aspects of the conflict can spread through platforms like X, underscoring the critical importance of thorough fact-checking.

An April article analysing a strike on World Central Kitchen workers highlights another example of Bellingcat's approach. It included a remark from the Israeli government that they did not intend to strike these aid workers, resulting in it being a 'tragic incident'.[46] However, through the analysis of available images and geolocating the struck vehicles, Bellingcat concluded that the 'vehicles bear the hallmarks of a precision strike, which only the IDF has the capability to conduct in the region.'[47] It is an excellent example of the diplomatic approach of Bellingcat: rather than directly accusing Israel or Hamas of falsehoods, they allow OSINT techniques to suggest contradictions in official narratives. This contrasts with the organisation's more explicit approach when addressing misinformation spread by external social media sources, where Bellingcat is particularly vocal about the harmful impact of such claims. They not only overshadow the actual struggles of the victims, but also fuel claims that all sources and footage online are unreliable.

Interestingly, the indicators for the *Debunking* function are more evident in Bellingcat's earlier articles than in those published later in the conflict. While some Israeli government claims are scrutinised, often implicitly, the rigorous debunking of mis- and disinformation becomes less prominent. As the conflict progressed, Bellingcat's focus shifted

[44] Bellingcat, "X's Community Notes."
[45] "About Community Notes on X."
[46] Bellingcat, "Strike That Killed."
[47] Ibidem.

to other functions, as will be discussed in subsequent sections. There is no evidence that this was a deliberate strategic shift, but it is understandable that as the conflict progressed and the humanitarian situation deteriorated the focus shifted to documenting that development and not, as in the beginning, on verifying the claims of outsiders.

Forensic Architecture

While Bellingcat refrains from explicitly accusing the Israeli government of dishonesty, the FA team is a bit more forthright. Unlike Bellingcat, their focus is not on social media posts spreading mis- and disinformation, but on verifying official Israeli claims. Their emphasis is largely on military assertions, which also aligns with the *Informing* function and its observable indicators. In this case, however, the focus remains on verifying events and debunking misinformation, whether military-related or not.

In February, FA released two reports that fit neatly into the *Debunking* function. The first report debunked alleged Israeli disinformation surrounding the bombing of the Al-Ahli Hospital.[48] On 17 October, an explosion within the hospital grounds killed 471 people and left 342 injured, according to the Ministry of Health in Gaza. However, this count has thus far not been verified.[49] Palestinian authorities immediately blamed Israel for a deliberate strike, while Israel attributed the explosion to a Hamas rocket. International media were also split due to the absence of definitive evidence, with many news sources aligning with either side.[50] In their article, FA examined a claim by Lt. Col. Peter Lerner, the British spokesperson for the IDF. He stated to CNN and BBC that the explosion at Al-Ahli was caused by a Hamas rocket, based on a still from an Al Jazeera livestream.[51] FA used the same still image and livestream to refute this allegation.

[48] Forensic Architecture (FA), "Israeli Disinformation."
[49] Human Rights Watch, "Gaza: Findings on October 17."
[50] Al Jazeera, "What we know so far"; Biesecker, "New AP analysis."
[51] Brandts, "Fierce exchange."

Figure 3. Lt. Col. Peter Lerner, the British spokesperson for the IDF, on CNN holding a printed still image of the Al Jazeera Livestream. (Ram Eli Brandts [@RamEliBrandts])

Lerner claimed that a misfiring rocket launched by Hamas had been responsible for the destruction of the hospital. FA determined the trajectory of the missile by cross-referencing the Al-Jazeera livestream with two other videos posted online. Particularly, they used the open source software Blender to track the missile and geolocate it. Their open sourced methodology revealed that the missile had been launched from outside Gaza, near a known Israeli missile launch site.[52] While FA could not conclusively identify who or what caused the explosion, they effectively debunked a significant portion of Israel's disinformation campaign that followed the Al-Ahli Hospital tragedy, by using OSINT.

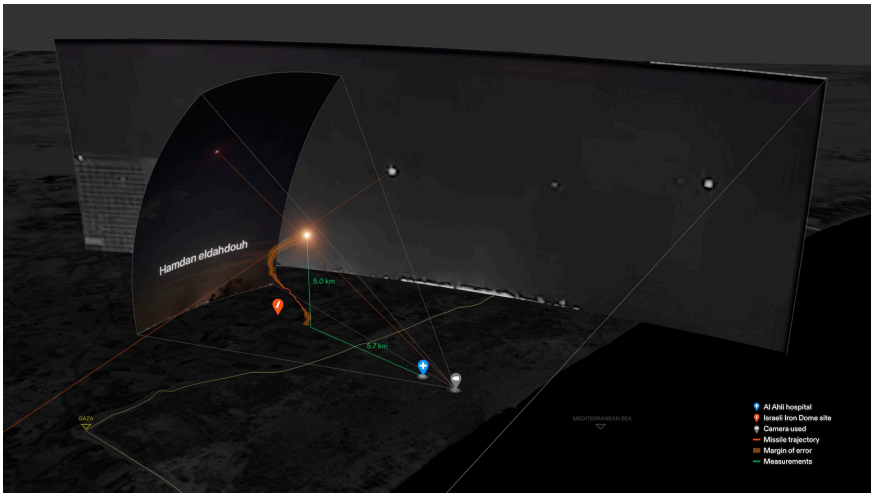

Figure 4. The trajectory of the Israeli missile, mapped through Blender. (FA, "Israeli Disinformation")

[52] FA, "Israeli Disinformation".

In the second February article, FA assessed the visual material presented by Israel at the International Court of Justice (ICJ).[53] In January 2024, Israel was called to the ICJ by South Africa on the accusation that it was violating the 1948 *Convention on the Prevention and Punishment of the Crime of Genocide*.[54] On 11 and 12 January, both sides presented their arguments. On 26 January, the ICJ ordered provisional measures to protect the rights of the Palestinians in Gaza. As part of their defence, Israel presented a variety of visual material, which FA analysed on authenticity, annotation, and interpretation. One example involved an image submitted by Israel, that was supposed to show an image of a Hamas fighter firing from a hospital. This evidence was intended to justify the subsequent targeting of the facility. However, FA used geolocation and cross-referenced the image with other photos of the hospital and its surroundings. They demonstrated that the image depicted a commercial storefront, not the hospital's boundaries.

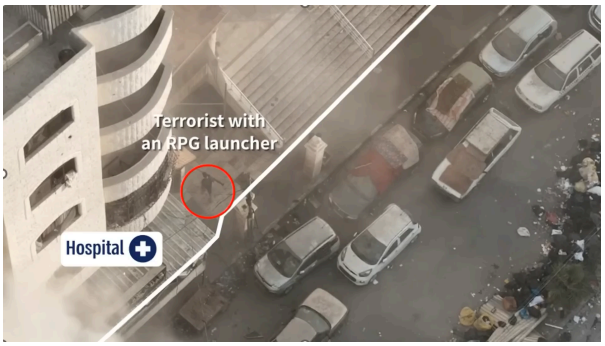

Figure 5. Evidence presented by the Israeli legal team at the ICJ. (FA, "Israeli Disinformation")

Figure 6. Residential building north of Al-Quds Hospital which was annotated as being part of the hospital by the Israeli legal team. Illustration by FA. (FA, "An Assessment of Visual Material")

[53] FA, "An Assessment of Visual Material."
[54] "Convention on the Prevention and Punishment of the Crime of Genocide."

Forensic Architecture identified eight instances where Israeli evidence was misrepresented in the ICJ case through OSINT and open source techniques. This report clearly fits the *Debunking* function, as it focused extensively on verifying claims and exposing mis- and disinformation. The two reports are the most prominent examples of this function, although indicators are also present in other articles.

Reshaping Perceptions

Bellingcat

Within the *Reshaping* function, Bellingcat frequently employs OSINT to highlight and verify instances of suffering and destruction resulting from the Israel-Hamas war. The insights derived from these analyses may change readers' opinions, but also potentially compel humanitarian agencies and policymakers to reconsider their strategies in response to the ongoing crises. This is achieved through two primary approaches, each corresponding to the observable indicators previously outlined. In the first place, OSINT serves to expose the atrocities committed as part of the conflict, such as the torture and killing of civilians, thereby exposing the horrors of war. For example, in their article 'Social Media Posts Show Off Blindfolded and Bound Palestinian Detainees', Bellingcat presents visual evidence to the horrific treatment of Palestinians.[55] In another article, Bellingcat analyses footage of the killing of a 12-year-old Palestinian child in a refugee camp. Rami Hamdan Al-Halhouli and his friends were reportedly aiming fireworks in the camp in the direction of the Israeli military forces. Through geolocation and audio analysis, Bellingcat establishes that the child was shot before he even threw his firework.

Secondly, OSINT is used to highlight the extensive suffering and crises arising as indirect consequences of the conflict, rather than casualties caused directly by fighting or specific acts of violence. This application of OSINT is prominently present in Bellingcat's articles, which address critical issues such as the lack of basic necessities, the cut off of power, an ecological crisis and widespread famine.[56] In some cases, this involved verifying specific instances, such as geolocating a lengthy que in front of a bakery.[57] However, this indicator is also evident in the significant OSINT tools that Bellingcat has developed to monitor the conflict and its effects more closely. One such tool is the Gaza Damage Proxy Map, which allows users to visualise the cumulative damage across the Gaza Strip, accompanied by geolocated footage that corresponds to specific damage points.[58] The Damage Map enhances the accessibility and quantifiability of the conflict's impact,

[55] Bellingcat, "Social Media Posts Show Off."
[56] Bellingcat, "Confirming a Strike"; Bellingcat, "Using Livestreams"; Bellingcat, "Gaza's Trees Disappear."
[57] Bellingcat, "Confirming a Strike."
[58] "Gaza Damage Assessment," Earth Engine Maps.

potentially influencing users' perceptions.[59] Another tool used to visualise destruction is satellite imagery analysis. Through this method, Bellingcat, in cooperation with Planet Labs, presented the existence of both an ecological crisis and a humanitarian crisis in the region.[60] They demonstrated that there has been a mass removal of trees in the Gaza Strip, attributed either to the Palestinians due to fuel shortages or to the IDF for military purposes. Images captured along important roads, such as Kissufim Road, revealed that military forces have cleared land of orchards and agriculture. The IDF justified this practice from a defensive perspective, claiming the potential presence of hidden landmines and the need to create a buffer zone. However, according to Human Rights Watch, the laws of war clearly prohibit attacks on objects needed for survival by the civilian population, which includes agricultural areas.[61] Bellingcat achieved two things with the satellite image analysis. First, it made the suffering of civilians visible through the disappearing trees. Second, it contrasted the IDF's narrative with established laws of war. This highlighted the tension between military operations and their impact on civilians. As a result, Bellingcat seems to have wanted to evoke an emotional response from the reader while encouraging them to critically question Israel's actions.

Figure 7. Satellite image of Kissufim Road on October 19, 2023. (Bellingcat, "Gaza's Trees Disappear")

[59] Bellingcat, "A New Tool."
[60] Bellingcat, "Gaza's Trees Disappear".
[61] Human Rights Watch, "Israel's Crimes Against Humanity."

Figure 8. Satellite image of Kissufim Road on 19 January, 2024. Highlighting added by Bellingcat. (Bellingcat, "Gaza's Trees Disappear")

This widespread destruction extends beyond the agricultural areas, as numerous buildings have also been deliberately demolished. Consequently, many Palestinians who fled will find themselves without homes to return to. In an article from April 2024, Bellingcat presented a focus story of a single IDF battalion, known as the 8219 Commando.[62] By analysing social media posts and the online diary of a captain from the unit, Bellingcat constructed a timeline detailing the path of destruction caused by the battalion. These investigations collectively aimed to illustrate the consequences of the war that arise not from the fighting itself, but from subsequent actions and their effects.

Forensic Architecture

The horrors of the Israel-Hamas war are most dramatically accentuated in the June article "The Killing of Hind Rajab".[63] In January, a six-year-old girl, Hind Rajab, was killed in a car in Gaza City alongside her four cousins, her aunt and uncle while fleeing on a pronounced safe route. Her cousin Layan had called the Palestine Red Crescent from the car to plead for help, but after audible shots her voice stopped abruptly. Two paramedics were dispatched to help the girls, but they too were found dead at the scene in their ambulance. FA, in cooperation with Al Jazeera and Earshot, examined the circumstances surrounding these killings. Through satellite imagery analysis, FA was able to map the original position of the car. Next, with the use of visual evidence of published photographs of the car, they mapped

[62] Bellingcat, "'We've Become Addicted to Explosions"
[63] FA, "The Killing of Hind Rajab."

the bullet holes, suggesting the position of the shooters. They used even more techniques, which will be discussed in more detail later, but FA concluded that the attacks were most likely conducted by Israeli forces. By combining these OSINT techniques and sources, they presented a graphic portrayal of violence against civilians.

Figure 9. The vehicle Hind Rajab and her family members were found in. (FA, "The Killing of Hind Rajab")

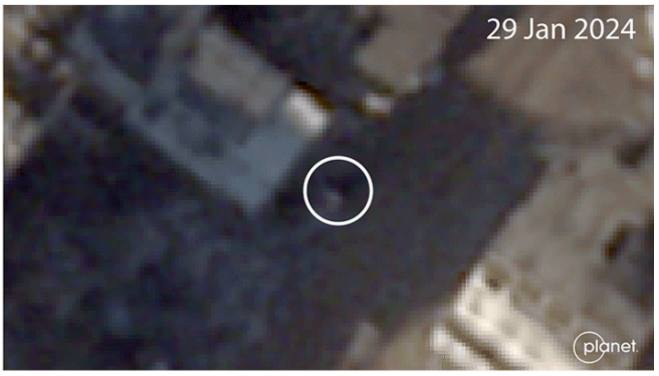

Figure 10. Satellite imagery of the vehicle on the day of the attack. (FA, "The Killing of Hind Rajab")

More of FA's investigations broadly addressed the extensive impact on the civilians in the Gaza Strip. OSINT is used to highlight three major points: the widespread destruction, the living conditions and again, the progression of an ecological crisis. Like Bellingcat, FA visualised the destruction in the Gaza Strip by developing an OSINT tool that is updated throughout the war. However, they placed particular emphasis on their 'web platforms' on the demolition of medical infrastructure, identified through pattern analysis of textual open sources, visual evidence and geolocated incidents. Such tools can once again make the situation more tangible for outside audiences.[64] OSINT is also used to demonstrate the deteriorating living conditions of Palestinians. One notable example is the use of satellite

[64] FA, "Destruction of Medical Infrastructure."

images to determine damage to facilities needed for survival, such as petroleum stations and drinking water stations.

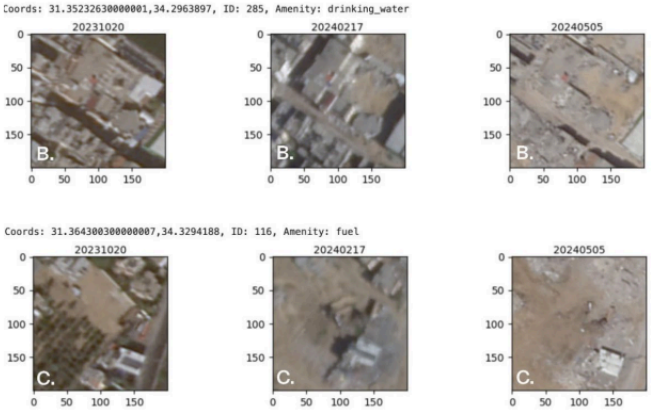

Figure 11. Damage detected on the Al-Rahma Mosque water desalination plant and the A. Odeh and Abu Younis Petroleum Station. Above the image is the date (YYYYDDMM), with each picture showing increasing damage (left to right). (FA, "Inhumane Zones")

Lastly, FA highlighted the unfolding ecological crisis, like Bellingcat's observations. They described this crisis as 'a deliberate act of ecocide', and argued that it forms 'part of a wider pattern of deliberately depriving Palestinians of critical resources for survival.'[65] To support their claim, FA employed satellite imagery analysis. For instance, nearly one-third of Gaza's greenhouses have been destroyed since October 2023, with this destruction largely concentrated in areas that were at some point occupied or invaded by Israeli forces. This argument goes beyond merely visualising destruction through OSINT, as FA aimed to demonstrate harmful intent behind Israel's actions.

[65] FA, "No traces of life'."

Figure 12. Maps of parts of Gaza. They show the destruction of greenhouses and the overlapping with ground invasion areas. (FA, "No traces of life")

Overall, in visualising the fate of civilians, the destruction, and the resulting crises of war, it is likely that civil society organisations aim to communicate something specific to their audiences. While this does not necessarily lead to a reshaping of perceptions, it is plausible that influencing perceptions is an intended goal. However, as neither this thesis nor the work by Van Beek and Rietjens delve into publishers' intentions, this function remains somewhat speculative. Nonetheless, both Bellingcat and Forensic Architecture frequently include the observable indicators of this function in many of their articles. This offers promising avenues for future research into the intentions and impacts of this OSINT function.

Informing Military Troops

Bellingcat

A big portion of Bellingcat's articles appears to serve the *Informing* function. Particularly, Bellingcat uses OSINT to document the activity of armed forces, predominantly that of the IDF. However, Bellingcat also monitored Hamas activity, as seen in their analysis of footage from the 7 October attacks. Shortly after the events at various kibbutzim and the Supernova music festival, Bellingcat published an in-depth examination of videos showing the assaults on Kerem Shalom and Sufa kibbutzim.[66] This article serves as a strong illustration of the first two indicators: documentation of military actions and creating situational awareness. In this case, Bellingcat reviewed video sets filmed by militants using wearable cameras. Initially, they verified the authenticity of the footage by geolocating distinct landmarks, such as a lattice tower in the background, which served as a reliable point of reference.[67]

Figure 13. Left: Screenshot of one video. In the black box is a recognisable lattice tower marked. Right: A red arrow indicating the direction of the fighters' movement, as identified by Bellingcat through visual feature matching. (Bellingcat, "Geolocating Hamas-Led Attacks")

Next, Bellingcat constructed a timeline of the attacks to clarify the sequence of events. They used coincidental markers, such as clocks in the footage, and estimated solar positioning based on shadows to determine the timing of events. By documenting and contextualising these details from the events on 7 October, Bellingcat exemplified how OSINT techniques can create a structured, chronological understanding of specific military actions. This method provides essential clarity, fitting fragmented footage into a cohesive narrative that deepens insights into the day's events.

[66] Bellingcat, "Geolocating Hamas-Led Attacks."
[67] Bellingcat, Archived Video.

This is not the only Bellingcat article tracking troop movements. Bellingcat frequently mapped IDF positions, highlighting locations where forces crossed into Gaza or established positions during the ground invasions. Satellite imagery is often used to verify these movements, allowing OSINT to deliver near real-time, multi-source updates.[68] This practice significantly enhances contextual awareness and provides a documented record of conflict developments. Due to the nature of Bellingcat's publishing approach, which often involves releasing articles after events have occurred, OSINT is not primarily utilised for actual real-time updates. Nevertheless, the organisation discussed the role of livestreams in monitoring wars and crises.[69] The current war in Gaza presents unique challenges, as power outages caused by Israeli actions have severely limited the functionality of cameras within the territory. Consequently, livestreams are largely confined to those provided by news outlets stationed just outside Gaza's borders. For open source researchers, the value of livestream footage lies in its ability to enable immediate monitoring of incidents and independent evaluation of activities.

The third indicator involves the verification of military claims, which aligns partially with the *Debunking* function of OSINT. However, this indicator is specifically concerned with distinct military assertions, primarily those that involve claims of actions, victories, or accusations against opposing forces. For instance, the previously discussed incidents, including the bombing of the Al-Ahli Hospital and the attack on World Central Kitchen workers, exemplify the types of claims that fall under this category.

Forensic Architecture

The FA team focuses far less prominently on using OSINT to track military movements compared to Bellingcat. Instances that align with the indicators for the *Informing* function often overlap with indicators of other OSINT functions. For example, in the previously discussed article that addressed claims by the Israeli legal team at the ICJ, FA analysed and refuted certain military claims.[70] Israel argued that 'hospitals have not been bombed, rather

[68] Bellingcat, "Confirming a Strike"; Bellingcat, "Gaza's Trees Disappear"; Bellingcat, "'We've Become Addicted to Explosions."
[69] Bellingcat, "Using Livestreams."
[70] FA, "An Assessment of Visual Material."

the IDF sends soldiers to search and dismantle military infrastructure'.[71] FA easily challenged this statement using its extensive OSINT platform, which records all attacks on medical infrastructure, such as the Al-Shifa Hospital. According to FA, the hospital was directly targeted by the Israeli army 11 times between 3 November and 8 February. Although this analysis involved verifying a military claim, it also contributed to the *Debunking* function by countering disinformation. A similar approach is seen in FA's investigation into the explosion at Al-Ahli Hospital. Previously, this thesis discussed misleading footage of a misfired rocket, which was alleged to be of Hamas and responsible for the attack. Both Israel and Hamas denied overall responsibility; however, through OSINT, FA demonstrated that Israel's claims regarding the misfired rocket were inaccurate.[72]

Although it is somewhat rare for FA to document Israeli troop movements, they occasionally do so in the context of Israel's evacuation orders. Two reports published by FA focused on the mass displacement of Palestinians due to these orders, which, as they demonstrated through OSINT, often directed civilians to areas that are not genuinely safe.[73] The humanitarian impact of these evacuation orders will be discussed under the *Documenting* function. However, part of demonstrating that the designated 'safe zones' are unsafe, involved showing Israeli military presence and even attacks on these areas. For instance, FA examined the declaration of the al-Mawasi 'humanitarian zone' in December 2023 and compared it with Israeli ground invasions during the same period. FA obtained information on evacuation orders from social media posts by the Israeli military, likely intended to reach civilians in the Gaza Strip.[74] Data on the ground invasion, however, was sourced from the Institute for the Study of War.[75]

[71] *South Africa v. Israel*, CR2024/2, 12 January 2024
[72] FA, "Israeli Disinformation."
[73] FA,"Humanitarian Violence."; FA, "Inhumane Zones."
[74] FA. "Humanitarian Violence," 40-41.
[75] Institute for the Study of War, "Interactive Map: Israel's Operation in Gaza."

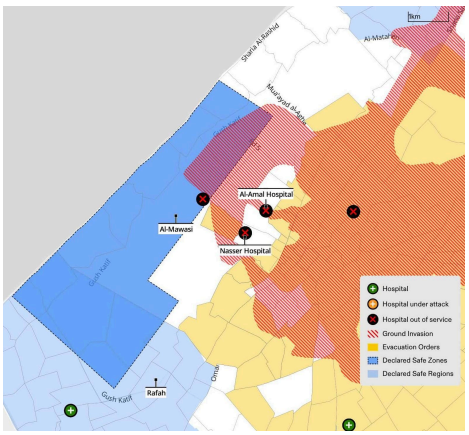

Figure 14. Map created by FA showing evacuation orders issued by the Israeli military up to 22 January 2024 (yellow). The designated al-Mawasi safe zone is highlighted in blue, overlapping with areas of the Israeli ground invasion (red). (FA, "Humanitarian Violence")

Overall, the *Informing* function is not a prominent aspect of FA's use of OSINT. When indicators of this function were observable, they often did not align with the primary purpose for which the OSINT is generated or published, instead overlapping with other OSINT functions.

Documenting War Crimes and Human Rights Violations

Bellingcat

The *Documenting* function is a central component of Bellingcat's use of OSINT in its reporting on the war between Israel and Hamas. This is evident in Bellingcat's frequent conclusions to articles which state that: 'Bellingcat continues to monitor the latest war in Israel-Palestine '...' with the aim of documenting civilian harm.'[76] Throughout the analysed timeframe, almost all articles show one or more indicators of this function. The following sections provide examples of how each indicator is applied in Bellingcat's reporting.

First, there is the documentation of targeted attacks on civilian structures. Bellingcat's first article following the events of 7 October investigated the supposed bombing of a church site.[77] Although Bellingcat used geolocation to debunk videos falsely claiming this strike, they discovered in the process that the strikes occurred in densely populated areas near several schools. Bellingcat's investigation into the strikes near schools was later corroborated by a UN report confirming the bombing of two UNRWA schools.[78] Other articles by Bellingcat covered the targeting of hospitals, refugee camps, and residential buildings.[79]

More grievously, Bellingcat has documented civilian casualties in the conflict. Numerous images and videos of bodies, graves, and injured civilians circulate online. Bellingcat used OSINT to link this footage to specific incidents, such as those at Al-Ahli Hospital, Jabalia refugee camp, and Rafah.[80] For instance, a video posted on Twitter shows an area near Al-Ahli Hospital after the October blast, with at least two dozen bodies. Although Bellingcat does not link to this video because of its graphic content, the location and timing were confirmed by geolocating the same area in a separate video.[81] Some articles focused solely on individual deaths, using OSINT to investigate specific casualties in detail, rather than addressing civilian casualties within the broader narrative. For example, the article on

[76] E.g. Bellingcat, "Confirming a Strike."
[77] Bellingcat, "Hamas Attacks."
[78] Guterres, "Secretary-General's remarks."
[79] Bellingcat, "Identifying Possible Crater"; Bellingcat, "In Rafah"; Bellingcat, "The Hidden War."
[80] Bellingcat, "In Rafah"; Bellingcat, "Confirming a Strike"; Bellingcat, "Identifying Possible Crater."
[81] Bellingcat, "Identifying Possible Crater."

the death of Rami Hamdan Al-Halhouli was devoted solely to documenting this casualty and assessed the context and legitimacy of his killing.[82]

Four articles also closely examined the types of weapons that may have been used in specific attacks, as this could help identify the responsible party and potentially reveal intent. This approach was particularly evident in the investigation of the Al-Ahli Hospital explosion, an incident marked by widespread confusion about what happened and who was responsible.[83] Bellingcat analysed the crater left by the explosion, using a panorama created from a video posted on Instagram.[84] The analysis revealed that the crater itself was relatively small. With the help of an expert from PAX, a peace organisation, Bellingcat concluded that the impact was inconsistent with an airstrike using a guided missile, a type of weapon available exclusively to Israel in the Gaza Strip. The question remained, however, as to what precisely it was. Furthermore, in the investigation into Rami's death, Bellingcat used audio analysis to examine weapon usage. By measuring the time between the ballistic shock wave and a subsequent sound, possibly a muzzle blast, they determined a gap of approximately 127 milliseconds. While calculating the exact distance would require the projectile's speed, the audio analysis strongly suggested that the bullet was fired before the fireworks were launched. This was an indication that the child had been shot before he posed a potential threat, which would be a violation of human rights.[85]

Finally, many articles used OSINT to map specific incidents or create timelines that provided a clear overview of events. For example, the geolocation and timeline of the Hamas attacks on 7 October outlined the locations and times of the attacks.[86] This gave a full picture of the destruction and casualties which could help determine whether these actions constituted war crimes. In another article, Bellingcat gathered intelligence on the mistreatment of Palestinian detainees.[87] Footage shared on social media by groups such as the 'Hamas Hunting Club' showed men being blindfolded, bound, and disgraced. By examining the followers of known IDF soldier groups on Instagram, Bellingcat identified several

[82] Bellingcat, "Footage Captures Moment."
[83] E.g. Al Jazeera, "What we know so far."
[84] Bellingcat, "Identifying Possible Crater."
[85] Bellingcat, "Footage Captures Moment."
[86] Bellingcat, "Geolocating Hamas-Led Attacks."
[87] Bellingcat, "Social Media Posts Show Off."

Israeli-American soldiers who had also posted content from Gaza. This included images depicting more questionable treatment of detainees. According to a law professor consulted by Bellingcat, this conduct by some IDF members is likely unlawful under international humanitarian law and could potentially amount to war crimes.

Figure 15. One of the images documented by Bellingcat was posted on Instagram Stories by the Hamas Hunting Club, with the caption: 'He won't sleep well.' (Bellingcat, "Social Media Posts Show Off")

In summary, Bellingcat has employed OSINT in a variety of ways to document potential war crimes and human rights violations.

Forensic Architecture

FA demonstrates a strong emphasis on the *Documenting* function, with all their reports containing one or more indicators. This highlights the prominence of this function in their work.

One of the most compelling aspects of FA's work is their use of the 'safe zones' framework to expose human rights abuses. They have produced two comprehensive reports dedicated to this effort.[88] One of these clearly articulated their stand on the designation of safe zones, stating: 'Israel has exercised a form of 'humanitarian violence', in concert with and in

[88] FA, "Humanitarian Violence"; FA, "Inhumane Zones."

support of its broader genocidal actions.'[89] This analysis drew on a wide range of open source data, including press releases, social media posts, and statements by officials related to the evacuation orders. These sources were further corroborated with other open source information and satellite imagery.[90] Through this methodology, FA documented the mass displacement of Palestinian civilians orchestrated by the Israeli military in the Gaza Strip, framing these actions as a form of humanitarian violence: a clear fit within the *Documenting* function. The following section looks at FA's use of OSINT and the presence of indicators based on the Van Beek and Rietjens framework in these reports.

The findings in these reports often highlighted the targeting of civilian infrastructure as a key issue. FA contended that Israel's actions violate Article 8(2)(e)(viii) of the Rome Statute, which prohibits 'ordering the displacement of the civilian population for reasons related to the conflict, unless the security of the civilians involved or imperative military reasons so demand.'[91] Furthermore, areas designated for civilian evacuation must be equipped with essential resources for survival.[92] According to FA, Israel failed to meet this obligation during the period from 8 October to 16 February 2024. Evidence included the destruction of designated safe zones, targeted attacks on medical infrastructure, and damage to UN schools that were used as shelters.[93] FA's analysis concluded that the al-Mawasi "humanitarian zone," designated on 6 May, was unable to sustain the thousands of evacuees directed there, mainly due to the systematic targeting of civilian infrastructure.[94]

[89] FA, "Humanitarian Violence," 3.
[90] FA, "Inhumane Zones"; FA, "Humanitarian Violence," 2.
[91] International Criminal Court, *Rome Statute of the International Criminal Court*, 9.
[92] "Rule 131. Treatment of Displaced Persons."
[93] FA, "Humanitarian Violence," 47, 67-69. 75-77.
[94] FA, "Inhumane Zones," 4.

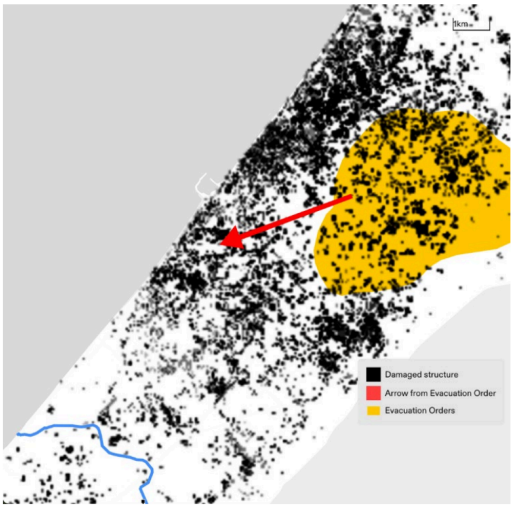

Figure 16. A map illustrating the direction of an evacuation order issued on 8 December, guiding civilians towards an area containing damaged and destroyed structures, as identified through destruction analysis (black). (FA, "Humanitarian Violence")

In addition to documenting the targeting of civilian infrastructure within designated 'safe' zones, FA also presented evidence of attacks on civilians within or en route to these areas. FA accused Israel of repeatedly targeting so-called humanitarian corridors, or failing to establish clear, safe routes to these zones.[95] They provided evidence of several documented attacks along evacuation routes explicitly designated by Israel. To illustrate, on 13 October 2023, a convoy of vehicles travelling on Salah-al-Din Street was targeted.[96] The same street was part of the evacuation route that was announced on the same day.[97] This information was verified through social media posts, with OSINT therefore confirming that civilians were targeted along a designated humanitarian corridor. Moreover, FA demonstrated that Israel had repeatedly attacked locations that it had previously designated as safe zones, resulting in civilian casualties. On 22 January 2024, Israeli forces attacked a school in Khan Younis, situated within the Al-Mawasi humanitarian zone, despite no evacuation orders having been issued for that area at the time. FA geolocated a video capturing this attack, as well as an additional video showing the killing of a civilian holding a white flag.[98] This provides further evidence of violations against civilians in a designated safe area.

[95] FA, "Humanitarian Violence," 4-5, 23.
[96] Soylu, "HORRIBLE footage."
[97] المنسق [Coordinator], "سكان مدينة غزة[Residents of Gaza City]."
[98] Forensic Architecture, "In its defence."

FA concluded that the so-called 'evacuation zones' were merely 'tools in a military campaign,' resulting in the deaths of tens of thousands of Palestinians.[99] Their methodology is consistent with a third indicator, namely the mapping of incidents and the creation of timelines. FA systematically constructed a timeline of evacuation orders, correlating these warnings with maps that outlined the designated zones and restricted areas. This analysis involved an examination of the location, boundaries, and timing of each evacuation order. FA identified a broad, three-phase evacuation strategy, which was characterised by inconsistency and confusion. Initially, all residents were evacuated from the northern regions of Gaza. This was followed by the implementation of an 'Evacuation Grid', which was then followed by the clearing of the 'safe zones'. By mapping the sequence and boundaries of these evacuation warnings, FA sought to demonstrate how Israel had weaponized this tool.

Three out of the four indicators for the *Documenting* function are clearly demonstrated in FA's reports on the evacuation orders, making them strong examples of this function. However, the final indicator, which concerns the identifying of weapon types and usage, is also prominent in other investigations. For instance, a significant part of FA's analysis of the killing of Hind Rajab centred on an audio analysis of gunfire captured during the phone call between Layan and the Red Crescent. Within just 6 seconds, 64 gunshots can be heard. FA deduced that this corresponds to a 750 to 900 rounds per minute range. The most commonly used rifle by Hamas is an AK-type rifle, which only has a range of around 600 rounds per minute. Conversely, the higher firing rate is consistent with weapons issued to the Israeli military, such as the M4 assault rifle.[100] Based on this analysis, FA concluded that the gunfire responsible for the civilian deaths was likely from Israeli forces. Additionally, FA used satellite imagery and photographs to map the car and its surroundings. By identifying entry and exit bullet holes, they pinpointed the position of the Israeli tank that Layan had described as having been within 13 to 23 metres of the vehicle. FA argued that 'at such proximity, it is not plausible that the shooter could not have seen that the car was occupied by civilians.'[101] This incident is presented as a deliberate attack on civilians, including children, which constitutes a clear violation of human rights and potentially a war crime.

[99] FA, "Humanitarian Violence," 3.
[100] FA, "The Killing of Hind Rajab."
[101] Ibidem.

These examples are just a few instances where the four indicators of the *Documenting* function are evident in FA's reports. The language employed by FA, coupled with their stated objectives, indicates that investigating potential human rights violations and war crimes represents a central focus. The recurrent appearance of these indicators further reinforces this priority.

Additional Function: Fostering Collectivised Intelligence

In their work, Van Beek and Rietjens identify four functions of OSINT, based on their observations of the Russia-Ukraine conflict. This thesis proposes an additional function, derived from the publications of Bellingcat and FA, namely *fostering collectivised intelligence*. This function is defined by the utilisation of open source data, methods and publications with the objective of establishing community-driven intelligence networks. This approach enhances the overall accuracy, scope and reliability of intelligence. The focus is on the construction of resilient, decentralised networks that accumulate diverse sources of knowledge to achieve a comprehensive open source intelligence outcome.

This function is distinct from the other functions in that it seeks to establish a collective system where information is not merely collected but also enriched through community collaboration. The concept of utilising OSINT to create such community-driven networks aligns with the emerging trend of decentralised intelligence networks, and the potential critical role they can play in contemporary conflicts. Regarding OSINT, for example, Sophie Perrot has examined the evolution of the OSINT community from a niche, informal network to a structured and self-organised ecosystem, particularly catalysed by the Russia-Ukraine war. Civil society groups and organisations have developed platforms, guides, methods, and tools to share with the public and other entities. Perrot identifies this tendency towards the formation of professionalised practices in examples such as the construction and development of expert knowledge or the establishment of training platforms.[102]

The introduction of the *Fostering* function is based on recent literature that has highlighted the complexities of the digital landscape and the growing need for community-driven networks. Although a substantial proportion of this research is focused on data science and computer networks, the underlying principles are highly relevant to the proposed function. For instance, Tobias Scholl et al. examined the challenges faced by e-science communities due to the increasing data volumes.[103] Their study explored scalable

[102] Perrot, "L'Open Source Intelligence," 66-67.
[103] Scholl "Scalable community-driven data."

information management through community-driven data grids, where members collaborate to share data and resources. This collaboration is vital for researchers worldwide, facilitating access to emerging data sources and fostering new scientific discoveries. The study, therefore, underscores the significance of collaboration in managing the growing information overload.

Similarly, Weiwei Yang et al. examined the rapid expansion and complexity of communication networks, proposing community-driven network research as a solution.[104] The authors proposed a three-tiered approach, comprising data sharing, facility sharing and intelligence sharing. Collectively, this entails full-scale collaborative research. The crowdsourced model reduces costs and enhances research repeatability, thereby increasing the credibility of findings. The authors posited that community-driven networks facilitate the efficient use of shared resources, thereby enhancing the robustness and reliability of scientific research.

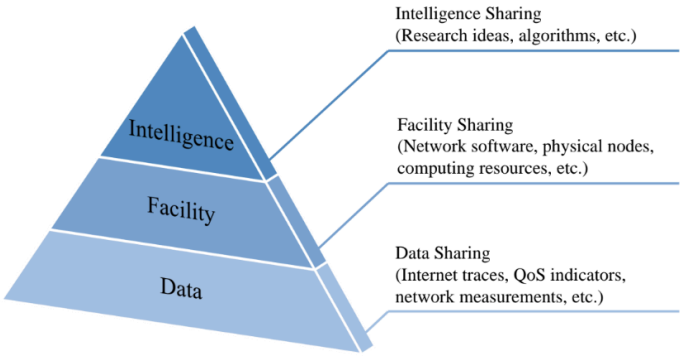

Figure 17. A taxonomy of community-driven communication network research schemes. (Jiang, "Rise of Community-driven Communication Network Research")

In this study, Weiwei Jiang et. al. examined information systems applications and network architectures. However, the taxonomy that they introduced is applicable to a broader range of community-driven research initiatives. The fundamental principles of the taxonomy align with the proposed function, which is focused on the development of community-driven intelligence networks utilising OSINT. The three identified stages of sharing, namely data, facility and intelligence, serve as observable indicators for the function.

The first indicator, data sharing, pertains to the utilisation of community-sourced

[104] Jiang, "Rise of Community-driven Communication Network Research."

information. Although this may appear to be a fundamental aspect of OSINT, it is vital to acknowledge its growing prevalence, as emphasised by Perrot. Data sharing can range from civil society organisations using fact-checkers' findings to incorporating grassroots information posted by users on platforms such as X and Telegram. Both forms of data contribute to the enhancement of the intelligence landscape.

The second indicator is the sharing of facilities. In the case of Weiwei Jiang et. al., this consisted of software and hardware that facilitated extensive data transfer to enable collaboration. For civil society organisations, this may include developing custom OSINT tools or the adoption of tools from other organisations to enhance their investigative capabilities.

The final indicator, intelligence sharing, represents a deeper level of collaboration, 'in which novel research ideas and algorithms can be collaboratively developed and validated.'[105] Intelligence sharing is built upon data and facility sharing. This can be further adapted for OSINT, as civil society organisations can develop and enhance OSINT by engaging in collaborative efforts with a diverse range of organisations and expertise.

These indicators form the foundation for the *Fostering* function, wherein OSINT is not only concerned with the gathering and analysis of information, but also with the establishment of resilient and collaborative networks. The subsequent analysis will examine the extent to which Bellingcat and FA articles reflect these indicators, assessing their contribution to this additional OSINT function.

Bellingcat

In the previous chapters, various examples have been presented in which open sourced data has been instrumental in producing intelligence on incidents and attacks. Yet, Bellingcat's methodology extends beyond merely collecting publicly accessible information and they actively engage in data sharing. This includes the incorporation and expansion of open source discoveries made by other researchers, journalists, and institutions. To illustrate, a video

[105] Ibidem, 309.

depicting an IDF tank firing at a civilian vehicle on a designated safe evacuation route was geolocated by a Senior Investigator at the Centre for Information Resilience.[106] While Bellingcat independently corroborates such claims, it also draws upon these pre-existing research efforts in their own analyses, thereby exemplifying a collaborative dimension in their intelligence gathering. Furthermore, Bellingcat leverages grassroots-provided information sourced from social media platforms. It should be noted, however, that not every article makes use of such content. Some open source materials, such as satellite imagery or stills from livestreams, are not necessarily intended to contribute to an OSINT narrative, but rather serve as raw data points. Such cases lack a collaborative dimension. An illustration of Bellingcat's utilisation of grassroots sources can be observed in its examination of the Al-Ahli Baptist Hospital attack. Jaap Meijer, an X user, posted a Reuters photograph with the suggestion that it might depict the impact site.[107] Despite the absence of further analysis in Meijer's post, it nevertheless provided Bellingcat with a potential geolocation lead for further investigation.[108]

Up to this point, Bellingcat's investigative articles have been the primary focus of the functional categorisation. However, Bellingcat also produces a different type of content: guides. The objective of these guides is to provide readers with a set of methods, tools, and critical thinking strategies to enhance their own OSINT capabilities. In general, these guides exhibit a lower number of indicators of specific OSINT functions compared to investigative articles. Alternatively, they frequently employ OSINT pertaining to the Israel-Gaza conflict to illustrate methodologies. One guide, for example, explored how to identify and utilise useful livestreams for monitoring breaking news.[109] Another guide, titled 'The Seven Deadly Sins of Bad Open Source Research', addressed common errors in OSINT analysis. The text went on to examine instances where intelligence has been misrepresented. One such example was a rumour that Israeli Prime Minister Netanyahu had secretly evacuated the country due to fears of an Iranian attack. This rumour was based on flight data from a government plane. Bellingcat drew attention to the absence of evidence to substantiate the claim that Netanyahu

[106] Bellingcat, "Confirming a Strike."
[107] Meijer "This looks like the exact impact spot."
[108] Bellingcat, "Identifying Possible Crater."
[109] Bellingcat, "Using Livestreams."

was on board, thereby exposing a misuse of OSINT.[110] This example is used to educate readers on how to spot flawed open source analysis and avoid similar mistakes. In addition to these guides, Bellingcat develops tools that are shared with the wider OSINT community. One such tool is their Damage Probability Map, created using open source data, which demonstrates the sharing of facilities.[111] This tool not only aided Bellingcat's investigations but was also made available for others to enhance their own research. The map has already been adopted by several media outlets, exemplifying Bellingcat's commitment to collaborative intelligence-sharing.

A review of the eighteen articles published by Bellingcat during the specified period revealed that three of them involved collaboration with Scripps News. Scripps News is an American news network known for its traditional and online investigative journalism. The partnership between Bellingcat and Scripps News has resulted in the creation of two documentaries and one major satellite imagery analysis.[112] These collaborations exemplify intelligence sharing, whereby both data and resources are pooled to enhance investigative outcomes. In the case of the documentaries, Bellingcat employed OSINT to investigate the destruction in Gaza, while Scripps News contributed the production resources to translate these findings into a visual narrative. This partnership highlights how OSINT can serve as a bridge, enabling cooperation between organisations with distinct capabilities and methodologies, thereby enriching the overall investigative process.

Forensic Architecture

This concluding section of the chapter examines FA's nuanced engagement with the OSINT function of *Fostering* through data, facility, and intelligence sharing. Regarding the sharing of data, FA frequently incorporates information derived from social media platforms. To illustrate, FA examined an Instagram post by Mahmoud Abusalama, which depicted the Al-Shifa Hospital site following bombardments.[113] The post included the hashtag '#ننقل_لكم_المشهد_والصورة' ('#We_transmit_to_you_the_scene_and_the_picture'), exemplifying

[110] Bellingcat, "OSHIT."
[111] Bellingcat, "A New Tool."
[112] Bellingcat, "The Hidden War"; Bellingcat. "Analysis Reveals Damage"; Bellingcat, "Gaza's Trees Disappear."
[113] Mahmoud_abusalama, "صور الدمار الكبير [Pictures of the great destruction]."

how some social media accounts specifically aim to document and provide evidence of ongoing events. FA employed this image to differentiate between various locations, such as a mass grave and a burial ground, thereby aiding in the verification of other images.[114] However, FA's substantial reliance on satellite imagery and other open source materials gathered independently limits the extent of their data sharing. As these sources are predominantly self-collected, it reduces external input and thereby constrains collaborative dimensions. However, even in articles that lack the data sharing indicator, there is evidence of intelligence sharing due to extensive collaboration with various partners, which will be explored shortly. Since intelligence sharing is built on the foundations of data and facility sharing, some level of data exchange is inherent among the collaborating authors.[115]

Bellingcat's identity is in part constituted by the publication of the previously discussed guides, which are designed to assist other OSINT researchers in their work. In contrast, FA does not engage in the production of comparable content, and the practice of facility sharing is less prominent within their OSINT publications. However, FA's OSINT platforms that track the destruction of medical infrastructure in Gaza provide analysts with comprehensive overviews that can be leveraged for independent open source research, thereby enhancing community-driven monitoring efforts.[116] Additionally, there is a certain degree of facility sharing present when FA collaborates with other organisations, which ultimately facilitates intelligence sharing. In five out of the eight reports published by FA, the organisation partnered with one or more entities. All but one of these collaborators are non-profit organisations, with many being Palestinian or even based in Gaza.[117] Nevertheless, the precise nature of these partners' contributions, whether in terms of data or facilities, is not always explicitly stated. In some cases, they are merely acknowledged as contributors. For instance, Ain Media Gaza is listed as a collaborator in FA's report on ecocide in Gaza. However, the only identifiable contribution appears to be a photograph of an orchard taken in 2019.[118] Nevertheless, a strong example of facility and data sharing can be seen in FA's investigation into the killing of Hind Rajab. As previously outlined, this analysis included an

[114] FA, "Mass Burials."
[115] FA, "No traces of life"; FA, "The Killing of Hind Rajab."
[116] FA, "Destruction of Medical Infrastructure."
[117] "About," Al-Haq; "Fault Lines," AlJazeera; "About," Ain Media; "Info," Earshot.
[118] FA, "No traces of life";

examination of audio from a telephone conversation between Layan and the Red Crescent. Since FA lacked the facilities to conduct this research internally, they enlisted the assistance of Earshot, a non-profit organisation specialising in audio investigations for human rights and environmental advocacy.[119] The analysis conducted by Earshot constituted a significant component of the OSINT findings that FA was able to produce. This investigation was further enhanced by collaboration with Fault Lines, a programme from the television network Al Jazeera. Fault Lines contributed on-the-ground interviews that added significant depth to the case. The joint efforts of FA, Earshot, and Fault Lines involved pooling their data and resources, leveraging their unique areas of expertise. This partnership exemplifies how OSINT analysis in conflict zones benefits from a global network of experts and amateurs, who not only cross-verify information but also amplify OSINT findings through collaborative efforts.

[119] Earshot, "Info."

Conclusion

This thesis has explored how OSINT produced by civil society organisations functions within the context of the Israel-Hamas war. This has been achieved by applying the framework proposed by Van Beek and Rietjens. The four functions were operationalised and analysed in the case studies of Bellingcat and Forensic Architecture. In conclusion, the four functions, *Debunking*, *Reshaping*, *Informing* and *Documenting* appear in both organisations' publications, albeit with variations in emphasis and methodology. The findings demonstrate that the OSINT functions are not only applicable but instrumental in conflict analysis, especially in a context as complex and ideologically charged as the Israel-Hamas war.

A major conclusion is that the four functions are evident across the publications studied, suggesting their potential for generalisation to other conflicts and organisations. However, their application also revealed limitations in the framework, particularly the need to adapt observable indicators to account for the unique socio-political and geographical dynamics of the Israel-Hamas war. This finding underscores the necessity for theoretical refinement to ensure broader applicability. In addition, the functions were not all equally present, reflecting organisational differences and the evolving nature of the conflict. The *Documenting* function was the most prominent across the case studies. Conversely, the *Informing* function featured more prominently in Bellingcat's work, reflecting their emphasis on specific incidents, while FA focused more on broader narratives and systemic issues. The *Debunking* function was particularly evident in the early stages of the conflict, as organisations addressed the surge in misinformation immediately following the 7 October attacks. However, no other consistent patterns emerged regarding when or why specific functions were more prevalent.

Furthermore, this thesis did not focus on the intentions of the authors, which made determining when an article was explicitly dedicated to a specific function challenging. Indicators of multiple functions were often present within the same publication, making it difficult to categorise articles definitively. For instance, an article titled 'Israeli Disinformation' may clearly align with the *Debunking* function, but other indicators might also be evident. This overlap complicates the task of identifying which function was the

primary focus of the OSINT. One other significant challenge lies in this overlap between functions. For instance, documenting civilian casualties often exposes the horrors of war, while verifying military claims can simultaneously debunk false narratives and provide critical situational awareness. Such overlaps highlight the interconnectedness of OSINT functions.

This thesis has also introduced a new function: fostering collectivised intelligence. The significance of this additional function is rooted in contemporary developments within the intelligence field. It challenges the poststructuralist notion of a world divided by polarised rhetoric, which often leads to subjective and emotionally charged reporting. By leveraging collaborative, community-driven networks, OSINT enables the production of intelligence that is broader in scope, more accurate, and inherently transparent, offering a powerful counterbalance to traditional narratives in conflict reporting.

Future research should investigate the long-term impacts of OSINT functions on global conflict dynamics and explore the intentions and strategies of civil society organisations in deploying OSINT. Additionally, the potential for greater collaboration within OSINT networks offers exciting opportunities for both academic inquiry and practical application.

In conclusion, this thesis demonstrates the significant role OSINT plays in contemporary warfare through its diverse functions. The Israel-Hamas war serves as a compelling case study, illustrating how civil society organisations effectively utilise OSINT to address the complexities of modern conflicts while critically engaging with and challenging dominant narratives.

Bibliography

Ain Media. “About.” Accessed November 25, 2024. https://ain-media.com/.

Al-Haq. “About.” Accessed November 25, 2024. https://www.alhaq.org/about-alhaq/7136.html.

Al Jazeera. “Fault Lines.” Accessed November 25, 2024. https://www.mezan.org/public/en/page/11/About-Us.

------. “What we know so far about the deadly strike on a Gaza hospital.” November 15, 2023. https://www.aljazeera.com/news/2023/10/18/what-do-we-know-about-the-strike-on-the-hospital-in-gaza.

------. “World reacts to ICC prosecutor seeking Israel, Hamas arrest warrants,” May 21, 2024, https://www.aljazeera.com/news/2024/5/20/world-reacts-to-icc-prosecutor-seeking-israel-hamas-arrest-warrants.

Al Jazeera Journalism Review. “In-Depth Analysis Reveals Distortion in U.S. Media's Coverage of the Gaza Conflict.” *Al Jazeera Media Institute,* January 14, 2024. https://institute.aljazeera.net/en/ajr/article/2496.

Aurora Intel [@AuroraIntel]. “Images being released on social media of militants in an IDF post shows participation of other factions in today’s operation by the factions.” X, October 7, 2023. https://x.com/AuroraIntel/status/1710576942599078382.

Bär, Dominik, Fausto Calderon, Michael Lawlor, Sophia Licklederer, Manuel Totzauer, Stefan Feurriegel. “Analyzing Social Media Activities at Bellingcat.” Paper presented at Web Science Conference, April 2023, 163–173.

Bellingcat. Archived Video. Accessed November 24, 2024. https://Bellingcat-archive.nyc3.cdn.digitaloceanspaces.com/https-t-me-southfirstresponders-245/0c5c7da8-29d4-4a.mp4

Betram, Stewart K., *The Tao of Open Source Intelligence.* Ely: IT Governance, 2015.

Bhandari, Pritha. "Operationalization." Scribbr, May 6, 2022. https://www.scribbr.com/methodology/operationalization/.

Biesecker, Michael. "New AP analysis of last month's deadly Gaza hospital explosion rules out widely cited video." *AP News,* November 22, 2023. https://apnews.com/article/israel-palestinians-hamas-war-hospital-rocket-gaza-8bc239d2efe0cff3998b2154d9220a83.

Bontea, George. "Gaza War: From Identity Politics to Polarization in the Western Foreign Policy." *Studia Universitatis Babeș-Bolyai* 68 (2023): 209-225.

Brandts, Ram Eli [@RamEliBrandts]. "*Fierce exchange between @LCTPeterLerner and @BeckyCNN on @CNN.*" X, October 18, 2023. https://x.com/RamEliBrandts/status/1714568646033355222.

Bruns, Axel, Tim Highfield, Jean Burgess. "The Arab Spring and Social Media Audiences: English and Arabic Twitter Users and Their Networks." *American Behavioral Scientist* 57:7 (2013): 871-898.

"Convention on the Prevention and Punishment of the Crime of Genocide." December 8, 1948, *United Nations, Treaty Series* no. 78.

Earshot. "Info." Accessed November 25, 2024. https://earshot.ngo/info.

Earth Engine Maps. "Gaza Damage Assessment." Accessed November 24, 2024. https://ee-ollielballinger.projects.earthengine.app/view/gazadamage.

Fiorella, Giancarlo. "First Steps to Getting Started in Open Source Research," *Bellingcat*, November 9, 2021. https://www.bellingcat.com/resources/2021/11/09/first-steps-to-getting-started-in-open-source-research/.

Flamer, Netanel. "'The Enemy Teaches Us How to Operate': Palestinian Hamas Use of Open

Source Intelligence (OSINT) in Its Intelligence Warfare Against Israel (1987-2012)." *Intelligence and national security* ahead-of-print (2023): 1–18.

Forensic Architecture [ForensicArchi]. "In its defence at the @CIJ_ICJ '…' ". X, January 26, 2024. https://x.com/ForensicArchi/status/1750876558166741003.

Glassman, Michael, Min Ju Kang. "Intelligence in the Internet Age." *Computers in human behavior* 28, no. 2 (2012): 676-677.

Guterres, António. "Secretary-General's remarks to the press on the situation in the Middle East." *United Nations*, October 9, 2023.

Hauter, Jakob. "A Digital Open Source Investigation of How War Begins: Ukraine's Donbas in 2014." PhD diss., London's Global University, 2021.

Higgins, Eliot. "A Beginner's Guide to Geolocating Videos." *Bellingcat*, July 9, 2014. https://www.Bellingcat.com/resources/how-tos/2014/07/09/a-beginners-guide-to-geolocation.

-----. "Russia's Bucha 'Facts' Versus the Evidence." *Bellingcat*. April 4, 2022. https:/www.bellingcat.com/news/2022/04/04/russias-bucha-facts-versus-the-evidence.

Human Rights Watch. "Gaza: Findings on October 17 al-Ahli Hospital Explosion." November 26, 2023. https://www.hrw.org/news/2023/11/26/gaza-findings-october-17-al-ahli-hospital-explosion.

------, "Israel's Crimes Against Humanity in Gaza." November 14, 2024. https://www.hrw.org/news/2024/11/14/israels-crimes-against-humanity-gaza.

Institute for the Study of War. "Interactive Map: Israel' s Operation in Gaza." Accessed 24 November, 2024. https://storymaps.arcgis.com/stories/2e746151991643e39e64780f0674f7dd.

International Committee of the Red Cross. "Rule 131. Treatment of Displaced Persons."

Accessed November 25, 2024. https://ihl-databases.icrc.org/en/customary-ihl/v1/rule131.

International Criminal Court, *Rome Statute of the International Criminal Court* (1998)

Jiang, Weiwei, Haoyu Han, Yang Zhang, Xu Li, Miao He, and Weixi Gu. "Rise of Community-driven Communication Network Research." Paper presented at International Conference on Communication and Information Processing, Lingshui, December 2023, 308–312.

Johnson, Lock K. *Handbook of Intelligence Studies*. London: Routledge, 2007.

Kenney-Shawa, Tariq. "Will Open-Source Intelligence Liberate Palestine From Digital Occupation?" *Foreign Policy*. October 3, 2022.

Khan, Sohail Ahmed, Jan Gunnar Furuly, Henrik Brattli Vold, Rano Tahseen, Duc-Tien Dang-Nguyen. "Online Multimedia Verification with Computational Tools and OSINT: Russia-Ukraine Conflict Case Studies." *Elsevier,* ahead-of-print (2023).

Lopis, Marta, [@LlopisMarta95]. "*Bucha. Two years ago.*" X, March 31, 2024. https://x.com/LlopisMarta95/status/1774393667928703042.

Mahmoud_abusalama. "صور الدمار الكبير من داخل مستشفي الشفاء الطبي بغزة [Pictures of the great destruction inside Al-Shifa Hospital in Gaza]. Instagram, April 2, 2024. https://www.instagram.com/p/C5QUPCGN58J/?hl=en&img_index=1

Meijer, Jaap [@climbingjaap]. "This looks like the exact impact spot.". X, October 18, 2023. https://x.com/climbingjaap/status/1714564507446436029.

Millett, Edward. "Open-Source Intelligence, Armed Conflict, and the Rights to Privacy and Data Protection." *Security and human rights* 33, no. 1 (2023).

National Defense Authorization Act for Fiscal Year 2006. Public Law 109-163. Sec. 931. Department of Defense Strategy for Open-Source Intelligence, January 6, 2006.

Pastor-Galindo, Javier, Pantaleone Nespoli, Felix Gomez Marmol, and Gregorio Martinez Perez. "The Not Yet Exploited Goldmine of OSINT: Opportunities, Open Challenges and Future Trends." *IEEE access* 8 (2020): 10282–10304.

Perrot, Sophie. "L'Open Source Intelligence dans la guerre d'Ukraine.' *Politique Étrangère* 3 (2022): 63–74.

Scholl, Tobias, Bernhard Bauer, Benjamin Gufler, Richard Kuntschke, Angelika Reiser, Alfons Kemper. "Scalable community-driven data sharing in e-science grids." *Future Generation Computer Systems* 25:3 (2009): 290-300.

Soylu, Ragıp [@ragipsoylu]. "HORRIBLE footage from Gaza Strip today when Israeli airstrikes hit a convoy of civilian cars that were fleeing to south as ordered by IDF." X, October 13, 2023. https://x.com/ragipsoylu/status/1712944592021045668

Van Beek, Hannah, and Sebastiaan Rietjens. "Open-Source Intelligence in the Russia-Ukraine War." In *Reflections on the Russia-Ukraine War,* ed. Maarten Rothman, Lonneke Peperkamp, Sebastiaan Rietjens*,* 57-75. Leiden: Leiden University Press, 2024.

Varzhanskyi, Illia. "Reflexive Control as a Risk Factor for Using OSINT: Insights from the Russia-Ukraine Conflict." *International journal of intelligence and counterintelligence* ahead-of-print, (2023): 1–31.

Williams, Heather J. and Ilana Blum. *Defining Second Generation Open Source Intelligence (OSINT) for the Defense Enterprise*. Rand Corporation eBooks, 2018.

Wolfsfeld, Gadi, Elad Segev, Tamir Sheafer. "Social Media and the Arab Spring: Politics Comes First." *The International Journal of Press/Politics* 18, no. 2 (2013): 115-137.

X Help Center. "About Community Notes on X." Accessed November 24, 2024. https://help.x.com/en/using-x/community-notes

Zehfuss, M. "Critical theory, poststructuralism, and postcolonialism." in *Handbook of International Relations*. Ed. Walter Carlsnaes, Thomas Risse and Beth A. Simmons, 145-169. SAGE, 2013.

المنسق [Coordinator]. "سكان مدينة غزة, قمنا بمناشدتكم صباحاً لمغادرة مدينة غزة إلى منطقة [Residents of Gaza City, We appealed to you this morning to leave Gaza City to the Area]." Facebook, October 13, 2023. https://www.facebook.com/photo/?fbid=655000310074000&set=pb.100066921098856.-2207520000

Primary Sources

Bellingcat. "Analysis Reveals Damage and Destruction of Cultural Heritage Sites in Gaza," June 26, 2024. https://www.bellingcat.com/news/2024/06/26/gaza-israel-destroy-destruction-damage-cultural-history-heritage-archaeology-conflict-war/.

Bellingcat. "A New Tool Allows Researchers to Track Damage in Gaza," November 15, 2023. https://www.bellingcat.com/resources/2023/11/15/a-new-tool-allows-researchers-to-tack-damage-in-gaza/.

Bellingcat. "Confirming a Strike on Jabalia Refugee Camp as Israeli Forces Approach Gaza City," October 31, 2023. https://www.bellingcat.com/news/2023/10/31/confirming-a-strike-on-jabalia-refugee camp-as-israeli-forces-approach-gaza-city/.

Bellingcat. "Footage Captures Moment that 12-year-old Palestinian is Fatally Shot in Shuafat Refugee Camp," March 13, 2024.

https://www.bellingcat.com/news/2024/03/13/palestinian-fatally-shot-israel-rami-hamdan-in-shuafat-refugee-camp/.

Bellingcat. “Gaza's Trees Disappear, Showing a Humanitarian Crisis,” March 15, 2024. https://www.bellingcat.com/news/2024/03/15/gazas-trees-disappear-showing-a-humanitarian-crisis/

Bellingcat. “Geolocating Hamas-Led Attacks on Israeli Civilians.” October 20, 2023. https://www.bellingcat.com/news/2023/10/20/geolocating-hamas-led-attacks-on-israeli-civilians/.

Bellingcat. “Hamas Attacks, Israel Bombs Gaza and Misinformation Surges Online.” October 11, 2023. https://www.bellingcat.com/news/2023/10/11/hamas-attacks-israel-bombs-gaza-and misinformation-surges-online/

Bellingcat. “Identifying Possible Crater from Gaza Hospital Blast.” October 18, 2023. https://www.bellingcat.com/news/2023/10/18/identifying-possible-crater-from-gaza-ospital-blast/.

Bellingcat. “Images of Syrian Civil War Take on a Second Life in Gaza Conflict,” December 8, 2023. https://www.bellingcat.com/news/2023/12/08/images-of-syrian-civil-war-take-on-a-second-life-in-gaza-conflict/.

Bellingcat. “In Rafah, Israel Continues to Strike Despite UN Ceasefire Resolution,” April 10, 2024. https://www.bellingcat.com/news/2024/04/10/in-rafah-israel-continues-to-strike-despite-un-ceasefire-resolution/

Bellingcat. “OSHIT: Seven Deadly Sins of Bad Open Source Research,” April 25, 2024.

https://www.bellingcat.com/resources/2024/04/25/oshit-seven-deadly-sins-of-bad-open-source-research/.

Bellingcat. "Separating Fact from Fiction on Social Media in Times of Conflict," October 26, 2023. https://www.bellingcat.com/resources/how-tos/2023/10/26/separating-fact-from-fiction-on-social-media-in-times-of-conflict/.

Bellingcat. "Social Media Posts Show Off Blindfolded and Bound Palestinian Detainees," March 5, 2024. https://www.bellingcat.com/news/2024/03/05/social-media-posts-show-off-blindfolded-and-bound-palestinian-detainees/.

Bellingcat. "Strike That Killed World Central Kitchen Workers Bears Hallmarks of Israeli Precision Strike," April 2, 2024. https://www.bellingcat.com/news/2024/04/02/strike-that-killed-world-central-kitchen-workers-bears-hallmarks-of-israeli-precision-strike/.

Bellingcat. "The Hidden War in Gaza and the West Bank," April 29, 2024. https://www.bellingcat.com/news/2024/04/29/the-hidden-war-in-gaza-and-the-west-bank/.

Bellingcat. "Using Livestreams to Monitor Crises in Gaza and Beyond," November 9, 2023. https://www.bellingcat.com/resources/2023/11/09/using-livestreams-to-monitor-crise-in-gaza-and-beyond/.

Bellingcat. "'We've Become Addicted to Explosions' The IDF Unit Responsible for Demolishing Homes Across Gaza," April 29, 2024. https://www.bellingcat.com/news/2024/04/29/weve-become-addicted-to-explosions-te-idf-unit-responsible-for-demolishing-homes-across-gaza/.

Bellingcat. "X's Community Notes is Spreading False Information About Taylor Swift's Bodyguard," October 20, 2023. https://www.bellingcat.com/news/2023/10/20/xs-community-notes-is-spreading-false information-about-taylor-swifts-bodyguard/.

Forensic Architecture. "An Assessment of Visual Material Presented by the Israeli Legal Team at the ICJ," February 26, 2024. https://forensic-architecture.org/investigation/assessment-israeli-material-icj-jan-2024

Forensic Architecture. "Destruction of Medical Infrastructure in Gaza," December 12, 2023. https://forensic-architecture.org/investigation/destruction-of-medical-infrastructure-in-gaza.

Forensic Architecture. "Humanitarian Violence: Israel's Abuse of Preventative Measures in its 2023-2024 Genocidal Military Campaign in the Occupied Gaza Strip," March 7, 2024. https://content.forensic-architecture.org/wp-content/uploads/2024/03/Humanitarian-Violence_Report_FA.pdf.

Forensic Architecture. "Inhumane Zones: An assessment of Israel's actions with respect to the provision of aid, shelter, safe passage, and assistance to evacuees in Gaza; response to questions raised in the ICJ on 17 May 2024," May 19, 2024. https://content.forensic-architecture.org/wp-content/uploads/2024/05/Inhumane-Zones-Report-Forensic-Architecture_WEBSITE.pdf.

Forensic Architecture. "Israeli Disinformation: Al-Ahli Hospital," February 15, 2024. https://forensic-architecture.org/investigation/israeli-disinformation-al-ahli-hospital.

Forensic Architecture. "Mass Burials at Al-Shifa Hospital." April 10, 2024, https://forensic-architecture.org/investigation/mass-burials-at-al-shifa-hospital.

Forensic Architecture. “No traces of life': Israel's Ecocide in Gaza 2023-2024,” March 29, 2024. https://forensic-architecture.org/investigation/ecocide-in-gaza.

Forensic Architecture. “The Killing of Hind Rajab,” June 21, 2024. https://forensic-architecture.org/investigation/the-killing-of-hind-rajab.

Appendix

Figure 1: The four functions and their observable indicators.

OSINT Function	Observable Indicators (Van Beek & Rietjens)	Observable Indicators (Israel-Hamas)
Debunking False Narratives	Identifiable claims or counterclaims	Verification of events, claims, and counterclaims
	Use of established OSINT techniques to authenticate or debunk details	Debunking of (social media) misinformation
Reshaping perceptions	Exposing the horrors of war	Exposing the horrors of war: human toll & destruction
	Amplification of incidents through OSINT investigations	Exposing direct and direct consequences of the war
	Refuting Russian government narratives	
Informing military troops	Crowdsourced intelligence collection	Documentation of military presence and movements
	Direct information flow from civilian devices	Producing situational awareness during active engagements
	Targeted killing through the use of OSINT	Monitoring and verifying military claims
Documenting potential war crimes and human rights violations	Verification of targeted civilian infrastructure	Verification of targeted civilian infrastructure
	Evidence of civilian casualties	Evidence of civilian casualties
	Identification of weapon types and usage	Identification of weapon types and usage
	Mapping incidents and creating timelines	Mapping incidents and creating timelines
Fostering collectivised intelligence		Data sharing
		Facility sharing
		Intelligence sharing

Figure 2: Overview of analysed articles and observable indicators. Bellingcat articles are represented in blue, and Forensic Architecture articles in red. Green cells (1) indicate the presence of an indicator, while white cells (0) denote its absence.