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# Midterm Evaluation of UNOSAT Mapping Service – Evidence-Based Information Support to Humanitarian Assistance, Peace and Security Using Satellite Imagery and Geospatial Techniques Project

May 2023

Planning, Performance Monitoring and Evaluation

This report is a product of the Planning, Performance Monitoring and Evaluation Unit of UNITAR. The findings, conclusions and recommendations expressed herein do not necessarily reflect the opinion of the partners of the United Nations Satellite Centre (UNOSAT) Mapping Service – Evidence-Based Information Support to Humanitarian Assistance, Peace and Security using Satellite Imagery and Geospatial Techniques Project (Reference: C2022.TARSA091.NORMFA). The evaluation was conducted by Dr. Boru Douthwaite. The report is issued without formal copy editing.



Cover: UN photo and UNOSAT

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# Foreword

The UNOSAT mapping service – evidence-based information support to humanitarian assistance, peace and security using satellite imagery and geospatial techniques ("UNOSAT Emergency Mapping Service (UNOSAT-EMS)" is a 24/7 service that provides satellite imagery analysis support following rapid on-set disasters, complex emergencies and crises. The service is free-of-charge for the emergency phase of the response. The UNOSAT-EMS was established in 2003 and funded in the last three project cycles by Norway through the Norwegian Agency for Development Cooperation (Norad) and the Norwegian Ministry of Foreign Affairs. The current phase of the project received funding from the latter. The interface of UNOSAT with the UN emergency response system (UN system focused on crisis response for natural disasters, complex emergencies, human rights and other humanitarian needs) varies in methodologies and practices with differences in information sharing, activation requests, acquisition of satellite imagery and UN policies concerned between the natural disaster and the peace, security and human rights work of UNOSAT.

The midline review assessed the project's progress and reflected upon opportunities and challenges during the first one and a half to two years of the project, both during the scoping phase and the early implementation phase. The review focused on the effectiveness, efficiency and early indication on impact of the OECD DAC evaluation criteria.

The evaluation purpose was to assess the relevance, coherence, efficiency, effectiveness, likelihood of impact and likelihood of sustainability of the project, together with cross-cutting issues including gender and human rights; to identify good practices and any challenges the project encountered; to identify lessons to be learned; and to formulate recommendations and to inform future phases of the project. The evaluation built upon an independent evaluation of an earlier phase of the project, with a report issued in 2018.

The evaluation followed a mixed-methods and participatory approach, drawing in the following methods: comprehensive desk review, stakeholder analysis, after-action review, key informant interviews, an online survey and case studies.

The evaluation issued a set of seven recommendations of which five were accepted and one partially accepted.

The evaluation was managed by the UNITAR Planning, Performance Monitoring and Evaluation (PPME) Unit and was undertaken by Dr. Boru Douthwaite. The PPME Unit is grateful to the evaluator, the UNOSAT-EMS team and partners, as well as other project stakeholders for providing important input into this evaluation.

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# Midterm Evaluation of the UNOSAT-EMS project

Project time frame 2022-2025

**The UNOSAT Emergency Mapping Service (UNOSAT-EMS) provides geospatial and satellite image analysis during humanitarian emergencies related to rapid on-set disasters, complex emergencies, and conflict situations to support evidence-based decision-making.**

- 24/7 service providing maps, reports and data
- Free of charge for emergency response, and can be activated by UN agencies and humanitarian entities operating in line with UN policies.

## Midterm Evaluation (2022-2023)

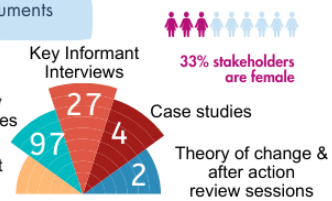
**Evaluation purpose**

Assess progress for accountability and learning

**Evaluation period**
2022- 2023

**Evaluation Criteria**
OECD- DAC

**Data collection instruments**




33% stakeholders are female

## KEY EVALUATION FINDINGS

### RELEVANCE

- Supports UNITAR's strategic objectives and SDG implementation, including countries in special situations
- Provides relevant, quality, timely products

Relevant to support people affected by emergencies including women, children and other groups made vulnerable

GEO Award in recognition of its use of Earth observations to support sustainable development

Could strengthen gender-sensitive humanitarian assistance approach

### COHERENCE

- Enhances UNOSAT/UNITAR recognition and funding (served as seed funding for other projects)
- Contributes to synergies (e.g. with NORAD-project) and reduces potential duplication within its unique niche in UN emergency response, particularly in disaster response, contributing to "One UN"

Aligns with Norwegian Humanitarian Strategy by contributing to the protection of civilians

14 MOUs Corporate and academic partnerships

Limited interaction between the activations managed by the UNOSAT-EMS' two main pillars on disaster response and on human rights

### EFFECTIVENESS

- Surpassed most output and outcome targets in its first year

59 disaster activations 13 conflict-related activations

AI and data innovation are being pursued through partnerships such as the Disha Initiative

- Co-location with other UN entities, CERN hosting, close partnerships and coordination with Copernicus enable effectiveness
- Sufficient M&E system and recommendations from 2018 independent evaluation sufficiently addressed

Need for a more ambitious R&D strategy to leverage new technologies, particularly AI

### EFFICIENCY

- Cost-effective with stable cost per request

Expenditure coherent with budget planning with some small variations

- Budget execution (2022-2025) 29%

Timeliness in achieving its outputs

It is important to attract additional funding to address staffing needs and maintain its cost-effectiveness

### LIKELIHOOD IMPACT

- The greatest impact is short-term, informing critical decisions and saving lives through timely situational awareness

e.g. Pakistan Floods (2022)
A complex emergency in South Sudan
Flooding in Thailand (2021)
Syria-Turkey earthquake 2023

Limited cumulative impact due to time-bound products. M&E should focus on short-term impacts and contribution made to other organizations' mandates as part of global technology collaboration.

### LIKELIHOOD SUSTAINABILITY

- Largely funded by Norway; seeking to broaden funding base

Awareness and visibility of the project should be elevated, especially among potential donors.

Threats to its future: funding, analyst retention in the work area of peace, security and human rights.

## Recommendations:

1. Improve visibility and relevance
2. Broaden funding base
3. Develop AI research and development strategy
4. Provide guidance about gender-sensitive GIS data analysis
5. Define a partnership strategy
6. Capture capacity development as an unintended outcome in the theory of change

## Lessons Learned

- Recognizing and value substantial short-term impacts of disaster response products is important
- Identifying a unique niche or service that complements and adds value to the work of partners
- Cultivating strong partnerships and relationships with key stakeholders and user organizations is important
- Recognizing capacity building and transfer of knowledge as an indirect outcome and impact
- Raising awareness and visibility to ensure sustained funding and effective utilization of services
- Diversifying funding sources to ensure long-term sustainability


e.g.
e.g.
LIKELIHOOD OF IMPACT
Pakistan Floods
In the 2022 Pakistan floods, UNOSAT's timely and frequent mapping services played a crucial role in providing situational awareness and informing critical decisions that saved lives. The satellite-based flood extent maps and population exposure estimates provided a comprehensive overview of the evolving situation, enabling OCHA, the Pakistani government, and humanitarian partners to prioritize response efforts and target vulnerable groups effectively. UNOSAT's products were vital in structuring UN decisions, shaping government response plans, and guiding provincial-level actions. The maps also supported public health interventions, resource mobilization, and advocacy efforts. By overcoming challenges such as unanticipated flash floods, inadequate donor funding, and limitations around population data, UNOSAT's services demonstrated the immense value of satellite imagery in humanitarian assistance, ultimately contributing to a more effective and coordinated response that saved lives in the face of a devastating disaster.
27
products were delivered including maps, vector/image among others
+33
million people were affected by the floods in 116 districts.
A complex emergency in Sudan
In the 2023 Sudan crisis, UNOSAT's satellite imagery-derived analysis played a crucial role in providing reliable information to identify damage to houses during an outbreak of ethnic violence as well as assessing the security situation and aiding in the evacuation of personnel. This helped OCHA to understand and gain hard evidence of what was happening, which informed their assessment response, involving sending teams out to areas where satellite images had identified damage. UNOSAT's multifaceted response encompassed crisis mapping, damage assessments, and support for various UN entities such as UNOCC, OCHA, and UNHCR. The satellite imagery analysis provided by UNOSAT was essential in assisting OCHA to comprehend the situation on the ground and make informed decisions regarding their assessment and response efforts. The close collaboration between UNOSAT and UNOCC facilitated seamless coordination and access to expertise, enabling the timely provision of analyses and graphics for high-level briefings, while UNOSAT's ability to handle sensitive and confidential information effectively further strengthened the trust placed in its services by the UN entities involved in the crisis response.
20
geospatial-derived products delivered, including security and damage assessment
7
million internally displaced people, asylum seekers, and refugees.
Thailand Floods
In the 2021 Thailand floods, UNOSAT flood maps analysis played a vital role in providing rapid and reliable information to support the humanitarian response efforts of UN agencies and government authorities. The flood extent maps, exposure statistics, and a collaborative monitoring dashboard created by UNOSAT and GISTDA helped responders plan their emergency response and target aid more effectively. The daily updates provided by UNOSAT enabled the provincial government to map agricultural damage for forecasting and preparedness, while also allowing comparison with the 2010 floods to understand the scope of the required response. UNOSAT's close collaboration with GISTDA and the support from the UNRCO facilitated the dissemination and visibility of the products generated for the disaster, ensuring that the information reached key decision-makers at government level and UN agencies.
28
satellite-derived products, including flood assessments and water extents
409 K
square kilometers monitored
Syria-Turkey earthquake
UNOSAT's EMS played a vital role in the humanitarian response to the devastating February 2023 earthquake in southern Turkey and northern Syria. Within hours of the disaster, UNOSAT provided timely and relevant satellite imagery analysis, including damage assessments and live map platforms, to a large network of disaster responders, including UN agencies, NGOs, and the Red Cross/Crescent. UNOSAT's products were essential for humanitarian responses, considering that in the case of some regions their personnel did not have the capacity to do the analysis on their own. Effective coordination between UNOSAT and Copernicus EMS ensured comprehensive coverage of the vast affected region, with UNOSAT focusing on Syria and Copernicus on Turkey. This timely situational awareness informed critical decisions and helped save lives by enabling OCHA and other humanitarian organizations to prioritize needs, guide relief efforts, and effectively coordinate the response.
25
products, including damage assessments, live map platform, and an assessment of UNESCO heritage site damage.
3
million people were reached with humanitarian assistance

# Executive Summary

The United Nations Satellite Centre (UNOSAT) is part of UNITAR's Division for Satellite Analysis and Applied Research. UNOSAT provides geospatial analysis and satellite imagery to support evidence-based decision-making in humanitarian relief, human security, and strategic planning. Funded by the Norwegian Ministry of Foreign Affairs (NMFA), the UNOSAT Emergency Mapping Service (UNOSAT- EMS) is a 24/7 service that provides satellite imagery analysis support following rapid on-set disasters, complex emergencies,[1] and crises. The UNOSAT-EMS is free of charge for the emergency phase of the response. It can be activated by UN agencies and humanitarian entities operating in line with the UN policies. The UNOSAT-EMS was established in 2003 funded in the last three project cycles by Norway, specifically including Norad and the Norwegian Ministry of Foreign Affairs.

The UNOSAT-EMS provides timely maps, reports, data, and other geospatial-derived products following major natural disaster events such as floods, tropical cyclones, earthquakes, volcanic eruptions, landslides as well as human-made disasters like oil spills. Geospatial-derived products are also generated to support refugee camp mapping, conflict damage assessment and situation analysis, human right investigations, and complex emergencies that require continuous monitoring.

The service fills a valuable role within the broader UN system focused on crisis response for natural disasters, complex emergencies, human rights, and other humanitarian needs, hereinafter the UN emergency response system. As the UN is a sprawling and global organization with myriad entities within the Secretariat, subsidiary bodies, and programmes and funds the interface of UNOSAT with the UN emergency response system varies in methodologies and practices. Most broadly, the natural disaster work of UNOSAT is done within a semi-public context in that relationships are relatively open and information is intended to be shared freely to best impact the post-disaster relief and recovery efforts. Alternatively, work on complex emergencies and human rights investigations is done much more discretely and often under confidentiality agreements given the political sensitivity of the issues themselves and also UN policy on those situations. Humanitarian support often straddles both worlds with information made as public as possible without putting vulnerable populations at further risk during and after both natural disasters and complex emergencies. UNOSAT relationships with the UN system are therefore not homogenous and can differ from one crisis response activation to the next, regardless of the context. Much of the current reform efforts in the UN system seek to reduce the barriers to information sharing presented by this sprawling organization and UNOSAT also plays an important role in those discussions in line with the Secretary-General's Data Strategy, the Inter-Agency Standing Committee, and other such initiatives.

UNOSAT relies on different mechanisms to collect a wide range of Optical and Radar satellite imagery from commercial and scientific sensors made available through open data platforms, commercial vendors, International Charter Space and Major

[1] A complex emergency can be defined as a humanitarian crisis in a country, region or society where there is a total or considerable breakdown of authority resulting from internal or external conflict, and which requires an international response that goes beyond the mandate or capacity of any single agency and/or the ongoing UN country programme. www.unhcr.org/publications/coordination-complex-emergencies.

Disasters (natural and technological disasters only) including the in-kind contributions of satellite imagery from Governments and space agencies.

The project was subject to an independent evaluation as per UNITAR's Evaluation Policy, building upon an independent evaluation of an earlier phase of the project, published in 2018. This is the report generated for this second evaluation. It was carried out in response to a series of evaluation questions relating to the six Organisation for Economic Co-operation and Development – Development Assistance Committee (OECD-DAC) evaluation criteria: relevance, coherence, effectiveness, efficiency, likelihood of impact, and likelihood of sustainability. The conclusions against each criterion are summarised below. The findings upon which the conclusions are based can be found in the main body of the report.

## KEY EVALUATON FINDINGS AND CONCLUSIONS

For further information, please check the referenced findings in the Findings section of the report. All conclusions presented below apply to UNOSAT-EMS' two workstreams: disaster response; and peace, justice, security and human rights.

### Relevance

The UNOSAT-EMS is helping UNITAR to support Member States to implement the 2030 Agenda for Sustainable Development, in particular SDGs 1, 11,13, 16 & 17. It provides highly relevant and bespoke products that are seen by users as relevant, of good quality, and timely. It is also relevant to almost all of UNITAR's strategic objectives. See Findings 1, Finding 2 & Finding 3.

The UNOSAT-EMS supports people affected by rapid on-set disasters, complex emergencies and crisis, including women and children. The project is relevant to countries in special situations. While it does not have an explicit gender strategy, it could strengthen its approach to gender-sensitive humanitarian assistance and support by undertaking and learning from impact stories with focus on women and vulnerable groups. See Finding 4 & Finding 19.

The UNOSAT-EMS has followed some environmental principles, e.g., Blue Marble principles. The project operates in environmentally sustainable ways without being designed to do so. It received a GEO Award in recognition of its use of Earth observations to support sustainable development. It operates in several environmentally friendly ways, including the use of existing satellites rather than special flights made by airplanes or drones to obtain geospatial data. See Finding 5 & Finding 17.

### Coherence

The UNOSAT-EMS provides valuable support to UNOSAT and UNITAR by enhancing their reputation and bringing in funding. It responds to requests made by different humanitarian organizations such as UN agencies (e.g., OCHA, UNICEF, UNHCR, etc.), IFRC and National Governments. It aligns with Norway's humanitarian strategy of protecting civilians. Norway uses the UNOSAT-EMS to demonstrate to high-ranking government officials how its Strategic Partnership Model is working in practice. See Finding 6 & Finding 8.

The UNOSAT-EMS has established a unique niche for itself within the UN emergency response system through its comprehensive and iterative approach and through its long-standing relationships. It is highly valued by others in this system and would be difficult to hard to replicate. See Finding 9.

UNOSAT has MOUs with 14 organizations, about half being disaster response partners. It also has corporate partnerships with Google and NVIDIA to explore uses of artificial intelligence (AI). As part of the

Data Insights for Social and Humanitarian Action (DISHA) initiative, UNOSAT-EMS collaborates with Google.org, the Jain Family Institute, McKinsey & Company, the Patrick J. McGovern Foundation, the United Nations Development Programme (UNDP) and the World Food Programme (WFP). MOUs with specific country governments are there to support UNOSAT's in-country operations. Some MOUs are renewed over time while others finish, reflect shifting relationships. See Finding 12.

### Effectiveness

The UNOSAT-EMS is performing to, and beyond, expectations in terms of achievement of milestones and budget expenditure. However, the project faces three threats to its future: funding, analyst retention in the work area of peace, security and human rights, and demand outpacing supply. See Finding 15, Finding 16, Finding 31 & Finding 32.

Project management has sufficiently addressed recommendations from the 2018 independent evaluation. See Finding 18.

New technology, including AI based applications, has the potential to significantly accelerate satellite imagery analysis carried out by the project. The project could benefit from a more ambitious R&D strategy to leverage new technologies, particularly AI, for faster analysis in response to activations. Finding 20, Finding 21 & Finding 36.

For varying reasons, co-location with ESCAP, UNOCC, and CERN has proven beneficial. See Finding 22, Finding 23, Finding 24 & Finding 25

The UNOSAT-EMS benefits, and is of benefit to other organizations, including: users such as OCHA and UNOCC and partners such as Copernicus EMS, amongst others. See Finding 26 & Finding 27.

The current M&E system is sufficient despite not adopting UN-ASIGN for real-time impact assessment, as recommended in the previous independent evaluation. See Finding 29.

### Efficiency

The UNOSAT-EMS is cost-effective, but staff workload needs to be managed carefully to avoid being overloaded. The UNOSAT-EMS' cost per request has remained relatively stable, and it is likely to be much less expensive than the Copernicus EMS. The project is attracting some additional funding, which will help it to help address staffing needs and maintain its cost-effectiveness. See Finding 30 & Finding 32.

### Likelihood of Impact

The UNOSAT-EMS' primary value is in contributing to short-term impacts, especially in the immediate aftermath of disasters, conflicts and complex emergencies. Its products inform time-critical decisions before quickly becoming obsolete. As a result, the normal project theory of change, which focuses on long-term outcomes, is not applicable to the main two outcomes of the UNOSAT-EMS theory of change. Here, M&E should focus on the rapid response phase where products can influence life or decisions over a few days or weeks and the contribution made to other organizations' mandates as part of global technology collaboration. Fit for purpose M&E will need to get the right balance between using resources to unpack and understand how UNOSAT-EMS products are being used or using the same resources to respond to requests for other products by humanitarian organizations. See Finding 33, Finding 34 & Finding 36.

In all likelihood, UNOSAT-EMS has contributed to strengthening emergency response systems at UN and national levels. This evaluation did not look specifically for this impact because the

project's theory of change does not include capacity development.

### Likelihood of Sustainability

The UNOSAT-EMS is not as well known or visible as it should be, in particular with potential donors and requestors of UNOSAT-EMS products, despite the quality and relevance of its products. This is particularly so for the UNOSAT-EMS' work in complex emergencies, where confidentiality about what the UNOSAT-EMS is doing is required. There is a concern that too much awareness could lead to too many requests and overload the UNOSAT-EMS, compromising its quality and timeliness. One way to increase visibility among donors is to ask the main users of UNOSAT-EMS products to better reference them in their own publications. See Finding 37.

The UNOSAT-EMS has made a significant contribution to its partners' work in emergency response and assistance by providing timely and relevant situational awareness and analysis to help partners prioritize response efforts and allocate resources effectively. While it is difficult to definitively quantify the impact of the EMS, qualitative evidence suggests that it has played an important role in improving humanitarian response and protecting human rights. See Finding 38.

The UNOSAT-EMS has limited cumulative impact due to the time-bound nature of its products. Despite this, the project has built credibility, partnerships, and a culture of "learning by doing". Capacity building initiatives, such as the Norad project, enhance partners' independent use of UNOSAT-EMS products, but fall outside the project's scope. See Finding 40.

The project's funding comes largely from Norway and has proven to be very consistent. Nevertheless, the UNOSAT-EMS is looking to broaden its funding base to better secure its long-term sustainability, and with it the sustainability of the broader UN emergency response system in which the UNOSAT-EMS is embedded, and for whom it provides a 'public good'. Despite seeking alternative funding from various sources, no donors have so far come forward. See Finding 41 & Finding 42.

## RECOMMENDATIONS

The evaluation findings led to five recommendations, all applying to both UNOSAT-EMS workstreams:

### 1. Improve project visibility and relevance.

The UNOSAT-EMS management team should agree with users to better reference EMS products. This also applies to other clients and users from side projects, co-funded projects and spin-offs, such as REACH's situational reports. Users can build on good practices from OCHA on referencing UNOSAT-EMS products to improve visibility of the UNOSAT-EMS. In return, UNOSAT-EMS could also be more pro-active and share products delivered by partners that are based on UNOSAT-EMS products to showcase what areas of use may consist of.

UNOSAT-EMS should consider reviving an internal UN-wide GIS publishing platform to share non-public analyses for user access and reporting. This could enable partners to better leverage UNOSAT inputs.

The UNOSAT-EMS' M&E facility should request to be part of future inter-agency humanitarian evaluations of responses to natural disasters, to use the opportunity to include questions about the use of the UNOSAT-EMS' products, in particular influence on decisions that concerned vulnerable groups (i.e., farmers, women, youth, elderly, etc.) in poorer countries. Answers to these questions should be used to inform future planning and awareness raising. Despite the confidential nature, collect more feedback data from the peace, security and human rights use of products.

## 2. Broaden the UNOSAT-EMS' funding base.

Develop a strategy to ensure sustainable funding for the UNOSAT-EMS. This could entail:

- Raising visibility on the UNOSAT-EMS as a 'public good' for the UN's emergency response system and campaign for pledged support.
- Devising creative methods for budgeting the UNOSAT-EMS' costs as part of other UNOSAT projects.
- Include funding for UNOSAT-EMS activation management and products as part of OCHA's flash appeals, after learning lessons from when this was previously attempted.
- Analyse the donors' appetite for supporting sub-projects (example Norad project) that have synergies with the UNOSAT-EMS.
- Looking for funding to support UNOSAT Rapid Mapping Partner Initiative. The latter's intention to help improve the way basic information is communicated through a more standardized set of data formats, as well as standardizing the different follow-up protocols used by different analytical providers, may be attractive to some donors.

## 3. On technology development

The UNOSAT-EMS management team should develop a research and development strategy that makes full use of its MOUs with NVIDIA, CERN and Google and its links to Wuhan University and the DISHA Initiative. The strategy could entail:

- Undertake a benchmarking study to analyse GIS capacities of partner organizations and define a plan on how to support institutions that intend to grow their own capacities.
- The technological developments that the UNOSAT-EMS will need to embrace to remain relevant and competitive within its niche, for example providing more integrated and complete situational awareness, while becoming faster and more accurate.
- Ways in which UNOSAT can leverage its historical data sets for use in training AI models.
- Options for products that are more interactive, such as live maps, moving away from static products unless users request those.
- The extent to which the UNOSAT-EMS should engage in AI model development, possibly in the framework of UN Global Pulse and the DISHA Initiative.

## 4. On benefiting gender and groups made vulnerable

UNOSAT-EMS should provide guidelines about further disaggregation of satellite imagery-derived products that could be reproduced by its users.

It is impossible to see gender and other affected population characteristics from space, however geospatial analysis combined with other population data, for example census data, can identify where vulnerable groups are situated and how badly they are affected. This can be used to target relief differentially, according to need. Currently, UNOSAT-EMS users are doing this disaggregation after receiving UNOSAT-EMS products. Therefore, to maintain the "rapid" quality of the UNOSAT-EMS, UNOSAT should provide guidelines about further disaggregation of satellite imagery-derived products that could be reproduced by its users, e.g., linking damage assessments analysis with the number of affected population disaggregated by gender or sex, given the gender dimensions of disaster risk and resilience and gender-related concerns in situations of conflict and instability, number of children and older persons, etc; or type of infrastructure damaged such as schools and farming plots (disaggregated by plot size), and the intersection between these different axes. Integrating gender analysis

into the mapping service is crucial to understand the differential impacts of disasters on women, men, girls and boys. For example, mapping location and the extent of the damage (homes, schools, hospitals or health infrastructures, among others and overlaying with this sex-disaggregated population data, can help to identify which groups are most affected and include the analysis in the damage assessment for a better informed humanitarian assistance. When done by the UNOSAT-EMS team, some of this data could be added to the final products made available to the public.

While the UNOSAT-EMS does not have an explicit gender strategy, it could strengthen its approach to gender-sensitive humanitarian assistance and support by undertaking and learning from impact stories with focus on women and groups made vulnerable.

### 5. On a partnership strategy

The UNOSAT-EMS should define a partnership strategy and map partners according to the joint interest and areas of work to increase awareness of active MoU and partnership opportunities. This may include:

- Regularly reviewing MoUs that require being renewed.
- Regularly scheduling meetings with partners and users to review common interest and potential joint work.
- Making use of stakeholder mapping exercises (see Annex XIII) to inform the team about existing partnerships.
- Inform partners about new service delivery and products and new AI initiatives in the view of creating additional side-projects.
- Consider partnering with UN Women in order to further strengthening the awareness that disaster and complex emergency impacts often reflect, and reinforce, gender inequality and how to overcome this in the area of GIS data analysis.

### 6. On capturing capacity development in the project's theory of change as an unintended outcome

The UNOSAT-EMS should consider capacity development as an unintended outcome and seek to capture unintended results even if the project is not funded to build capacity of other institutions. Doing so will ensure the EMS' contributions to strengthening emergency response systems and institutional capacities will be acknowledged in subsequent evaluations.

## LESSONS LEARNED

The following lessons were identified by the evaluation as being relevant beyond UNOSAT-EMS:

### 1. Short-term and long-term impacts resulting from emergency response

Realise and account for the difference between short-term and long-term impacts resulting from emergency response is important. Emergencies – resulting from both natural disasters and conflicts – require a particular type of product that supports time-critical decisions that can save many lives. These outputs can contribute to substantial impacts within days, before becoming obsolete. This is a different class of output than is produced by development projects, for which most M&E systems are based. Standard assumptions about the need to show long-term impacts do not apply and using them unchallenged will potentially lead to a waste of valuable resources. Short-term impacts should be recognized as being generated from a different theory of change than the default development programme theory of change. Short-term emergency response impacts should be recognized as an end in themselves (Conclusion 14 and Conclusion 18).

### 2. Complementarity and niche

Identifying a unique niche or service that complements and adds value to the work of partners and stakeholders is key. The UNOSAT-EMS established itself in a key role within the UN emergency response system, providing a comprehensive service that is difficult to replicate and therefore helps ensure the service's sustainability (Conclusion 5).

### 3. Partnerships, relationships and one UN

Cultivating strong partnerships and relationships with key stakeholders and user organizations is important. The UNOSAT-EMS benefited from long-standing relationships and established mechanisms for coordination and collaboration (Conclusions 5 and 6). The UNOSAT-EMS provides a good example of 'One UN' working in practice through working to achieve objectives shared by other UN agencies.

### 4. Capacity building

While not a primary focus, projects can indirectly contribute to capacity building and knowledge transfer over time through repeated engagement and "learning by doing". Such indirect outcomes and impact should be included in their theories of change (Conclusion 15).

### 5. Visibility and awareness

Continuously work on raising awareness and visibility among potential donors, partners, and users can help to ensure sustained funding and effective utilization of services (Conclusion 16).

### 6. Funding Diversification

Overdependence on a single donor can threaten long-term sustainability. Actively seek to diversify funding sources to mitigate risks (Conclusion 19).

# Acronyms and abbreviations

| | |
|---|---|
| **2030 Agenda** | The 2030 Agenda for Sustainable Development |
| **CERN** | European Organization for Nuclear Research |
| **ECOSOC** | United Nations Economic and Social Council |
| **GDACS** | Global Disaster Alert and Coordination System |
| **GDACS SMCS** | GDACS Satellite Mapping Coordination System |
| **GIS** | Geographic Information Systems |
| **HDX** | Humanitarian Data Exchange |
| **HNPW** | Humanitarian Networks and Partnerships Week |
| **ICC** | International Criminal Court |
| **ICRC** | International Committee of the Red Cross - |
| **IOM** | International Organization for Migration |
| **IT** | Information Technology |
| **IFRC** | International Federation of Red Cross and Red Crescent Societies |
| **NMFA** | Norwegian Ministry of Foreign Affairs |
| **Norad** | Norwegian Agency for Development Cooperation |
| **OHCHR** | Office of the United Nations High Commissioner for Human Rights |
| **OTP** | Office of the Prosecutor |
| **REACH** | Joint initiative of IMPACT Initiatives, ACTED and the United Nations Operational Satellite Applications Programme (UNOSAT). |
| **SDGs** | Sustainable Development Goals |
| **ToC** | Theory of Change |
| **ToR** | Terms of Reference |
| **UN** | United Nations |
| **UNAMA** | United Nations Assistance Mission in Afghanistan |
| **UNDAC** | United Nations Disaster Assessment and Coordination |
| **UNDP** | United Nations Development Programme |
| **UN EOSG** | United Nations Executive Office of the Secretary General |
| **UN ESCAP** | United Nations Economic and Social Commission for Asia and the Pacific |
| **UNESCO** | United Nations Educational, Scientific and Cultural Organization |
| **UNHCR** | United Nations High Commissioner for Refugees |
| **UNICEF** | United Nations Children's Fund |
| **UNITAR** | United Nations Institute for Training and Research |
| **UNOCC** | United Nations Operations and Crisis Centre |
| **UNOCHA** | United Nations Office for the Coordination of Humanitarian Affairs |
| **UNOSAT** | United Nations Satellite Centre |
| **WFP** | World Food Programme |
| **WHO** | World Health Organization |

# Introduction

The United Nations Institute for Training and Research (UNITAR) is a principal training arm of the United Nations, focused on improving the UN's effectiveness in achieving its goals through training and research. Its mission is to enhance the capacities of individuals, institutions and organizations through high-quality learning solutions and knowledge products and services. The aim is to support decision-making and country-level action in addressing global challenges.

The United Nations Satellite Centre (UNOSAT) is a technology-intensive programme under UNITAR's Division for Satellite Analysis and Applied Research that provides satellite imagery analysis, satellite solutions, and capacity development in the use of geospatial information technologies to member states, humanitarian and development organizations both within and outside the UN. The goal is to contribute to evidence-based decision-making in areas such as humanitarian relief, human security, and strategic planning using geospatial technologies.

The UNOSAT Emergency Mapping Service (UNOSAT-EMS) project, funded by the Norwegian Ministry of Foreign Affairs (NMFA), offers satellite image analysis during humanitarian emergencies, including disasters, complex emergencies, and conflict situations. The service caters to the demand for mapping and satellite-derived analysis from humanitarian organizations both within and outside the UN, national institutions, and other international and regional organizations. UNOSAT-EMS provides timely maps, reports, data, and other products derived from satellite imagery for direct integration into Geographic Information Systems (GIS).

The UNOSAT-EMS is activated for various emergency events, including natural disasters like floods, earthquakes, storms, fire, landslides and volcanoes, as well as human-made disasters such as oil spills and chemical waste incidents. It also supports satellite image-derived analysis of refugee and Internally Displaced Persons (IDP) camps, conflict damage assessment, and situation analysis. The service handles requests related to complex emergencies, requiring continuous monitoring and additional support compared to sudden onset disasters. UNOSAT utilizes a range of satellite imagery sources, including free and open-source, commercial vendors, and international initiatives for major disasters.

The project aims to improve humanitarian assistance and the protection of peace, justice, security, and human rights. It expects to achieve four outcomes: i) enhanced evidence-based decision-making in humanitarian assistance and the promotion of peace, justice, security and protection of human rights, ii) improved synergy and coordination during emergencies through information dissemination and web-based tools, iii) increased exploration and adoption of innovative approaches and methodologies in satellite imagery and geospatial information, including artificial intelligence, and iv) heightened awareness of the value of satellite imagery analysis for evidence-based decision-making in humanitarian assistance and the promotion of peace, justice, security and protection of human rights.

The project is subject to an independent evaluation as per UNITAR's Evaluation Policy, building upon an independent evaluation[2] of an earlier phase of the project, published in 2018.

[2] https://unitar.org/results-evidence-learning/evaluation/independent-evaluation-unosat-rapid-mapping-service

The evaluation provides findings, recommendations and lessons learned to inform the remaining time of this phase and potential future phases of the project.

Box 1 provides a brief history of UNOSAT-EMS.

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- 2001 – UNOSAT, the UN Satellite Centre, is launched as a project funded by the United Nations Office for Project Services (UNOPS).
- 2002 to present – UNOSAT established an office at CERN.
- 2003 to present – The UNOSAT-EMS is launched to provide satellite imagery analysis during onset disaster emergencies.
- 2006 – Norway started supporting the service.[3]
- 2009 – UNOSAT joins UNITAR as a programme unit. In the same year UNOSAT extends its scope to include peace, justice, security and protection of human rights.
- 2011 - UNOSAT begins developing applications to crowdsource and collect geospatial data from mobile devices through citizen science. UNOSAT makes the UN-ASIGN app available in 2015.[4]
- 2017 - Delays in funding in 2017 led to an 11-month gap, which impacted UNOSAT's operations.
- 2017- 2021 – Norway (through NMFA and Norad) funds the UNOSAT-EMS at the rate of 30,000,000 NOK (NMFA, 2019-2021), 15,000,000 NOK (Norad, 2017-2019).
- 2021 - The UN Economic and Social Council (ECOSOC) recognizes UNOSAT as the UN Satellite Centre.[5]
- 2022-2025 - Current 3-year UNOSAT-EMS project funded by NMFA at the rate of 45,000,000 NOK begins implementation.

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As Box1 suggests, the UNOSAT-EMS is a major service offered by UNOSAT. UNOSAT has other mapping services and non-mapping activities as well, for example, providing mapping products to partners on a demand basis and on a fee, training and capacity development on the use of geospatial information technologies, but the UNOSAT-EMS is the centre's backbone, a flagship service that UNOSAT is well known for in the humanitarian space.

The UNOSAT-EMS has several defining elements to its structure and delivery model.

It is run by a relatively small team of staff including analysts and GIS experts, supported by the broader UNOSAT programme in terms of human and technological infrastructure. Leadership and oversight are provided by UNOSAT management. The UNOSAT-EMS receives in kind support from CERN where it is based, the US State Department and other Member States through provision of imagery, and external funding from the Norwegian government. The Service has a large network of users including UN, NGO, governments, and other agencies to which it provides a free global emergency mapping service during disasters and crises.

[3] KII
[4] https://unitar.org/sustainable-development-goals/united-nations-satellite-centre-unosat/our-portfolio/un-asign
[5] https://www.unitar.org/about/news-stories/news/unosat-becomes-united-nations-satellite-centre#:~:text=UNOSAT%20becomes%20the%20United%20Nations%20Satellite%20Centre%20UN%2FAmanda,for%20its%20Operational%20Satellite%20Applications%20Programme%20-%20UNOSAT.

The UNOSAT-EMS's delivery model is driven by requests for geospatial analysis from its network of users. The Service operates 24/7 in response to requests during disasters and crises. It leverages various satellite imagery sources including free and commercial. The Service's team of analysts conduct geospatial analysis of imagery to produce a range of products delivered via reports, interactive maps and data. The products are tailored for different users and their delivery is timed to key disaster, conflict and complex emergency response milestones. Products are normally delivered directly to users via email and, unless unadvisable for security concerns, they are also published on UNOSAT's website or sent out to UNOSAT-EMS distribution list. For distribution in the context of natural disasters, the products are additionally made available on other platforms, such as OCHA HDX and ReliefWeb. For coordination under this context, the Service uses the GDACS-SCMS platform. Moreover, it supports users through the customization of deliverables. It aims to continuously improve its service through monitoring, evaluation, and user feedback.

# Purpose and Scope of the Evaluation

The purpose of this evaluation is to assess the progress being made towards the achievement of planned targets; to identify good practices as well as any challenges that the project has encountered; to issue recommendations; and to identify lessons to be learned on design, implementation, and management. The evaluation's purpose is thus to meet accountability requirements, and provide findings, conclusions, recommendations, and lessons learned to contribute to the project's improvement, strategic direction, and broader organizational learning. The evaluation does not only assess how well the project has performed, but also seeks to answer the 'how' question by identifying factors contributing to (or inhibiting) successful delivery of the results.

The evaluation includes an assessment of all six OECD DAC evaluation criteria[6] (relevance, coherence, effectiveness, efficiency, likelihood of impact and likelihood of sustainability of the project) and cross-cutting topics such as gender, disability and human rights and environmental considerations. In addition to serving as a tool for project accountability, the evaluation's purpose is also to be as forward-looking as possible to inform strategic decisions on the design and planning of the current and possible future phases and focus areas of this or similar projects.

The midline evaluation covers the project's first year starting from August 2022 to July 2023. Although the scope of the evaluation does not include the previous phases of the project (since 2003, 2016-2017, 2017-2019 and 2019-2021), funded by the same and another donor, the evaluator considered the findings and the implementation of the recommendations from previous independent evaluation and looked back at previous phases for assessing the impact criterion. The evaluation provides forward-looking recommendations to inform possible future phases or the development of similar projects.

# Evaluation Approach and Methods

The evaluation was undertaken in accordance with the UNITAR Evaluation Policy[7] and the United Nations norms and standards for evaluation, and the UNEG Ethical Guidelines.[8] The evaluation was carried out by an independent evaluation consultant with support from the UNITAR Planning, Performance Monitoring and Evaluation Unit (PPME).

[6] https://www.oecd.org/dac/evaluation/daccriteriaforevaluatingdevelopmentassistance.htm
[7] https://unitar.org/sites/default/files/media/file/UNITAR%20Evaluation%20Policy.pdf
[8] http://www.unevaluation.org/document/detail/1914

The evaluation approach is based on an evaluation matrix developed with UNITAR's PPME As per the ToR, the matrix is based on six main questions relating to the OECD DAC evaluation criteria:

- Relevance: Is the project on track in reaching its intended users (beneficiary organizations) and are activities relevant to the beneficiaries' needs and priorities, and designed with quality?
- Coherence: To what extent is the project coherent with relevant policies (institutional and national) and complementing other projects or services available?
- Effectiveness: How effective has the project been in delivering results so far and in making progress towards the intended outcomes?
- Efficiency: To what extent has the project delivered its results in a cost-effective manner and optimized partnerships?
- Likelihood of Impact: What are the potential cumulative and/or long-term effects expected from the project, including contribution towards the intended impact, positive or negative impacts, or intended or unintended changes?
- Likelihood of Sustainability: To what extent are the project's results likely to be sustained in the long term? How is environmental sustainability addressed in the project?

Each main evaluation question (EQ) is addressed through a number of sub-EQs. Together they create the structure for this section of the report. The full matrix, showing the judgement criteria used in addressing the questions, the sources of information and analytical approaches, can be found in Annex VII.

The evaluation draws on the following approaches and methods:

**Participatory approach:** To maximize utilization of the evaluation, the evaluation followed a participatory approach, meaning the evaluation team involved stakeholders in specific parts of the evaluation.[9] Engagement with UNOSAT-EMS stakeholders took place during the entry conference, through the conduct of an After-Action Review (AAR), presentation of interim findings in a meeting with the donor and project management, and stakeholder review of the final report.

**Comprehensive desk review:** The evaluation team compiled, reviewed, and analysed background documents and secondary data/information related to the project, including a results framework indicator tracking review. A list of the documents accessed by the evaluation team is included in Annex VI.

**Stakeholder analysis:** An analysis of the stakeholders most closely linked to the UNOSAT-EMS was carried out as part of analysing the organizations making requests to the UNOSAT-EMS, the organizations with memoranda of understanding (MOUs) with UNOSAT-EMS, the donor, and other mapping service providers. Two stakeholder maps were drawn, see Annex VIII, one for disaster response and one for human rights. In the mapping, stakeholders were mainly classified considering their relative level of involvement in the project, based on how many activities and outputs were directly connected to such stakeholder, the contractual relationship (i.e., in kind support, service recipient, service provider, etc.) in addition to the financial support provided in relation to the overall project budget.

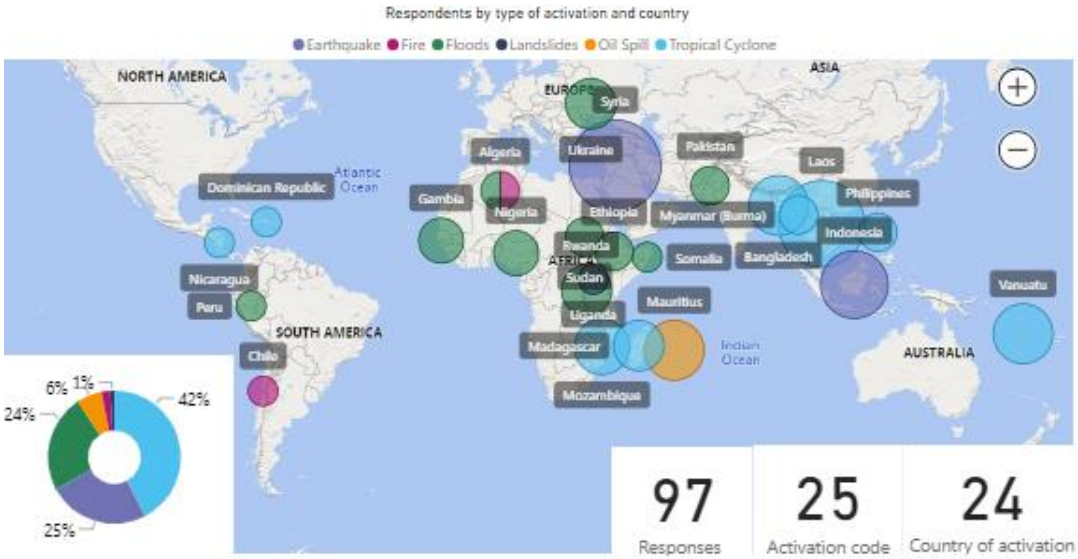
[9] https://www.unicef-irc.org/KM/IE/impact_5.php

**After-Action Review (AAR) of the project's progress to midterm:** The AAR is a commonly used and simple tool for allowing a team to reflect on past events.[10] During the evaluation, the evaluation team facilitated project staff as they reflected on what went well, not so well, and what to change in the second half of the project. A revision of the project and emerging Theory of Change was also done. Two AAR workshops were conducted: one for staff based in Europe and one for staff based in Thailand.

**Interviewing of stakeholders**: The evaluation team identified and interviewed different stakeholders involved in implementing the project to help answer the EQs. The team interviewed 27 (11 female, 16 male) individuals representing stakeholder organizations including UNOSAT itself, OCHA, REACH, UNICEF, the NMFA, among others. (See Annex III for names and positions). The team developed an interview protocol tailored to each interviewee, depending upon their involvement with the UNOSAT-EMS. Interviews were recorded and transcribed using the Teams conferencing software. Summary notes on each interview were developed using Claude.ai, by first asking the Chatbot to identify the main topics discussed and then asking for more detail on each topic. At least two people attended each interview. The evaluation team checked and modified the notes based on PPME and the evaluator's own notes and recollections.

**Online surveys**: The evaluation team designed and administered an online survey that was sent out to 528 users and recipients of UNOSAT-EMS products related to disaster response. There were 97 replies giving a response rate of 18 per cent. The respondents provided information regarding 25 activations in 24 countries. Over 40 per cent were regarding tropical cyclones, 25 per cent earthquakes and 24 per cent floods. However, it is important to mention that over 85 per cent of the users during the past two years have requested, activated, or used UNOSAT-EMS and products more than once. UNOSAT-EMS' work in complex emergencies was not covered by the survey because a list of users was not provided to the evaluation team, for reasons of confidentiality. Therefore, for the complex emergencies activations the evaluation relied on interviews rather than on the online survey.

Figure 1 - Online survey respondents by activation type and country of activation




Source: Online survey UNOSAT"s mapping service users

[10] https://www.betterevaluation.org/methods-approaches/methods/after-action-review

**Case studies**: The evaluation team developed three case studies, two for disaster response and one for the promotion of peace, justice, security, and the protection of human rights. The case studies were chosen by asking key project staff what they thought were the main outcomes achieved by the UNOSAT-EMS in these two areas. The case studies chosen were:

- UNOSAT response to the 2022 flooding in Pakistan
- UNOSAT response to the 2021 flooding in Thailand
- UNOSAT's support to providing security for foreign nationals to leave Sudan focusing on its collaboration with UNOCHA, UNOCC and UNHCR.

An additional fourth case study theme on the earthquake in Syria and Turkey was identified following the results of key informant interviews with stakeholders and complemented by google and social media analytics.

**Gender and human rights**: The extent to which the UNOSAT-EMS took human rights, gender,[11] disability,[12] and equity perspectives into account were pursued during the document review, survey, and key informant interviews. All key data collected was disaggregated by gender.

**Environmental sustainability:** The evaluation's ToR asked the team to consider "how well does the project align to environmental frameworks?" As suggested by the ToR we evaluated the project against the Blue Marble principles,[13] which are a set of guidelines for conducting evaluations that promote environmental sustainability and global systems change.

**Guiding principles**: The guiding principles for the evaluation were transparency, stakeholder engagement; ensuring confidentiality of data and anonymity of responses; and following ethical professional standards.[14]

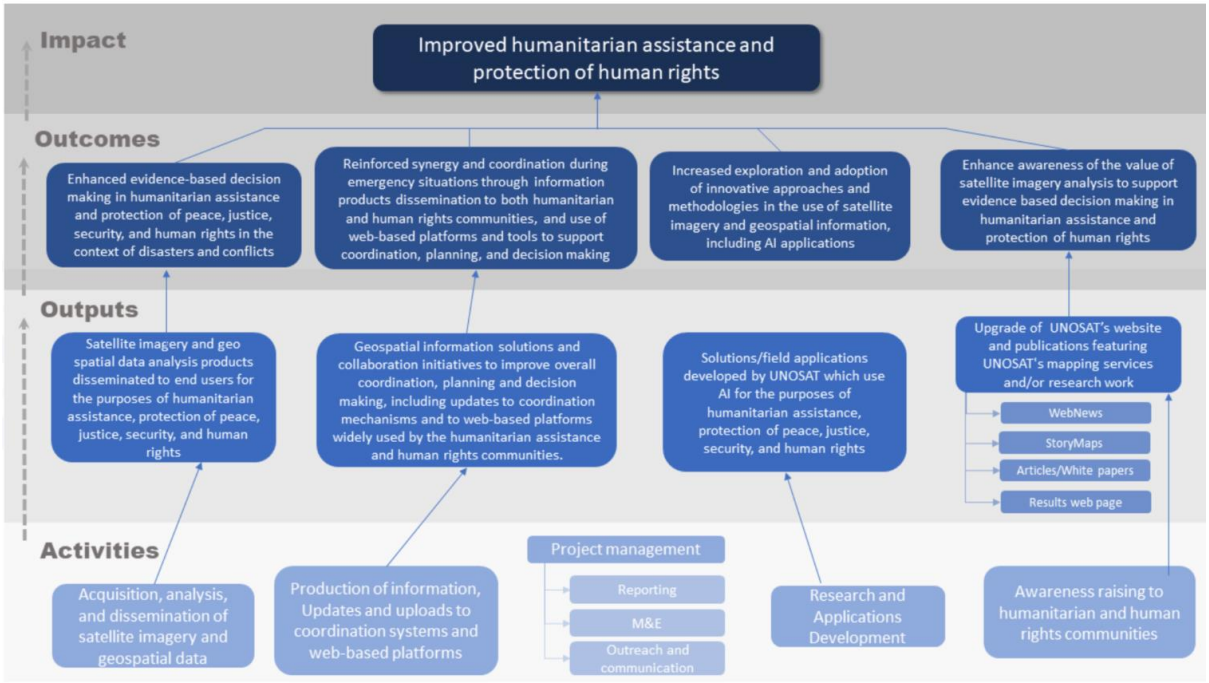
**Presentation of emerging findings:** The preliminary findings of this MTE were presented to the donor and Project Management for inference and fact checking. The draft report was reviewed by a subset of key informants, chosen based on their level of interest in and knowledge of the project, including, for example, a donor representative. An audit trail was used to show how the MTE had responded to comments, queries and corrections made during the review process.

## The UNOSAT-EMS's logical framework and theory of change

For the first time, the current UNOSAT-EMS has developed a theory of change based on its logical framework, see Figure 2. This evaluation uses both to answer several evaluation questions, particularly those relating to effectiveness, efficiency, and impact. The theory of change was shared with participants during the AAR carried out as part of the evaluation.

[11] http://www.uneval.org/document/download/1294
[12] http://www.uneval.org/document/detail/3050
[13] https://bluemarbleeval.org/principles/
[14] http://www.unevaluation.org/document/detail/102

Figure 2 - The project's ToC.[15]




# Challenges and limitations

Based on the 2018 independent evaluation, the evaluation team took steps to compensate for three limitations. The first was low response rate to online surveys sent out to users of UNOSAT-EMS products. To compensate, the evaluation took steps to increase the survey response rate, including repeated follow up and intelligent design (i.e. limiting survey length, using skip logic, personalizing survey outreach emails, etc.). The evaluation also compared the findings of its online survey with online surveys carried out by the Service's M&E expert.

The second limitation was that it is not possible to capture sex-disaggregated data from satellite imagery, making it at first appearance difficult to provide a meaningful answer to gender and equality evaluation questions. The evaluation tackles the limitation by focusing inquiry on whether UNOSAT-EMS products are used to benefit women, children and other groups made vulnerable when planning and implementing disaster and complex emergency responses.

The third limitation was that activities and outputs from the peace, justice, and human rights team are normally made less public than those disaster-related due to concerns with human security, safety and confidentiality. The evaluation carried and acknowledges these limitations, and recognizes that much more is likely going on than can be reported. The result is that inevitably the report says more about UNOSAT-EMS' disaster-related work. When a finding or conclusion only applies to disaster response, the evaluation indicates this accordingly. The lack of data collected through the online survey for the justice, peace and human rights workstream is mitigated by using qualitative data collected through interview with key informants.

[15] Project Document

# Evaluation findings

This section presents the answers to the sub EQs under each of the six main EQs. The judgement criteria and analysis carried out to arrive at these findings are described in the evaluation matrix (Annex VII) and the methodology section above. Findings under this section apply to both UNOSAT-EMS workstreams except for Findings 11, 13, 22, 26, 27 and 32 that relate to the disaster response workstream and Finding 23 concerning the peace, justice, security, and human rights workstream.

## EQ1. Relevance: Is the project on track in reaching its intended users (beneficiary organizations) and are activities relevant to the beneficiaries' needs and priorities, and designed with quality?

### EQ1.1 To what extent is the project supporting UNITAR to help Member States implement the 2030 Agenda for Sustainable Development (particularly Goals 1, 13, 16 and 17) and the UNITAR strategic framework (2022-2025)?

**Finding 1 on the UNOSAT-EMS' contribution to helping Member State's implement the 2030 Agenda for Sustainable Development**

**The project is helping UNITAR to support Member States to implement the 2030 Agenda, specifically:**

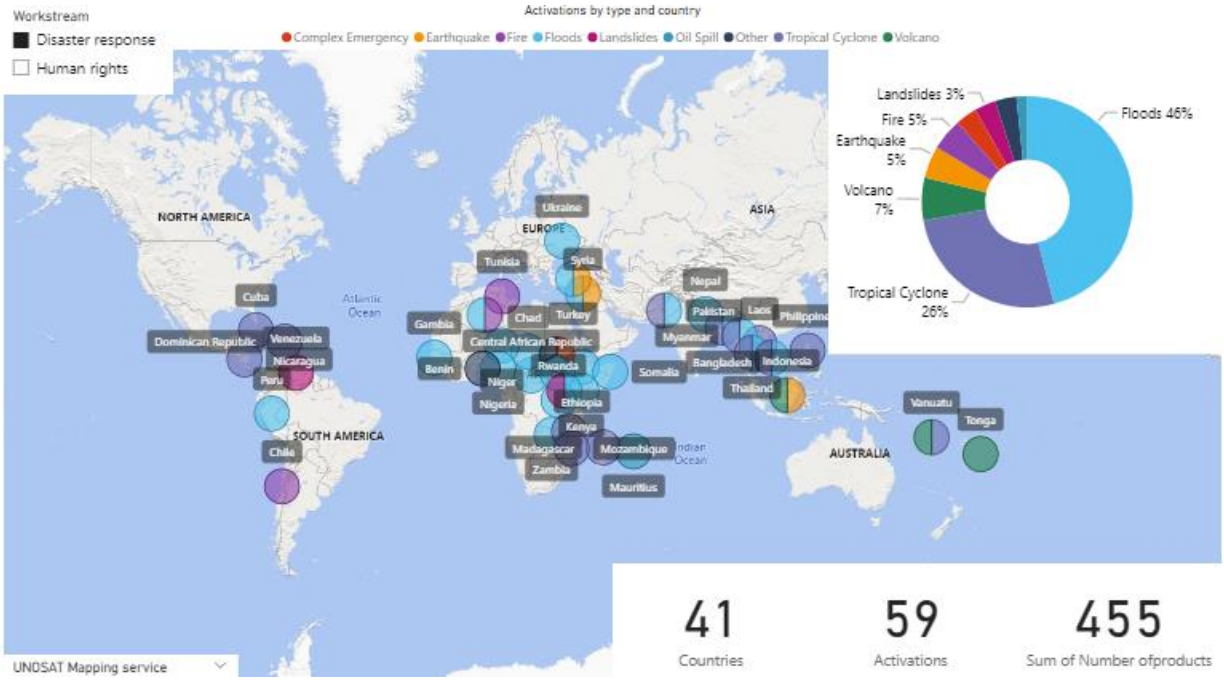
- **Goal 1: The UNOSAT-EMS supports relief efforts and rebuilding after emergencies to help affected populations survive, rebuild and to avoid falling further into poverty than they might otherwise have done.**
- **Goal 11: By providing timely geospatial data and analysis for disaster response and recovery, UNOSAT is making an important contribution to reducing disaster risks and building resilience in cities and communities.**
- **Goal 13: Other UNOSAT projects do more to build Member States' adaptive capacity to climate related disasters through building capacity to deliver humanitarian assistance and through building preparedness by developing early warning systems. The UNOSAT-EMS helps with preparedness by proactively suggesting early activations of the Space Charter ahead in anticipation of a disaster event, for example a typhoon.**
- **Goal 16: The UNOSAT-EMS has a team that works to support peace, justice, security and human rights protection, typically in the context of complex emergencies. The outcomes of this work are less evident for political reasons, but just as important as those generated by the team working on humanitarian assistance in disasters.**
- **Goal 17: The UNOSAT-EMS is UNOSAT's most important mechanism for establishing and maintaining partnerships that help UN agencies work together with Member State governments, NGOs and the private sector to address SDG goals through working on geospatial imaging and analysis.**

The UNOSAT-EMS produces geospatial information and analysis during disasters and conflicts which helps Member States affected by these events to implement the 2030 Agenda in the following ways:

**Goal 1 (No Poverty):** The UNOSAT-EMS provides analysis and products that help guide humanitarian assistance and disaster relief provided by the UN and Member States' governments. The products are usually in response to activations requested by partner organisations and Member State governments. From August 2022 to July 2023, the project responded to 59 activations regarding natural disasters in 41 countries resulting in 455 products and 13 activations in 11 countries related to complex emergencies. 46 per cent of the activations responded to floods, 26 per cent to cyclones, 7 per cent to volcano and 5 per cent to earthquakes. More than 57 per cent of the disaster response activations and about 56 per cent of the derived products were focused on countries in special situations according to UN classification. Similarly, from the 13 activations for the human rights workstream, 10 were focused on countries in special situations and 3 in conflict-affected countries.

Figures 3 and 4 provide a snapshot for disaster response events for illustrative purposes only.

Figure 3 - Activations for the purposes of Disaster Response (August 2022-June 2023)

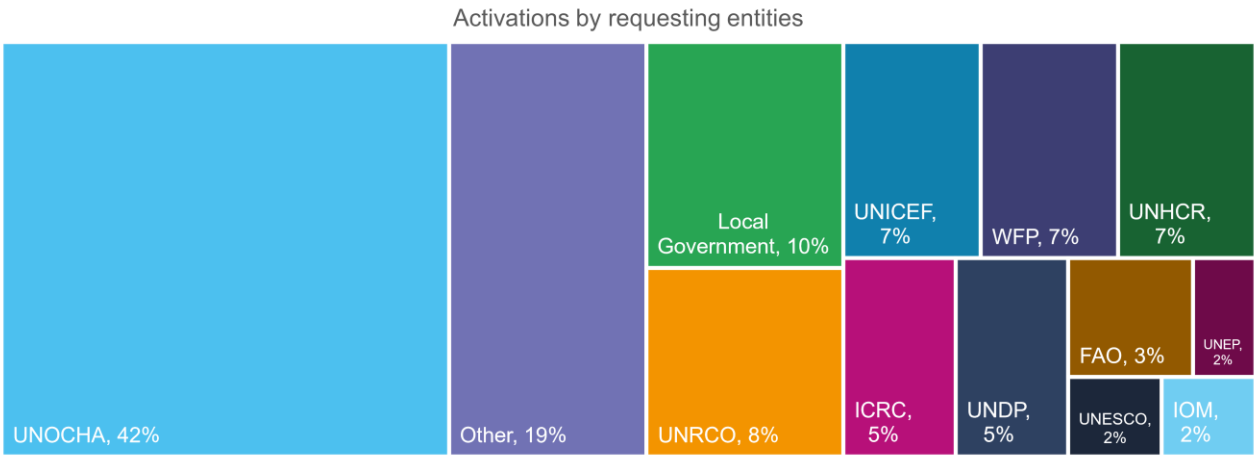



Source: Own elaboration based on UNOSAT-EMS activation table (August 2022- July 2023).[16]

For disaster response, UNOCHA requested 25 activations, making it by far the greatest user of UNOSAT-EMS products, followed by Local Governments (6 activations) and UNRCOs (5 activations). Four activations were made by UNICEF, WFP and UNHCR, three activations by ICRC and UNDP and ten by other organizations, see Figure 4.

[16] The data is consistent with the Activity report (Aug 2022-Jul 2023) of the UNOSAT-EMS. In this regard, It includes the activation code FL20220424SSD, which was activated in April 2024, however, it still delivered products during the period of analysis, As well the activation code FL20221117NPL, was considered in the analysis, due to an identification of a typing error in starting date of and the activation code LS20230722IDN was not considered in the analysis. This last one was activated the last days of July, so therefore was not considered in the report.

Figure 4 - Disaster Response Activations by requested institution.[17]




Source: Own elaboration based on UNOSAT-EMS activation table (August 2022- July 2023)

This assistance helps recipients from going deeper into poverty than they might have without some external help. For example, UNOSAT damage assessments helped the Thai government to identify farmers who suffered crop loss due to flooding in 2021, to provide them with compensation for lost income (see Annex I, case study 3).[18] Satellite images-derived products are also used to advocate for the provision of emergency and longer-term assistance to people living in disaster-affected areas. Poor people are often more badly affected by natural disasters because they can only afford to live in more hazard-prone areas such as areas prone to flooding.

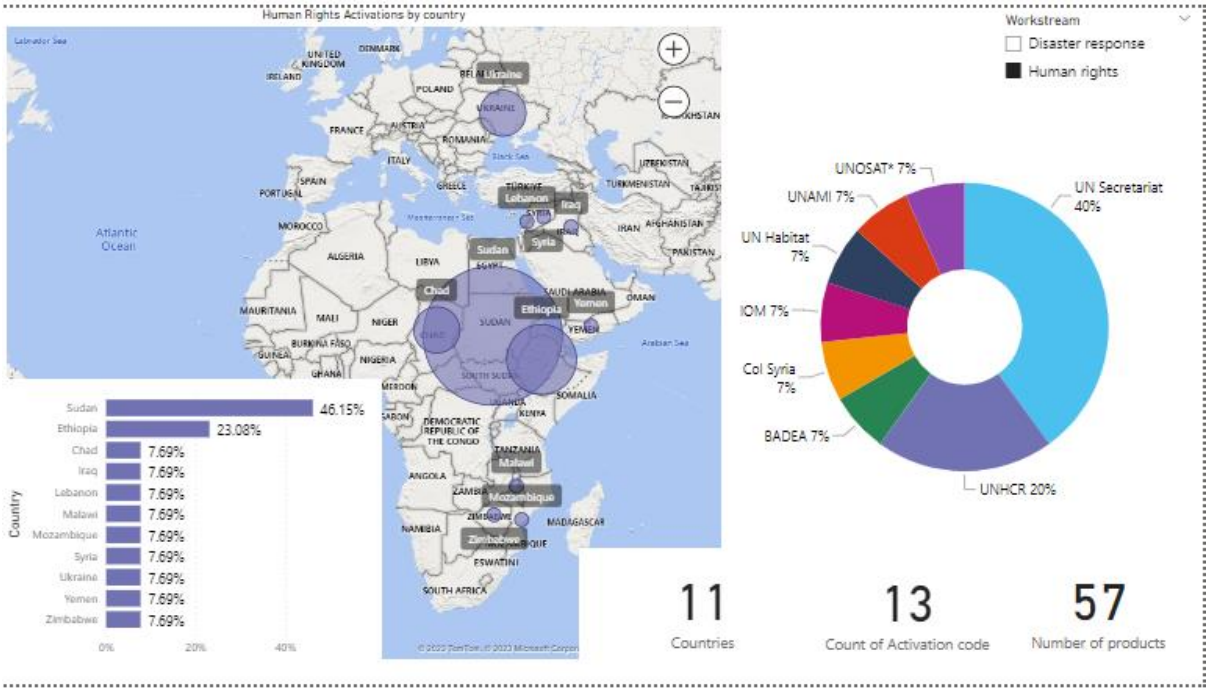
**Goal 11 (Make cities and human settlements inclusive, safe, resilient and sustainable):** The UNOSAT-EMS provides satellite imagery and analysis to help disaster management agencies respond to natural disasters and humanitarian crises. This supports Target 11.5 on reducing the impact of disasters. The damage assessments performed by UNOSAT help identify damaged buildings and infrastructure after a disaster. This assists recovery efforts and building back better, supporting Target 11.b on implementing policies for inclusion, resource efficiency, and disaster resilience in cities. By mapping disaster damage and risks, UNOSAT helps improve understanding of disaster vulnerabilities. This information can be used to enhance disaster preparedness and early warning systems, supporting Target 11.5 on reducing disaster losses and casualties.

**Goal 13 (Climate Action):** It is generally accepted that disasters such as flooding, wind-damage and landslides are on the increase because of climate change. Building up capacity to deliver humanitarian assistance and disaster relief is part of Member States' efforts to strengthen resilience and adaptive capacity to climate related disasters (Target 13.1). Preparedness is also an important part of adaptive capacity. While other UNOSAT and UNITAR projects focus more directly on capacity development and on developing early warning systems, the EMS can be requested to provide analysis and mapping ahead of anticipated disasters such as typhoons. The NMFA year 1 report records seven products distributed in anticipation of disaster events for the purpose of preparedness (OP1.1 a). Most of the activations benefit countries in special situations, see under Goal 1.

[17] Each activation can have more than one requesting party.
[18] KII.

**Goal 16 (Promote just, peaceful and inclusive societies):** The UNOSAT-EMS responds to activation requests relating to peace, justice, security and human rights protection, particularly in complex emergencies. In the first year of implementation, the project responded to 13 activation requests in 11 countries resulting in 57 products. The most common information derived were security and damage assessments. For example, the project produced nine outputs in response to the instability caused by the conflict in Sudan in 2023. Some of these products were up to date security assessments to help efforts to evacuate foreign nationals to avoid military and militia unit locations and movements enroute to the airport (see Annex I case study 2).[19] The UNOSAT-EMS provided outputs to eight organizations, most frequently to UN Secretariat and UNHCR. The EMS' work in complex emergencies is less visible than its humanitarian work because of political sensitivities and the need for confidentiality given concerns for human security and safety (see Annex I case study 2).

Figure 5 - Activations for the purposes of Humanitarian Assistance for the Promotion of Peace, Justice, Security, and Human Rights Protection (August 2022- June 2023)




Source: Own elaboration based on UNOSAT-EMS activation table (August 2022- July 2023)

**Goal 17 (Partnerships for the Goals):** The UNOSAT-EMS helps UNOSAT establish partnerships by being quick to respond to new disasters. This allows for UNOSAT to demonstrate its expertise and usefulness to new potential partners.[20] The various partnerships are described in more depth under Finding 12. A respondent described the UNOSAT-EMS as "showcase and door opener".[21] for securing support for other initiatives. This MTE has calculated that from August 2022 to July 2023 every dollar invested in the UNOSAT-EMS, UNOSAT was able to bring in $1.4 in other projects, sometimes with new partners (see Finding 30). The UNOSAT-EMS is also engaging with partners to complement each other and foster synergies and provide access to earth science and enhance sharing of mapping products, see Finding 12.

[19] KII
[20] KII
[21] KII

**Finding 2 on the UNOSAT-EMS' support to UNITAR's strategic objectives**

**The UNOSAT-EMS directly helps UNITAR progress against four of its five strategic objectives (SO) listed in UNITAR's strategic framework (2022-2025):**

- **SO1: Peace:** See the answer under Goal 16 above.
- **SO3: Planet:** By helping to ameliorate the impacts of natural disasters made worse by climate change, see Goal 13 above**.**
- **SO4: Prosperity:** By providing products that help direct development aid to where it is most needed, to help affected communities to build back stronger, see Goal 1 above.
- **SO5: Cross-fertilizing Knowledge and Expertise:** by providing geospatial technologies for evidence-based decision-making.
    - UNITAR's 2022-23 Programme Budget includes two result areas related to the UNOSAT-EMS under this strategic objective:
        - Improved decision making through enhanced analyses and maps routinely available to support decision making processes related to human security and human rights issues (GEEW and LNOB).
            - Percentage of eligible requests for support met. Target: 100 per cent. No information on achievement level.
            - Percentage of requester agreeing that analysis provided was useful for decision making or operational coordination. Target: 70 per cent. Achieved for the period of the project.
        - Improved routine access by international humanitarian community and Member States to high-quality satellite imagery analysis for senior level decision making and operational coordination & response in the field (LNOB)
            - Percentage of requests supported. Target: 100 per cent No information on achievement level.
            - Percentage of requester agreeing that analysis was useful for decision making or operational coordination. Target: 70 per cent.
            - Average number of views of GIS products published on UNOSAT's website. Target: 60 views per product. Achievement: Total pageviews: 209,223, unique pageviews on average: 199,155.

**EQ1.2 To what extent is the UNOSAT-EMS and its different products relevant to the institutional needs and priorities of the respective partner institutions working in disaster management and in the protection of peace, justice, security and human rights?**

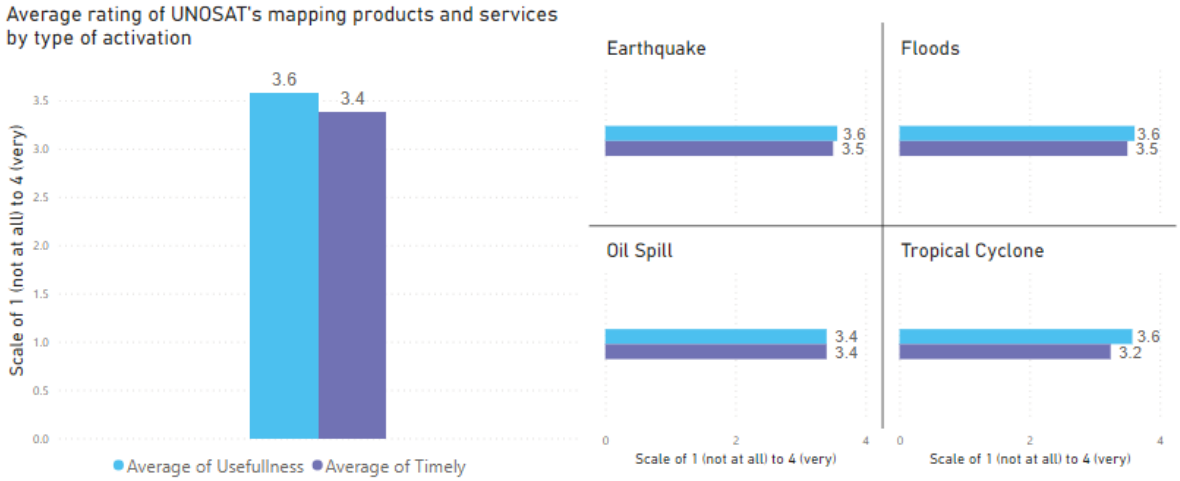
**Finding 3 on relevance of UNOSAT-EMS products**

**The UNOSAT-EMS is highly relevant to the institutional needs of its partners. Most are mandated to respond to humanitarian and complex emergencies. The UNOSAT-EMS provides products that help them do their job, *ipso facto*, the UNOSAT-EMS is highly**

**relevant to institutional needs. The logic is born out in practice. A survey of users found that all respondents thought that the UNOSAT-EMS' disaster response products were relevant, nearly all thought they were of good quality and most thought they were timely. The results for complex emergency products were rather unknown for understandable reasons relating to the need for confidentiality. A key informant praised the UNOSAT-EMS' sensitivity and discretion in providing situational awareness in complex emergencies.**

Logically, it stands to reason that the UNOSAT-EMS is relevant to the institutional needs of the Service users. Users are mainly UN organizations mandated to respond to disasters and conflicts, e.g., OCHA, UNOCC, WFP, UNHCR and IOM. These organizations need to know the situation on the ground and how that has changed because of the disaster or conflict to which they are responding. UNOSAT and its EMS have created a niche for themselves in meeting this need with outputs that are relevant, of high quality and timely.

Figure 6 - Average rating of UNOSAT's mapping products' usefulness and timeliness for disaster management situations by survey respondents [22]




Source: Online survey UNOSAT-' EMS disaster response users

This claim that UNOSAT-EMS products are relevant is supported in part by the results of an online survey carried out by the evaluation for the disaster management workstream. Users of project outputs were asked if they thought UNOSAT-EMS products were relevant or not to their organization's work. Of the 78 respondents who answered, all thought that the UNOSAT-EMS' disaster response was relevant, with 81 per cent saying the products were highly relevant and 19 per cent relevant. 99 per cent of the respondents affirmed that the products were very well or well aligned with their organizational goals and priorities. With respect to human rights and conflict-related monitoring, 68 per cent of survey respondents from the disaster-user list thought the UNOSAT-EMS' outputs were relevant or highly relevant, with only 24 per cent saying they were moderately relevant and 8 per cent not relevant at all.[23] 98 per cent of respondents said the quality of UNOSAT-EMS products were good or very good. On a scale of one to four, with four being quick and one being slow, survey respondents, on average, rated the UNOSAT-EMS at 3.4 with respect to timeliness. In nearly all the one-on-one interviews, interviewees were very positive about the relevance, quality and timeliness of the UNOSAT-EMS' outputs.

[22] Not all type of disasters are covered due to limited responses for those.
[23] Responses available for 53 participants.

A plausible explanation for why respondents were less sure of the relevance of peace, justice and human rights outputs is that it is much less clear how UNOSAT-EMS products are used. One UNOSAT respondent said their outputs ended up in a "black box". It is not surprising that the use of UNOSAT outputs is opaque given the political sensitivities that surround working for peace, justice and the respect for human rights. Responding to natural disasters is less political such that the International Charter for Space and Major Disasters (Space Charter), which UNOSAT often relies on for imagery, can be activated for natural disasters but not for conflicts. Nevertheless, relevance to peace, justice and human rights for disaster users indicate a nexus between disaster and peace.

In the key informant interviews, all respondents said they thought UNOSAT-EMS outputs were relevant to their organization's efforts to provide humanitarian assistance, peace and security during natural disasters and on-going conflicts. Some examples are:

- UNOSAT imagery and analysis is particularly important to the UNHCR on an ongoing basis in mapping refugee camps to know who is where, when planning humanitarian interventions.
- During flooding in Pakistan from June to October 2022, UNOSAT produced 12 preliminary satellite-derived flood evolution assessments. The repeat mapping allowed OCHA and the government to track which areas were still flooded and prioritize the response accordingly. The flood maps helped identify areas with stagnant water, which was crucial for planning and implementing targeted public health interventions. OCHA used the maps and the project's analysis in their public communications and social media posts to advocate for continued assistance to flood-affected areas. Project outputs helped correct exaggerated claims in the media about the scale of the flooding.[24]
- When Russia invaded Ukraine, UNOSAT was able to immediately activate and divert its resources to analyse satellite imagery of destroyed buildings, infrastructure damage, etc. The flexible NMFA funding covered the first two months until UNDP was able to mobilize funding for a full damage assessment project in partnership with UNOSAT. The analysis carried out by the project was used by UNOCC to provide the Secretary General with situational updates and crisis reporting. Its products are internal and meant for senior leadership decision-making. By working with UNOCC, UNOSAT is part of this larger UNOCC structure aimed at crisis monitoring and response across the UN system, see Finding 23. UNOSAT has been working with UNOCC since 2013.[25]

### EQ1.3: How relevant is the project to supporting gender equality and women's empowerment and meeting the needs of other groups made vulnerable, including countries in special situations?

**Finding 4 on GEEW**

**While satellite images cannot capture gender, it is possible for users of UNOSAT-EMS products to estimate the extent to which already vulnerable people have been affected, and plan relief efforts accordingly. Nearly 70 per cent of survey respondents indicated that UNOSAT mapping products and services contributed to improving assistance and**

[24] KII

[25] https://unitar.org/about/news-stories/news/unosat-support-un-operations-and-crisis-centre-satellite-analysis

**support for women and groups made vulnerable in the humanitarian settings they work in.**

**The UNOSAT-EMS is most useful for non-space-faring countries who are generally poorer, and more likely to be classified as countries in special situations.**

**The UNOSAT-EMS could provide more guidance to its users on how to better use UNOSAT products to capture further implications of disasters and complex emergencies and conflicts to affected population.**

GEEW is generally not considered in UNOSAT-EMS products because, as one interviewee said, "you cannot see gender from space."[26] The interviewee went on to say that UNOSAT is aware of the importance of GEEW, saying that product users often ask whether the EMS incorporates a gender perspective. The UNOSAT-EMS can analyse if people affected by an emergency are vulnerable by, e.g., looking at the pre-existing standard of housing and physical infrastructure and the subsequent damage. Population data can be cross-referenced with damage estimates. It is the UNOSAT-EMS' clients that determine if and how GEEW is considered in the response to an emergency. For example, UNOSAT maps showed flood extent in Pakistan, which OCHA combined with population data to calculate the number of vulnerable people affected.[27] Another respondent said that OCHA in Indonesia has advocated for collecting sex disaggregated data during disasters and that the government is starting to include the collection of this type of data in their guidelines.[28]

The UNOSAT-EMS indirectly supports the advancement of gender equality as studies show that women are more negatively affected by disasters and complex emergencies, and those have negative long-term consequences.[29][30]

While the UNOSAT-EMS does not have a GEEW policy or strategy, UNITAR does, published in 2016.[31] The project could usefully engage with the mandated gender working group to make sure the project is compliant with the policy.

Nearly 90 per cent of survey respondents indicated that the provision and use of geospatial data through UNOSAT mapping products and services contributed to improving assistance and support for women and groups made vulnerable in the disaster response settings they work in.

The following two quotes were made by survey respondents:

> *"Ensured speedy planning & response to flood displaced women & girls including distribution of dignity kits to women & girls who had lost everything."*
>
> *"We helped more women to protect themselves from flooding, as we have used the UNOSAT info also for radio alert messaging."*

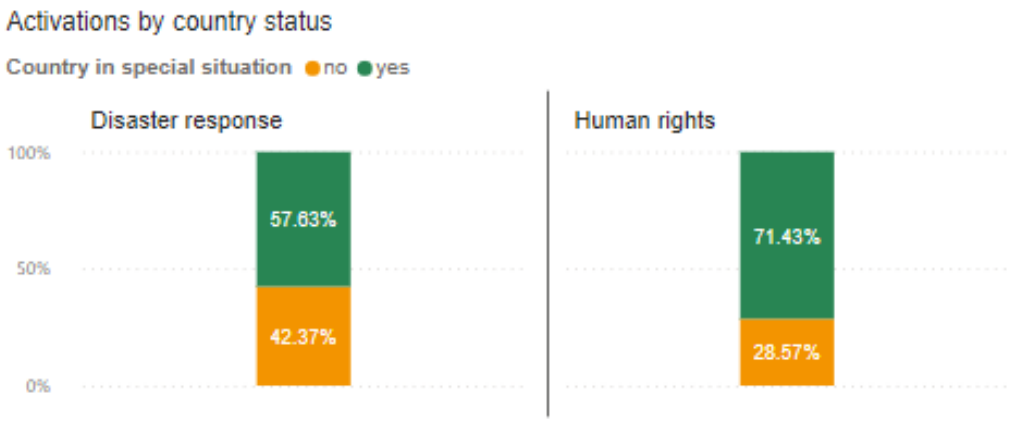
The UNOSAT-EMS is particularly valuable for non-space-faring countries, which are often poorer and more likely to face humanitarian crises. These countries may not have their own space agencies or resources to conduct their own satellite imagery analysis, making the

[26] KII
[27] KII
[28] KII
[29] https://wrd.unwomen.org/sites/default/files/2021-11/Gender-Dimensions-of-Disaster-Risk-and-Resilience-Existing-Evidence.pdf
[30] https://www.ohchr.org/en/women/womens-human-rights-and-gender-related-concerns-situations-conflict-and-instability
[31] https://unitar.org/sites/default/files/media/publication/doc/unitar-gender-mainstreaming2016.pdf

UNOSAT-EMS a crucial resource for disaster response and preparedness and conflict response.

Over 57 per cent of disaster response activations were done for countries in special situation[32] and over 71 per cent of human rights and peace-related activations. For the latter, the remainder were done for countries in conflicts.

Figure 7 - Activations by UN country classification




Source: Own elaboration based on UNOSAT-EMS activation table (August 2022- July 2023)

## EQ1.4: How well does the project align and implement according to environmental frameworks, e.g., Blue Marble principles? (ENVSUSE)

### Finding 5 on environmental frameworks

**The UNOSAT-EMS project was not designed explicitly according to any environmental framework. However, it aligns with some of the Blue Marble principles. The UNOSAT-EMS was given the GEO Participating Organisation Award at GEO Week 2022 in November in recognition of the productivity, innovation, novelty, and exemplary efforts in the use of Earth observations to support sustainable development. Also see Finding 17 on environmental-sustainability and -friendliness**

The Blue Marble principles[33] are a set of guidelines for conducting evaluations that promote environmental sustainability and global systems change. Neither the UNOSAT-EMS project, nor this evaluation, were designed according to these principles. However, both align with some of the operating principles, namely:

- Transboundary engagement – both the project and the evaluation have engaged with stakeholders across national and sectoral boundaries because disasters and conflict awareness and response cross national and sectoral boundaries.
- Resilience principle – both the project and the evaluation are concerned with the long-term sustainability of the UNOSAT-EMS, given the public good it provides to the UN emergency response system.

[32] Landlocked developing countries, least developed countries and small island developing States. https://www.unescap.org/our-work/countries-special-situations
[33] https://bluemarbleeval.org/principles/

- Time being of the essence principle – providing near-real time geospatial analysis to inform disaster response is core to the service provided by the project.
- Emergence principle – UNOSAT-EMS staff are fully aware that the world's weather systems are complex and are being made less predictable and more damaging because of climate change. Staff are also aware that disaster response is complex, and its products contribute to outcomes that are hard to predict and attribute to any single intervention.
- GLOCAL principle – UNOSAT-EMS products provide evidence-based damage analysis to inform the response to the disaster at a national or global level.
- Bricolage methods principle – This evaluation carried out an AAR with EMS staff as novel way to capture their perspectives while building their awareness of this evaluation and its potential use and usefulness.

UNOSAT received the GEO Participating Organisation Award for the UNOSAT-EMS during GEO Week 2022[34] at the beginning of December. The award was in recognition of the productivity, innovation, novelty, and exemplary efforts in the use of Earth Observations to support sustainable development. Launched in 2019, this annual award is presented to those making an impact on the 17 SDGs. The award is given by The Group on Earth Observation and the Earth Observations for Sustainable Development Goals (EO4SDG) Initiative.[35]

# EQ2. Coherence: To what extent is the project coherent with relevant policies (institutional and national) and complementing other projects or services available?

## EQ2.1 To what extent does the UNOSAT-EMS complement other humanitarian assistance related projects and services provided by UNITAR Divisions and UNOSAT and by other organizations?

**Finding 6 on if and how the UNOSAT-EMS complements UNITAR and UNOSAT**

**The UNOSAT-EMS complements UNOSAT and UNITAR by being the backbone of UNOSAT in terms of building recognition for projects that ultimately bring resources to both its parent entities. The UNOSAT-EMS helps UNOSAT win $1.4 for every $1 provided by the NMFA. In one case, the project has served as seed funding (here below called spin-off) for a new project that would not have materialized otherwise. The UNOSAT-EMS complements its beneficiary organisations by providing a specialized service that they are not able to do themselves. UNOSAT-EMS is particularly complementary to OCHA.**

According to an HR interviewee, UNOSAT currently employs 60 staff with 10 to 20 staff comprising the UNOSAT-EMS team. As discussed above, the free, timely and high-quality outputs provided by the UNOSAT-EMS helps build recognition of and trust in UNOSAT, who is then able to secure follow up projects – see Finding 30. The same respondent said that the UNOSAT-EMS is what UNOSAT is famous for.[36]

[34] 20231099 _NMFA Year 1 Report Final.pdf, p 64
[35] The Group on Earth Observations is a unique global network of international experts designed to build connections, identify gaps, share best practices and reduce duplication of effort in sustainable development and sound environmental management.
[36] KII

The usefulness of satellite imagery and analysis creates a demand for more imagery and analysis, which in turn creates a demand for strengthening capacity in Member States to develop capacity in carrying out geospatial information analysis. UNOSAT and UNITAR meet some of this need, in part through a NORAD-funded project called "Strengthening Capacities in the use of geo-spatial information for improved resilience in Asia-Pacific and Africa" that began in July 2020 and will run until July 2024, also see Finding 13 on the complementarities between the UNOSAT-EMS and the NORAD-funded project.

**Finding 7 that there is limited interaction between the activations managed by the UNOSAT-EMS' two main workstreams on disaster response and on human rights.**

The evaluation looked at the extent to which the UNOSAT-EMS' main workstreams – disaster management and peace, justice, security and human rights – are or could be working together. At present, the disaster workstream is of use to the human rights workstream if its products can be repurposed to answer human rights' questions such as whether satellite imagery captured in the response to a natural disaster shows damage to hospitals caused by civil unrest. Beyond this, the evaluation found that the two workstreams responded to activations in only two countries at the same time, see Table 1 - Activations carried out by the UNOSAT-EMS' two workstreams in the same country at the same time. However, no nexus approach was taken, thus reducing potential to understand and act upon interactions between natural disasters on one hand and peace and security issues on the other.

Table 1 - Activations carried out by the UNOSAT-EMS' two workstreams in the same country at the same time

| Country | Month | Year | Workstream | Type of event/Activities |
|---|---|---|---|---|
| **Ethiopia** | **June** | 2023 | Disaster response | Floods |
| | | | Human rights | UNHCR request |
| **Sudan** | **April** | 2023 | Disaster response | Complex Emergency |
| | | | Human rights | No information |
| | **June** | 2023 | Disaster response | Other |
| | | | Human rights | Self-activation |

Source: Own elaboration based on UNOSAT-EMS activation table (August 2022- July 2023)

## EQ2.2: How well does the UNOSAT-EMS align with the Norwegian Humanitarian Strategy and the Strategic Partnership Model?

**Finding 8 on UNOSAT-EMS alignment with the Norwegian Humanitarian Strategy**

**The UNOSAT-EMS aligns well with the Norwegian Humanitarian Strategy by contributing to the protection of civilians. The Norwegian Ministry of Foreign Affairs via its Permanent Mission to the UN takes high-level government visitors to the UNOSAT Operations Room in Geneva to show how Norway's Strategic Partnership Model, built on the provision of predictable and flexible funding to the UNOSAT-EMS, is working in practice.**

Norway's Humanitarian Strategy, which runs from 2019 to 2023, is being revised. A senior advisor[37] in the Norwegian Department for Foreign Affairs said that the key elements that pertain to UNOSAT are likely to remain the same, including flexibility and reliability of funding;

[37] KII

protection of civilians; innovation to improve the effectiveness and efficiency of humanitarian aid; and partnerships with other humanitarian actors, including UN agencies, NGOs and other donor countries. How the UNOSAT-EMS aligns with these elements is considered in turn.

Flexibility and reliability of funding: According to a senior UNOSAT leader,[38] the UNOSAT-EMS' ability to respond quickly to unanticipated emergencies and "random humanitarian requests" is only possible because NMFA provides UNOSAT with funding that is flexible enough to allow them to respond. The funding allows for work to begin quickly and to keep it going until more permanent funding can be found, for example in Ukraine as described under Finding 3. For more information on NMFA funding, please see Finding 30.

Protection of civilians: UNOSAT protects civilians during emergencies by providing near real-time situational awareness to inform decision-making of the agencies offering humanitarian assistance. The situational awareness helps advocate for resources and can help guide relief work to where it is most needed, thus protecting the most vulnerable civilians from post-emergency events such as disease and malnutrition.

Many emergencies have both humanitarian and human rights impacts. Satellite imagery acquired for humanitarian reasons can also be relevant to human rights actors. For example, a satellite image to estimate the number of people in need of aid in a city is also relevant to human rights actors as it documents when damage occurred, and what buildings were targeted. UNOSAT has expertise in both areas and seeks to bring both to bear in emergencies to also protect civilians' human rights,[39] as well as increasing the usefulness and value of its products.

Several interviewees mentioned an increasing interest in providing early warning of impending disasters such as typhoons or wildfires. This would protect civilians by moving them out of harm's way. This is an area that the UNOSAT-EMS may wish to develop.

Innovation:

The Norwegian Ministry of Foreign Affairs see UNOSAT as an innovative organisation, starting from the 2000s when UNOSAT pioneered the use of satellite imagery in humanitarian response.[40] Several key UNOSAT staff and an external partner highlighted the ongoing exploration of AI to assist in satellite imagery analysis as an important innovation focus area for UNOSAT over the next five to ten years, while emphasizing that expert human oversight remains critical at present before any AI outputs are operationally deployed.

Three UNOSAT staff[41] and two external partners[42] said they see the development of AI and machine learning for automated analysis of satellite imagery as an important ongoing innovation area for UNOSAT. Two respondents[43] expressed interest in public-private partnerships involving Norwegian companies and gave the example of on-going work to develop apps to triangulate satellite imagery with ground photos to build trust and confidence in the imagery.

Partnerships: Norway launched a new partnership model in 2020 based on providing predictable and flexible funding to help Norwegian humanitarian organisations to improve their

[38] KII
[39] Year 1 progress report, p. 8
[40] KII
[41] KII
[42] KII

response capacity in the many protracted and complex crises across the world.[44] The UNOSAT-EMS is a good example of the strategy working in practice, one which the Ministry of Foreign Affairs takes high-level Norwegian visitors, such as government ministers,[45] see Finding 8.

### EQ2.3: To what extent is the UNOSAT-EMS contributing to synergies and reducing potential duplication within the UN's emergency response system?

**Finding 9 on the UNOSAT-EMS' support to the UN emergency response system.**

**UNOSAT has established a niche for itself at the heart of the UN emergency response system by providing an end-to-end service that begins with an activation request and finishes with sharing its products through its distribution channels, such as the SMCS and the HDX for the disaster response work. The process is iterative and depends upon long-established relationships, making the UNOSAT-EMS hard to replicate or replace. The UNOSAT-EMS is highly respected, trusted and valued among other members of the UN's emergency response system.**

For this evaluation, the UN's crisis and emergency response system includes i) UNOSAT and the UNOSAT-EMS as a provider of satellite imagery analysis in emergency contexts, ii) agencies with humanitarian mandates or that support humanitarian response within and outside the UN, acting as users or partners of the UNOSAT-EMS, such as the UN Operations and Crisis Centre (UNOCC); Executive Office of the Secretary General; other UN agencies (OCHA, UNHCR, UNICEF, WHO, UNESCO, OHCHR, ESCAP amongst others); the ICC, and iii) partner agencies with humanitarian mandates or that support humanitarian response within and outside the UN, making use of UNOSAT satellite imagery capacities beyond the UNOSAT-EMS project such as UNDP for Ukraine and the REACH Initiative.

Existing coordination mechanisms within the system for disaster response to avoid duplication of work include the Satellite Mapping and Coordination System (SMCS) set up in the framework of the Global Disaster Alerts and Coordination System (GDACS). Coordination also occurs to obtain satellite imagery for disaster response events from the International Charter Space and Major Disasters (Space Charter). The Humanitarian Data Exchange (HDX) acts as a distribution tool for products related to disaster response.

To understand how the UNOSAT-EMS contributes to the UN emergency response system following disaster events it is useful to understand how the Space Charter works.

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Box 2 - How the Space Charter works and UNOSAT's unique role in major disasters events.

The Space Charter is made up of Members and Partners. Members are space agencies and space systems operators from around the world who work together to provide imagery for disaster monitoring purposes. Some Partners can trigger activations of the Space Charter (e.g., UNOSAT, UNOOSA and Sentinel Asia through the Asian Disaster Reduction Center). Some Partners contribute additional satellite data, while others are value added providers, who produce maps and carry out analysis based on geospatial data for use in interpreting and

[44] https://www.norway.no/en/missions/wto-un/our-priorities/humanitarian-affairs/partnership-hum-org/
[45] KII

assessing disaster situations.[46] UNOSAT is also both a value-added provider and a project manager of activations. UNOSAT collaborates with other mapping organizations, an important one being Copernicus EMS, who is also a Space Charter partner and value-added provider. Copernicus EMS focuses on Europe and countries neighbouring Europe, using European satellite data predominantly. Copernicus activation decisions are made by the European Commission. When the Space Charter and Copernicus are activated for the same disaster, the two organizations share the maps they produce, through the SMCS (see Annex I case study 4).

The process of activating the space charter by UNOSAT, under the EMS framework, works as follows:

1. The process begins with UNOSAT-EMS receiving a request from an organisation in an area where a disaster has happened. Most of the requests come from UN agencies, followed by government agencies, the Red Cross and Red Crescent Movement (ICRC and IFRC). International and regional organizations and humanitarian NGOs can also make a request by emailing a hotline.[47]
2. UNOSAT then activates the Space Charter on behalf of the requesting organization while starting a conversation on what analysis is needed.
3. UNOSAT prepares an acquisition plan using available satellite resources, planning out what will be the best satellites to use based on the request. This plan is submitted to the relevant space agency. It may also source satellite data from member states and commercial companies, for which it pays.
4. UNOSAT initiates the activation by acquiring and analysing the satellite imagery to produce outputs such as maps, reports, statistics, data, live web maps, etc. that provide information about the disaster impact and situation on the ground. This is an iterative process as the requestor and UNOSAT analyst "keep narrowing it down until you get the data you want."[48]
5. These outputs are delivered to the requesting organization within specified timeframes to support their disaster response and decision making. The outputs are tailored based on the specific needs and requirements of the requestor.
6. UNOSAT also shares and coordinates the outputs and areas of analysis with other satellite mapping organizations through the GDACS Satellite Mapping Coordination System (SMCS) platform. This avoids duplication of efforts and allows organizations to see who is analysing which areas.
7. Additionally, UNOSAT uploads and disseminates outputs and data to platforms like the Humanitarian Data Exchange (HDX) and through its email distribution list to allow open access and sharing of the information with the wider humanitarian community.
   This process applies for disasters events only. In complex emergencies, the requesting agency may not want its request to be common knowledge, for example when they will involve satellite imagery of war zones. An OCHA employee commended the UNOSAT-EMS for being appropriately confidential in these situations – see Box 3.

It should be noted that the Space Charter is one of several mechanisms that UNOSAT-EMS uses for satellite acquisitions, albeit the main one.

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46 https://disasterscharter.org/web/guest/home;jsessionid=102AEBAFB90E20B7BBC328D754B5ED8C.APP1

47 https://unosat.org/services

48 KII

**Finding 10 on the UNOSAT-EMS' main outcome pathway.**

**Being part of the UN emergency response system is the main way in which the UNOSAT-EMS is achieving two of its four outcomes relating to enhanced evidenced-based decision-making and reinforced synergy and coordination. The UNOSAT-EMS is a 'public good' with respect to the UN. The Emergency Response System is also a good example of 'One UN' working in practice.**

As the Box 1 shows, UNOSAT has created a niche for itself as a 'public good' that is valuable to the UN emergency response system. The UNOSAT-EMS provides a joined-up service starting with the activation request, through managing the activation, carrying out the necessary analysis, the production of outputs that are useful and timely through to finally sharing the products through UNOSAT's website and mailing list, and SMCS and the HDX for the disaster response related work, all for free. UNOSAT also works to avoid duplication of efforts and allows organizations to see who is analysing particular areas. Being part of the UN emergency response system is the main way in which the UNOSAT-EMS contributes to two of its four outcomes (see the ToC in Figure 2), namely: contribution to enhanced evidence-based decision-making; and reinforced synergy and coordination during emergency situations. Seventy per cent of the users of UNOSAT-EMS products for disaster response said they used them to enhance coordination with other actors.

**Finding 11 on responses to requests when an activation by another organization has already taken place.**

**There is usually only one Space Charter activation per disaster. Organisations receive the analysis they require if their request is included in the activation request. UN organizations usually make their requests through UNOSAT who then manage the subsequent interactive process to match the satellite data available to answer the questions being asked. For example, if governments request an activation through UNOSAT, UNOSAT will ask OCHA if it has its own request. However, when UNOSAT is not the Charter project manager, UN requests may not be heeded, and the quality of UN agency damage reports suffer as a consequence.**

There were two concerns raised by users of UNOSAT-EMS products that responded to the online survey. The first, reported by OCHA Philippines, was that the organisation did not have its request for analysis from UNOSAT granted when Super Typhoon Noru was threatening the Philippines. This was because the charter had already been activated by UNOOSA on behalf of two organisations, the Philippines Space Agency (PHILSA) on behalf of the Philippines National Disaster Risk Reduction and Management Council and the Asian Disaster Reduction Center (ADRC) on behalf of the ASEAN Coordinating Centre for Humanitarian Assistance on Disaster Management (AHA Centre). The project management was carried out by the International Water Management Institute (IWMI) and value adding by the Philippines Space Agency. As the Charter had already been activated by another organization, UNOSAT pointed OCHA Philippines' to UNOOSA's activation, following a standard procedure that aims to avoid duplication. As a result, OCHA's Consolidated Rapid Assessment Report, published on reliefweb.int five days after the Typhoon made landfall did not include UNOSAT's analysis on flooding and inundation over the first few days, particularly around large dams. The report was without UNOSAT's initial damage assessment of infrastructure, as previously carried out for Typhoon Rai, and had proved very useful to inform OCHA's own damage assessment at the time..[49]

[49] Email from OCHA Regional Office in Bangkok to the regional UNOSAT office also in Bangkok

The second concern raised had more to do with internal communication channels in WFP. The respondent said it was confusing when on the one hand UNOSAT was providing analysis to the UN in-country response while at the same time providing analysis to WFP's own GIS unit. The respondent did not know which channel to follow. See further details under **Finding 26 on OCHA**.

### EQ2.4 How well does the project complement and foster synergies with the private sector, academia, NGOs, and Member State governments?

**Finding 12 on UNOSAT's use of MOUs with its partners to help the UNOSAT-EMS complement and foster synergies.**

**An analysis of UNOSAT's MOUs suggests that the UNOSAT-EMS is working to strengthen and formulate its relationships, and thereby generate greater complementarities and synergies, in the following ways:**

- **Establish MOUs with some, but not all the other organizations in the UN emergency response system, see Finding 8.**
- **Establish MOUs with academia and the private sector to increase exploration and adoption of innovative ways of using satellite imagery and geospatial information, including AI applications. UNOSAT has made most progress with NVIDIA by working together to run an online course attended by 5,000 people, and participation in a conference held by NVIDIA.**
- **Establish MOUs with some countries in which UNOSAT has offices.**

The ways in which the UNOSAT-EMS complements and fosters synergies with other actors is reflected in the MOUs that UNOSAT has with other organizations. The following are the organizations that have current and lapsed MOUs with UNOSAT. The assumption is that, as the backbone of UNOSAT, most MOUs relating to UNOSAT also pertain to the UNOSAT mapping activities and the UNOSAT-EMS.

- UN organizations
  - Current: UNICEF; UNHCR; UNESCO; UNDP; UNESCAP; The Office of the High Commissioner for Human Rights (OHCHR)
  - Lapsed: UNOPS; UN Secretariat; UNOOSA; UNOICT
- Other international organizations
  - Current: CERN
  - Lapsed: International Criminal Court; International Federation of Multimedia Associations; Regional Centre for Mapping of Resources for Development; ICRC
- INGOs
  - Current: Human Rights Watch.[50]
  - Lapsed: Centre for Enhancement of Science in Space; Map Action; Radiant Earth
- Governments
  - Current: The Ministry of Climate Change of Vanuatu; LAO PDR; Rwanda Space Agency; Geo Informatics and Space Technology Development Agency (GISTDA)
  - Lapsed: Ministry of Economy, Fiji; Agence Spatiale Algérienne (ASAL)
- Private sector

[50] The MoU was signed in 2011 and is still active given that the MoU has no expiration date. The evaluation is not aware of any joint activities under this MoU at the time of the evaluation.

    - Current: Google; NVIDIA[51]
    - Lapsed: BlackSky
- Academia
    - Current: Wuhan University
    - Lapsed: Oxford University

The list shows that of the 14 current UNOSAT MOUs, about half are with organisations in the UN emergency response system. Of those outside, two MOUs are with large multinational companies, namely Google and NVIDIA. Google is interested in working on early warning and response preparedness with UNOSAT.

NVIDIA wants to work with UNOSAT to adapt and use GPU-accelerated computing platforms to accelerate AI for earth observation in general, and on floods and fires specifically. UNOSAT has partnered with NVIDIA to produce an online open course on Disaster Risk Monitoring Using Satellite Imagery. The course teaches users how to build and deploy a deep learning model to automate the detection of flood events using satellite imagery. As of September 2023, over 5,000 people have taken the course.[52] The partnership with NVIDIA also resulted in UNOSAT's participation in a global AI conference hosted by the company in August and September 2022, where UNOSAT discussed how AI and deep learning can be used for real-time monitoring of the Earth with geospatial satellite imagery - to predict and respond to natural disasters.

UNOSAT also has an MOU with Wuhan University in China on AI modelling amongst others, that was renewed in July 2023 with a broader scope. Wuhan University will grant the Mapping Services access to more geospatial data, including nighttime light data, which can be an invaluable source of information in the context of emergencies (see Annex I case study 4). An internship programme with the university is in place through which several GIS students have supported and learned from the work performed by UNOSAT, especially in the fields of AI and disaster-related analysis.

One of the attractions of working with UNOSAT is that UNOSAT has been able to compile a huge amount of data on different types of disaster, in particular flooding, on which AI models can be trained.[53]

UNOSAT has current or lapsed MOUs with ministries in three Pacific Island states - Solomon Islands, Fiji and Vanuatu, and Lao PDR, Bhutan, Nigeria and Bangladesh, seven countries in which it has presence through in-country experts deployed as part of capacity development related projects managed by UNOSAT. UNOSAT has regional offices in Bangkok and Nairobi, two cities with large UN presence. UNOSAT has an MOU with the Thai-based Geo-Informatics and Space Technology Development Agency (GISTDA) - see Finding 1, but nothing similar in Kenya. It has a current MOU with the Rwanda Space Agency.

**Finding 13 on the complementarities between the UNOSAT-EMS and the NORAD-funded project**

**The NORAD-funded project, which works in eight countries in Africa, Asia, and the Pacific, aims to develop GIS capacities of beneficiary organizations through technical training to participants, awareness raising, backstopping service, a knowledge platform, and the development of technical application solutions. The backstopping service allows the respective organizations to make satellite imagery analysis requests**

[51] The MOU was signed in 2009 but without end date and hence still active.
[52] 20231009_NMFA Year 1 Report Final.pdf p. 59
[53] KII

**to UNOSAT. Some of these requests are processed by the UNOSAT-EMS staff, building working relationships between the two parties as a result. Both the capacity development and the new relationships have helped the UNOSAT-EMS provide timely and useful products after disaster activations triggered in the eight countries. The capacity development has also helped the respective country disaster response systems to incorporate and use the UNOSAT-EMS products to make better evidence-based decisions.**

UNOSAT's eight in-country presence were set up as part of the CommonSensing project (for the Pacific countries only) and the NORAD-funded project - Strengthening Capacities in the use of geospatial information for improved resilience in Asia-Pacific and Africa. The latter began in July 2021 and will run until July 2024. The MOUs established in Vanuatu, Fiji and Solomon Islands were established as part of this project. The NORAD project complements the UNOSAT-EMS by building capacity for in-country development actors to make better evidence-based decisions based on outputs provided by mapping services, including UNOSAT's.[54] The NORAD project allows participants and their respective organizations to make requests of UNOSAT as part of a backstopping service. Some of the requests are processed by the UNOSAT-EMS team. For example, after a landslide killed 16 people in Uganda on 7 September 2022, the Department of Relief Disaster Preparedness and Management made a request to UNOSAT to map the landslide extent and resulting damage. The UNOSAT-EMS used satellite and drone images to complete the work.[55]

Carrying out the requests has built relationships between the UNOSAT-EMS and the disaster management systems in the respective countries. This has meant that when natural disasters have hit, the subsequent iterative activation process described in Box 1has worked better than if UNOSAT-EMS staff did not have trained counterparts to work with that they already knew. One such activation occurred when the East Epi submarine volcano erupted in February 2023,[56] for which UNOSAT developed a preliminary situation assessment which was used to provide early information about damage on islands to which all forms of communication were down.

**Finding 14 on the UNOSAT Rapid Mapping Partner Initiative**

**UNOSAT has established the "UNOSAT Rapid Mapping Partner Initiative" and is collaborating with GISTDA. In this launch, UNOSAT is signalling its intention to help improve the way basic information is communicated through a more standardized set of data formats, as well as standardizing the different follow-up protocols used by different analytical providers - protocols that are very important in supporting effective coordination between time-sensitive activations.[57] The UNOSAT - GISTDA MOU was renewed in 2023. No mention is made of it in the Project Document or first year annual report. Project Management plans to reach out to Centre in China (CBAS), and other organisations in the next year as part of the "UNOSAT Rapid Mapping Partner Initiative."[58]**

[54] Norad proposal theory of change
[55] Norad backstopping requests
[56] https://unosat.org/products/3477
[57] GISTDA MOU with UNOSAT, p. 6
[58] KII

# EQ3. Effectiveness: How effective has the project been in delivering results so far and in making progress towards the intended outcomes?

### EQ3.1: To what extent is the project on track in achieving planned outputs, outcomes and impact?[59] What are the factors positively or negatively affecting the project's performance?

**Finding 15 on project achievements and factors affecting project performance.**

**The project is on track to achieve its output and outcome targets, see Finding 31 on project performance with respect to targets and timeliness and Annex XI on achievement of outcomes and outputs. Also see the updated project logframe in Annex IV.**

**Three factors threatening project performance – loss of funding, shortage of analysts to do the work, and lack of capacity to respond to increasing numbers of requests. These factors are dealt with** under **Finding 41 on project vulnerabilities**.

### EQ3.2: To what extent is the UNOSAT-EMS on track to provide better information for informed decision-making in situations of natural disasters and conflict?

**Finding 16 that the UNOSAT-EMS is providing high quality and timely information to inform decision-making in situations of natural disasters and conflict.**

This finding is based on:

Finding 3 on relevance of UNOSAT-EMS products.

Finding 9 on the UNOSAT-EMS' support to the UN emergency response system.

Finding 10 on the UNOSAT-EMS' main outcome pathway.

### EQ3.3: To what extent is environmental sustainability considered when operating the UNOSAT-EMS? (ENVSUSE)

**Finding 17 on environmental-sustainability and -friendliness**

**The UNOSAT-EMS does not explicitly consider environmental sustainability. Nevertheless, the project operates in several environmentally friendly ways including the use of existing satellites rather than special flights made by aeroplanes or drones to obtain geospatial data.**

Review of the current project document and first year progress report shows that environmental sustainability is not considered by the UNOSAT-EMS, except to include it as a question in this MTE. Nevertheless, the project is in alignment with at least half of the implementation principles of the Blue Marble sustainability framework, see **Finding *5***. Also, the EMS operates in several environmentally friendly ways. The project's use of existing satellites saves the greenhouse gas emissions, and risks involved, in flying staff to disaster locations. The imagery may also remove the need to use drones or aeroplanes to gain geospatial information, saving the fossil fuel they would burn. The project uses CERN's IT infrastructure, including data storage, which helps reduce the carbon footprint of storing large amounts of data.

[59] Log frame and project Theory of Change available in Annex E.

### EQ3.4: To what extent have relevant recommendations from the previous independent evaluation been considered/implemented in the project design and implementation?

**Finding 18 on the extent to which recommendations made by a previous independent evaluation have been implemented.**

**Two recommendations were fully implemented, one partially and three were not implemented to any significant degree. The MTE largely agrees with these levels of response and does not recommend any remedial action.**

The previous independent evaluation, carried out in 2018, made six recommendations[60] shown in Table 2.

Table 2 - Recommendations made by the 2018 independent evaluation of the UNOSAT-EMS, together with the management team's response in 2019 and MTE commentary in 2023

| Recommendations made in the 2018 evaluation of the EMS | Management team's response in 2019 | 2023 MTE commentary |
|---|---|---|
| 1. UNOSAT should enhance the visibility of the Rapid EMS due to its global relevance for the UN family and the UN Member States. More visibility could be achieved for example by establishing a strategic advisory board for the Rapid EMS comprised of UNOSAT's main institutional partners and the current donor Norad | The establishment of a strategic advisory board is planned. | Partially implemented<br><br>No advisory board was established and is not now necessary because the UNOSAT-EMS has enough regular users for its limited capacity to respond to requests |
| 2. UNOSAT should revise current MoUs with institutional partners and include more joint planning and implementation tasks including secondments. This could strengthen UNOSAT's position in an increasingly competitive environment. | Revision of MOUs is under way. No activities have materialized. New MoU with Chinese universities will ensure significant numbers of trainees that will assist with the Service.<br><br>Secondments will lead to spreading operational resources too thin thus not ensuring the service. If significant funding was made available for a full team of analysts and secondment to partners, this could be revisited. | Partially implemented<br><br>This MTE agrees that operational resources are being spread thin, with difficulties in recruiting and keeping analysists, see Finding 30. The MTE disagrees that the EMS is facing an increasingly competitive environment because of the niche it has cut out for itself, see **Error! Reference source not found.** and Finding 10.<br>MOUs should be revisited as part of the project developing an explicit strategy for its technological innovation work – Outcome 3 in the project log frame, see Finding 21.<br>UNOSAT benefits from a Junior Professional officer funded by China.<br>Several MoUs are outdated and would need renewal. |
| 3. UNOSAT should invest in a strategic retreat with Norad, other potentially interested parts of the Norwegian administration, other potential donors and selected institutional partners to shape a redefined business model of the Rapid EMS. | Implemented<br><br>Strategic meetings held with Norway and Switzerland. This resulted in a US$ 3 million contribution towards Rapid Mapping from Norway MFA. Nothing from Switzerland. | Implemented<br><br>Funding remains an issue, see Finding 41 on project vulnerabilities. Engagement with Norway in approaching other donors is very active with regular meetings and exchanges, including between Nordic countries ambassador meetings in Geneva. |

[60] Independent Evaluation on Rapid Mapping.pdf p 45

| | | |
|---|---|---|
| 4. UNOSAT should identify indicators and targets for the outcome and impact of the Rapid EMS, as a means to move from activity-based management to results-based management. | Still being planned | Implemented<br><br>Completed in 2020 with the publication of the NFMA Evaluation Plan. |
| 5. UNOSAT should consider to which extent user-based real-time impact assessment by upgrading existing technical solutions related to UN-ASIGN can be accommodated in any future business model of the Service, given donor interest and opportunity to lead the global humanitarian community on this topic. | Under implementation | Not implemented<br><br>This MTE finds that the UNOSAT-EMS does not need to do more than it already is with respect to M&E of its products. Additional investment is better spent in ensuring that UNOSAT-EMS products are properly referenced in the documents to which they contribute.<br>No mention is made of UN-ASIGN in the current project document, nor M&E strategy. |
| 6. If the current funding crisis requires a prioritization in the service portfolio, UNOSAT should focus on risk analysis/possible scenario definition maps and location/preliminary situation maps due to the more direct access to end-users for those products | Partially implemented<br><br>The project should keep prioritizing its core rapid mapping situational awareness | Partially implemented<br><br>The MTE agrees with the UNOSAT-EMS continuing to focus on providing rapid situational analysis. |

### EQ3.5: To what extent are a human rights-based approach, disabilities and a gender mainstreaming and inclusiveness strategy incorporated in the design and implementation of the project? (GEEW)

**Finding 19: The project does not currently incorporate GEEW strategy in the design and implementation of the project, see Finding 4.**

**The project could usefully add a question in its regular user follow-up survey asking if survey respondents are combining UNOSAT-EMS products with other sources of information, e.g., census data, to estimate the extent to which already vulnerable people have been affected, and plan relief efforts accordingly.**

### EQ3.6: To what extent is the project making effective use of new technologies including Artificial Intelligence (AI), machine learning and algorithms to achieve its outcomes?

**Finding 20 on an apparent reduced level of activity related to new technology in the current project cycle**

**The innovative new technology targets for the current UNOSAT-EMS cycle are modest compared to the previous cycle. This is because the current phase will receive less funding than was initially requested and project leadership has chosen to prioritize its core business, which is responding to increasing numbers of requests. However, AI and data innovation remains an active area of UNOSAT through partnerships like the DISHA Initiative. The project has become more cognizant of the shortcomings of AI.**

The current project document has one output related to AI and innovation, namely: “solutions/field applications developed by UNOSAT which use AI for humanitarian, peace and

justice purposes." This work is to be carried out in partnership with universities and AI research centres. No mention is made of CERN or the OpenLab that have been important in previous project cycles.

The project's first annual report states that the Flood AI model was deployed as a response to seven activations and that 86 per cent of the images processed by the model did not require correction or adjustment by the analysts.[61] No mention is made in the annual report as to further development of Flood AI. No mention is made of any research and development being carried out under existing MOUs with Google.

An intent is expressed in the project document to develop another AI model for shelter mapping and damage assessment before the end of the project in 2025. UNOSAT began to engage staff to work on this in January 2024,[62] funded by the Data Insights for Social and Humanitarian Action (DISHA) Initiative.[63] The DISHA Initiative is led by UN Global Pulse which brings together a coalition of partners including Google.org, the Jain Family Institute, McKinsey & Company, the Patrick J. McGovern Foundation, UNDP, WFP and UNOSAT to accelerate ethical and responsible access to data and AI solutions to unlock social impact at scale. The Initiative has a broad overlap with UNOSAT-EMS. Two of DISHA's three focus areas match UNOSAT-EMS' two workstreams, namely:

- Humanitarian action: DISHA works on projects like damage assessment after disasters using AI models.
- Peace building: DISHA aims to utilize data and AI for initiatives promoting peace and stability.

DISHA has been running for about four years.

The annual report says that UNOSAT and NVIDIA collaborated to provide an online course entitled "Disaster Risk Monitoring Using Satellite Imagery."[64] The partnership with NVIDIA also resulted in UNOSAT's participation in a global AI conference hosted by the company in August and September 2022.

This low-key description of research and development in the current project cycle contrasts with the previous project cycle[65] which worked and reported on developing Flood AI, including the publication of a related peer-review journal article (Nemni et al., 2020),[66] see Finding 25. The previous project cycle also worked on using AI to perform assessments of damage caused by natural disasters and conflicts, in particular damage to buildings using very high-resolution satellite imagery.

One reason for the difference are that the current phase will receive less funding than was intended while at the same time, the number of requests to which the UNOSAT-EMS has responded has increased by 13 per cent from 2021 to 2023. As a result, the project leadership has chosen to prioritize the response to activations which are increasing.[67]

[61] 1st project annual report, p. 20
[62] KII
[63] KII
[64] NMFA Report p 59
[65] NMFA Report 2021- 22 p33
[66] Nemni, E., Bullock, J., Belabbes, S. and Bromley, L., 2020. Fully convolutional neural network for rapid flood segmentation in synthetic aperture radar imagery. Remote Sensing, 12(16), p.2532. https://doi.org/10.3390/rs12162532
[67] KII

While the UNOSAT-EMS did not receive the full budget it aimed for by approaching multiple donors, it should be noted that annual funding from Norway has doubled from when the donor was NORAD, from 2017 to 2019, as shown in Table 3.

Table 3 - Norwegian funding to the EMS project since 2017

| Phase | Funding in NOK | Funding in US$ | Project duration in years | Donor | Average per year (US$) |
|---|---|---|---|---|---|
| 2022-2025 | 45000000 | 4.2 million | 3 | NMFA | 1.38 million |
| 2019-2021 | 30000000 | 2.8 million | 2.5 | NMFA | 1.11 million |
| 2017-2019 | 15000000 | 1.38 million | 2 | NORAD | 0.69 million |

A second reason is that during the previous phase, CERN made available a key hardware component (GPUs). This has not been the case for the last two years or so.[68]

A third reason might be that key project staff have become less positive as to the immediate potential of AI. So far AI models have not been able to provide partners with the detailed building counts and classifications they need, with sufficient accuracy.[69] In particular, AI models struggle with identifying small, informal shelters, necessitating "extensive manual re-work."[70] Another issue is that the effectiveness of AI models is highly context dependent. For example, an AI model trained on camp images from Africa did not yield satisfactory results when tested on Asian settings, with only a 50 per cent accuracy rate.[71] This highlights the challenges of generalizing AI models across diverse regions and the limitations of their adaptability.

AI is not the only innovation with promise. One of the main technological advances in recent years has been the use of infrared and other tools to see through cloud cover which is particularly important for determining flooding after typhoons. An interviewee said the UN emergency response system should put more effort on using existing datasets describing previous disasters at becoming much better at early warning and preparedness.[72]

### Finding 21: On the need for the UNOSAT-EMS to have a research and development strategy

**What the UNOSAT-EMS appears to be lacking is an explicit research strategy laying out the role of Google and NVIDIA, two multinational tech companies, with respect to the EMS with comparatively miniscule level of funding available. The strategy could usefully explore how UNOSAT can best leverage the disaster databases that it has built over 20 years that could be invaluable for training AI models. The strategy should also make explicit the role of the DISHA Initiative in UNOSAT and the UNOSAT EMS' research and technology development work.**

## EQ3.7: To what extent has the project's structure been effective?

UNOSAT has its headquarters located in UNITAR and CERN offices in Geneva. It has a liaison office in New York, regional offices in Bangkok and Nairobi, and presence through in-country experts in Nigeria, Uganda, Bangladesh, Bhutan, Lao PDR, Solomon Islands, Fiji and

[68] KII
[69] KII
[70] KII
[71] KII
[72] KII

Vanuatu. Interviewees highlighted the co-location of UNOSAT staff with ESCAP in Bangkok, with UNOCC in New York and with CERN in Geneva as particularly helpful in ensuring the effectiveness and relevance of the UNOSAT-EMS. Each are taken in turn.

**Finding 22 on benefits from the UNOSAT-EMS' Asia and Pacific regional team being co-located with ESCAP in Bangkok**

**UNOSAT's mapping expertise is co-located at ESCAP's Bangkok headquarters since 2015. ESCAP facilitates the implementation of a 10-year plan for space applications, emphasizing capacity building in geospatial analysis and access to space-derived data for disaster response, both of which can be of benefit to the UNOSAT-EMS. While the latest MoU between UNOSAT and ESCAP concerns only the rent of office space, a previous MoU that expired end of 2021 focused on ESCAP's role as a broker of UNOSAT products to ESCAP member states. Until now, the UNOSAT-EMS assists ESCAP's member countries lacking rapid satellite data analysis capabilities during emergencies. The co-location in Bangkok helps both organizations to communicate frequently. It has also helped UNOSAT provide support in combined UN response to serious flooding in Thailand in 2021.**

ESCAP has had a space applications programme since 1999. ESCAP and UNOSAT signed an MOU in 2013 and have been working together closely since then. ESCAP invited UNOSAT to co-locate an Asia and Pacific team at their building in Bangkok. ESCAP recognized the value of having UNOSAT's mapping expertise closer to Asia-Pacific countries prone to disasters.[73] In 2018, ESCAP member states adopted a plan of action on space applications for sustainable development for 2018-2028. ESCAP has a section responsible for facilitating member states' implementation of this plan of action. ESCAP's main mandates are to carry out capacity building in geospatial analysis and facilitating members' access to space-derived data and technology for disaster response. The UNOSAT-EMS is of benefit to ESCAP, which can rely on UNOSAT to work on activations for member countries that do not have their own capacity to rapidly source and analyse satellite data in emergencies. ESCAP plays a facilitation role in this regard, including sourcing, if needed, raw satellite data from member space-faring nations, including China. The UNOSAT-EMS benefits from interacting with country-level requestors who ESCAP have trained in geospatial analysis. Both ESCAP and the UNOSAT-EMS have a coordination role. The co-location of ESCAP's satellite section with UNOSAT's Asia and Pacific regional team makes it easier for both to coordinate and avoid duplication.

The location of the UNOSAT Asia and Pacific regional team in Bangkok helped the UN Resident Coordinator in Thailand to mount a coordinated UN response to flooding in 2021.[74] The UNOSAT-EMS provided updates to the UN Country team set up to respond to the flooding, and supported agencies' responses.

**Finding 23 on the benefits of UNOSAT being co-located with UNOCC in New York**

**UNOCC's Watch Room benefits from having UNOSAT-EMS staff co-located with it by gaining access to near-real time situational awareness together with imagery that validates and provides evidence about what is happening and as a result helps the Watch Room do its job to inform high-level UN decision-making. The UNOSAT-EMS'**

[73] KII
[74] KII

**products are always an input into often opaque and complex decision-making processes which makes it hard to attribute outcomes and impact to the UNOSAT-EMS.**

The United Nations Operations and Crisis Centre (UNOCC) conducts situational awareness, crisis assessment, and response planning for the United Nations system. One of its roles, for which the UNOCC Watch Room is responsible, is to provide situational analysis to senior UN leaders including the Office of the UN Director General. UNOSAT has one staff working in the same building as the UNOCC Watch Room. This proximity makes it easy for UNOCC to ask UNOSAT for analysis without going through a formal activation process.[75]

UNOCC includes UNOSAT's satellite imagery and analysis in their crisis updates and alerts for senior UN leadership. UNOSAT inputs act as visual proof and verification to support timely decision-making by senior officials during disasters and crises that can save lives. The Watch Team's updates and alerts are shared widely within the UN. For example, the Watch Room was the conduit by which UNOSAT's early imagery from the outbreak of the Ukraine war was able to inform high-level UN decisions. It has proved impossible to confirm which decisions UNOSAT imagery may have influenced, because decision-making processes are opaque due to political sensitivities, and UNOSAT-EMS products always complement other sources of data and analysis. Early UN decisions in Ukraine that may have been influenced by UNOSAT-EMS products were the early provision of humanitarian aid; establishment of humanitarian corridors; and, launching an investigation into allegations of war crimes committed during a conflict, led by the International Criminal Court.

### EQ3.8: To what extent has the project's partnerships been effective?

In addition to relations or co-locations with ESCAP as described above and the UNOCC, the UNOSAT-EMS has three important partnerships with CERN, OCHA, and Copernicus EMS, which are described in turn.

**Finding 24 on IT benefits from UNOSAT's partnership with CERN**

**UNOSAT has had an important partnership with CERN since 2002, benefiting from access to data storage, fast connectivity, technical expertise, cost savings and continuity for UNOSAT's IT infrastructure. UNOSAT has also benefited from CERN's expertise in data analysis and visualization, and provision of cutting-edge technologies.**

**Finding 25 on CERN providing a research platform for UNOSAT**

**In the past, CERN's OpenLab platform has helped UNOSAT work with research partners to develop AI algorithms, including Flood AI. The current project has set itself the target of using Flood AI at least 4 times a year and to employ AI to a new field by the end of the project. Both targets are relatively modest for reasons given in Finding 20. The current project document makes no mention of OpenLab or CERN as a research partner, even though some UNOSAT staff are based there.**

Perhaps the most important partnership UNOSAT and UNOSAT-EMS have enjoyed is with CERN, the European Organization for Nuclear Research, which is the largest particle physics laboratory in the world and is located near in Geneva at the border to France. UNOSAT has been co-hosted at CERN since 2002 and is currently part of CERN's OpenLab, which is a public private partnership to find applications for CERN's breakthroughs in carrying out high energy physics. Some of these breakthroughs relate to capturing, analyzing and visualizing

[75] KII

large amounts of data,[76] which is what the UNOSAT-EMS strives to get better at. Facilitated by the OpenLab platform, UNOSAT developed AI algorithms to enhance flood detection and refugee camp simulations in previous EMS project cycles. The algorithms were used in 2020 to monitor the situation after heavy monsoon rains in Bangladesh and Myanmar.[77] A notable publication coming out of this work is the paper "Fully Convolutional Neural Network for Rapid Flood Segmentation in Synthetic Aperture Radar Imagery",[78] published in 2020, that describes a fully automated approach to rapid flood mapping using machine learning. Three of the four authors worked for UNOSAT. The fourth was affiliated to UN Global Pulse and Durham University. He was also an author on a UN Global Pulse web article on the work.[79] The authors acknowledge OpenLab for providing them with access to public cloud services.

In 2021, UNOSAT's Director said: "Our partnership with CERN allows us to benefit from cutting-edge technologies to develop new solutions to support peace, security and climate resilience in yet inaccessible and often vulnerable parts of the world".[80]

UNOSAT enjoys other benefits as well from being hosted at CERN.

- Data Storage: UNOSAT benefits from CERN's robust data storage infrastructure to securely store the large amounts of raw and processed satellite imagery it works with.
- High Speed Connectivity: CERN's advanced networking provides UNOSAT with high bandwidth internet connectivity to rapidly transfer large imagery datasets and share final analysis products.
- Technical Expertise: provides valuable technical expertise to support UNOSAT's computing infrastructure and help optimize its systems.
- Cost Savings: By leveraging CERN's existing computing facilities, UNOSAT avoids substantial costs in developing comparable infrastructure independently. This provides significant cost savings and allows more funds to be directed towards UNOSAT's programmatic work.
- Sustainability: The long-term stability and operational expertise of CERN as host provides sustainability and continuity to UNOSAT's technical infrastructure. This is a major benefit over ad-hoc or short-term computing arrangements.

In response to the UNOSAT Director's comment, the Head of the IT department at CERN said: "Hosting UNOSAT is part of CERN's mission to push the frontiers of science and technology for the benefit of society. Our team is looking forward to working on future innovative projects with such a high humanitarian impact."

**Finding 26 on OCHA**

**OCHA was responsible for over half of all the UNOSAT-EMS' activations from August 2022 to July 2023, making OCHA by far the UNOSAT-EMS' largest client. A close working relationship exists between the two organizations, which helps OCHA: 1) gain an initial sense of the scale of the disaster and what size of flash appeal is appropriate; 2) coordinate the first humanitarian response after an emergency; and 3) to have**

[76] https://cds.cern.ch/record/2301895/files/Whitepaper_brochure_ONLINE.pdf
[77] https://home.cern/news/news/knowledge-sharing/unosat-cern-satellite-mapping-good-humanity
[78] https://www.mdpi.com/2072-4292/12/16/2532
[79] https://www.unglobalpulse.org/2021/04/fusing-ai-into-satellite-image-analysis-to-inform-rapid-response-to-floods/
[80] Ibid

**discreet access to satellite imagery and analysis to guide human rights actions in complex emergencies involving armed conflict.**

As already discussed, (see Finding 1), OCHA was the originator of half of all the EMS' activations from August 2022 to July 2023, making OCHA one of the UNOSAT-EMS' most important partners. OCHA's unique mandate is to provide coordination and advocacy in the humanitarian system and promote greater effectiveness of humanitarian efforts. OCHA has 40 country offices employing 100 GIS experts, many of which adept and use UNOSAT-EMS products. For example:

- UNOSAT maps were adjusted by OCHA in-house GIS experts to convey information in black and white that were printed out and used for planning disaster relief in the field after the Turkish and Syrian earthquake in 2023, when colour printers were not available;[81]
- OCHA staff regularly write assessment reports containing EMS images and analysis and published them on reliefweb.int within one week of a disaster to help coordinate and guide humanitarian relief.[82]

UNOSAT has a letter of agreement with OCHA rather than an MOU, reflecting the close relationship.[83]

Box 3 describes the importance of OCHA's relationship with UNOSAT.

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Box 3: A view from OCHA of their relationship with the UNOSAT-EMS for disaster response

The following aspects of OCHA's relationship with the UNOSAT-EMS was provided by a senior OCHA employee.

- Given its mandate, OCHA often coordinates the UN response to emergencies in the countries the 40 countries in which it has a country office. Satellite imagery is key to inform coordination in the early stages of an emergency when the analysis of satellite imagery is all that humanitarian agencies have to go on. The interviewee said that OCHA's work would be "worse on a lot of levels" without the analysis of satellite imagery.
- The iterative process, in which the OCHA requester and the UNOSAT-EMS analyst quickly decide what is the key information OCHA needs which available satellites can provide, is a crucial step in the activation process. If OCHA are not the requester then the organization will likely not have the same level of situational awareness, thus prejudicing OCHA's ability to coordinate a UN response. It is therefore important to OCHA that it controls the activation process, as the requestor. See Finding 11 on the consequences of UNOSAT not being the project manager on an activation.
- Activation is a very public event and in complex emergencies OCHA may not want everyone to know that it is looking at satellite images, that might be showing troop movements, for example. The interviewee was very complementary of UNOSAT's confidentiality in such circumstances. She also said that there was "a lack of general comprehension within OCHA that you can use UNOSAT for complex emergencies and that they are capable of doing this in a very sensitive way."[84]

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[81] KII
[82] See https://www.unocha.org/publications/report/philippines/philippines-severe-tropical-storm-nalgae-paeng-mindanao-consolidated-rapid-assessment-report-7-november-2022 for an example
[83] KII
[84] KII

- OCHA has a strong preference for working with UNOSAT rather than Copernicus EMS, with which it does not have the same interactive relationship.
- The interviewee thought it important that UN agencies use just one emergency mapping service per activation. They cited the example of some confusion when WFP uses Copernicus EMS and OCHA uses UNOSAT when working together on an emergency. OCHA cedes its control to WFP in the areas mapped by Copernicus EMS.
- The interviewee thought that efforts to avoid duplication might have gone a bit too far, citing Finding 9 as an example.
- The interviewee said that new technology will make it possible for early situational awareness to be built on a more comprehensive view of an emergency than can be seen from a satellite image, for example a map that includes wind speeds and air temperature. To remain relevant, UNOSAT should take this into account.

**Finding 27 on Copernicus EMS**

**Copernicus EMS is the only other entity offering a free disaster mapping service, but focusing on the European Union. The two EMS coordinate with each other so as not to duplicate effort through the SMCS set up by the EU and the UN, as part of GDACS. Nevertheless, coordination issues can still occur if both mapping services activate for a single emergency and if the two respective activation owners do not coordinate between themselves. This has happened between OCHA, that uses UNOSAT, and WFP, that uses Copernicus EMS. A suggestion from a Copernicus interviewee is that coordination could be improved by greater "automated" use of SMCS and correspondingly less use of "manual" emails.**

The only other entity offering a free disaster mapping service is Copernicus EMS (for the European Union). The two services try to complement and not duplicate their efforts. For example, in the 2023 Turkish and Syrian earthquake, they agreed that UNOSAT-EMS should cover Syria and Copernicus should cover Turkey, see the case on Syria and Turkey. The decision reflects Copernicus' focus on Europe with approximately 75 per cent of its mapping activations covering Europe and neighbouring countries.[85] In contrast, UNOSAT has a "global" scope. (see Annex I case study 4).

Both EMS use the Satellite Mapping and Coordination System (SMCS), within the UN Global Disaster Alert and Coordination System (GDACS) platform, to coordinate their disaster-related mapping work.[86] GDACS was established as "a cooperation framework between the United Nations, the European Commission and disaster managers worldwide to improve alerts, information exchange and coordination in the first phase after major sudden-onset disasters."[87] GDACS was established in 2014 by OCHA and UNOSAT for the UN and by the European Commission.[88] SMCS operationalizes GDACS by providing "a communication and coordination platform where organisations may monitor and inform stakeholders of their completed, current and future mapping activities for ongoing emergencies."[89]

In terms of sourcing satellite imagery, Copernicus EMS leverages private sector consortia that have contracts to provide analysis and mapping services, paid for by the EU. UNOSAT draws much more from the International Charter on Space and Major Disasters. Both services are also exploring uses of AI to accelerate image analysis.

[85] KII
[86] KII
[87] https://gdacs.org/
[88] https://www.gdacs.org/Documents/GDACS%20Guidelines%202014_-_FINAL.PDF
[89] https://smcs.unosat.org/home

An interviewee made suggestions about how coordination and information sharing between UNOSAT and Copernicus EMS could be improved. These revolved around making SMCS the primary platform for real-time information sharing and automating coordination on one hand and reducing the use of emails and "manual" efforts at coordinating on the other hand.

One interviewee praised UNOSAT for its efforts to better coordinate with Copernicus EMS. She said that it used to be the case that there would be multiple analyses of the same imagery for the same area causing confusion. SMCS has helped resolve this, however, now the problem is that if there are two activations it means in practice that there are two organizations trying to coordinate for different areas affected by the same disaster. This has happened between OCHA and WFP. One of the respondents to the online survey independently confirmed this can cause confusion.

### EQ3.8: To what extent is the project's monitoring and self-evaluation effective in assessing user-based real-time impact (see recommendation from previous independent evaluation) and updating indicators and targets for outcome and impact?)

**Finding 28 that the project's M&E system is fit for purpose and does not need to do more to establish that UNOSAT-EMS products are useful and valued in both the humanitarian and peace, justice and human rights arenas.**

The previous independent evaluation recommended that the UNOSAT-EMS engage in user-based real-time impact assessment based on UN-ASIGN. This has not happened, see Finding 18. In light of Finding 33 that the project has near-immediate impact with bespoke outputs that quickly become obsolete and Finding 35 on the possibility and desirability in attributing significant decisions made during disasters to UNOSAT-EMS **products**, this evaluation finds that the project's current M&E system is fit for purpose. EMS' products are always inputs into decision-making processes in which many other factors are considered. It is not practically possible and may even be counterproductive for the part of the project working on peace, justice and human rights, to say to what extent UNOSAT-EMS products made a difference. It is enough that users say they were useful and played a role, which they do and which the M&E system captures and reports on.

The project set itself targets and indicators in the Project Document, which have been reviewed in the first annual progress report, see Finding 15 on project achievements and factors affecting project performance. The project conducts periodic on-line feedback surveys and presents M&E findings during annual meetings with the donor.

## EQ4. Efficiency: To what extent has the project delivered its results in a cost-effective manner and optimized partnerships?

### EQ4.1: To what extent have outputs been produced in a cost-efficient manner (e.g., in comparison with alternative approaches)?

**Finding 29 on the UNOSAT-EMS' cost-effectiveness**

**The UNOSAT-EMS is likely very cost-effective compared to its only analogue, Copernicus EMS. The cost per request has increased by 10 per cent in the year 2022 to**

**2023 compared to 2020 to 2021, which is in line with inflation. The number of activations has increased from 34 in 2017 to 50 in 2022 - 2023, an increase of almost 50 per cent. Workload is likely to have increased even more because much of the UNOSAT-EMS' human rights work is not covered by public activation processes, due to the need for confidentiality, see Finding 37.**

For the year 2020 to 2021, the cost to the UNOSAT-EMS of responding to a request was US$ 5000. This is calculated by dividing the budget received from NFMA (US$ 1.11 million) by the number of requests in that year (222). For the first year of the current project cycle, 2022 to 2023, the cost per request was $5520 ($1.38 million annual budget divided by 250 requests). This is almost the same when inflation is factored in. On average, for 2022 to 2023, each activation produced 5 requests and each request generated 1.8 products.

The previous independent evaluation of the UNOSAT-EMS calculated that the cost per activation at $11,900 for 2016 - 2017, simply by dividing the funding received from NMFA by the number of activations carried out that year (August to July). Using the same calculation, the cost per activation for the year 2022 to 2013 is $19,400, representing a two-thirds increase over five years. The previous evaluation estimated the cost of a Copernicus EMS activation at $138,000, more than ten times the EMS' price. It is likely that Copernicus EMS costs have also increased in the last five years as has the overall budget of the EU Space Programme[90] of which Copernicus is part of, meaning that it is probable that the cost per Copernicus EMS activation in 2023 remains an order of magnitude more expensive than the EMS. Copernicus EMS is the EMS' only competition, funded by the EU. Both EMS provide their services free of charge.

### EQ4.2: Were the project's resources (human and financial) used as planned and fully utilised?

#### Finding 30 on use of project human and financial resources

**The project is using its human and financial resources as planned, with the proviso that planning is difficult because of the unpredictability of what and when requests will be made. Funding and human resources are being stretched, in part because of an increasing number of requests being received by the project. Project spending is on track, with one third of the budget spent in the first of three years of operation.**

As of July 2022, UNOSAT was providing mapping services to 20 projects, one of which is the NMFA-funded EMS project with an annual budget of $1.4 million. The other 19 projects were funded by other donors / clients, with an average annual budget of $156,000 per project, adding up to $ 3.22 million for year August 2022 to July 2023. Ten of the 19 projects were funded by Impact Initiatives. This is to pay for UNOSAT to carry out analysis to go into the large number of publications produced by REACH ever year to inform the humanitarian sector. These projects are for relatively small amounts of money – on average just $33,000 – for periods of time as short as 14 days. Two other projects made use of mapping activation case studies for teaching University students.

According to the REACH website, "REACH is a leading humanitarian initiative providing granular data, timely information and in-depth analysis from contexts of crisis, disaster and displacement." The work of REACH directly feeds into decision-making and aid response by

[90] Special Report No 07/2021: EU space programmes Galileo and Copernicus (europa.eu)

providing accessible and precise information on the humanitarian situation of crisis-affected populations. REACH was created in 2010 as a joint initiative of IMPACT Initiatives, ACTED and the United Nations Operational Satellite Applications Programme (UNOSAT). It was formed in by the Director of ACTED as the result of violent ethnic tensions in Kyrgyzstan. The Director of ACTED saw the potential of using satellite images to show the burning of houses as a quick way to estimate the scale of the conflict, which was very useful for ACTED's work, while at the same time it was beneficial to UNOSAT to have on-the-ground verification of their analysis of satellite data. This led to the creation of REACH which continued with this mutually beneficial relationship in subsequent emergencies, specifically in Sudan and then in Syria (see Annex I case study 4). Since 2010, REACH has produced more than 10,000 publications for more than 30 countries. The publications include annual plans based on a needs overview for every crisis, which in turn contribute to response plans that put a cost on what needs to be done. UNOSAT products and analysis are included in these documents, combined with REACH's on-the-ground validation, to strengthen the advocacy case for the humanitarian sector to respond at an appropriate scale.

REACH plays an important role in securing funding for UNOSAT, through IMPACT Initiatives. "IMPACT Initiatives is a leading Geneva-based think-and-do tank which aims to improve the impact of humanitarian, stabilisation and development action through data, partnerships and capacity building programmes. The work of IMPACT is done through its three initiatives: REACH, AGORA and PANDA.

Additional funding mobilized by UNOSAT mapping services can be classified into four types of which two (spin-off and co-funding) are directly related to the UNOSAT-EMS. Related side projects include mainly the REACH and Impact Initiatives projects as well as two other projects related to the identification and acquisition of investigation-related satellite imagery as well as satellite imagery-based analysis in support of investigations and prosecution of violations of international humanitarian law and human rights and enhancing the capacity of OHCHR to perform remote monitoring and investigation with dedicated satellite imagery analysis.

Table 4 -Type of funding leveraged by having the EMS as part of UNOSAT

| Type of funding secured | Description | Amount in USD | Percentage |
|---|---|---|---|
| Spin-off | Started with mapping service and resulted in new project | 70,000 | 2% |
| Co-funding | Used some funding from mapping and some funding from other donor | 950,750 | 29% |
| Related side projects | Independent similar mapping projects not started with the UNOSAT-EMS, although the partnership initiation benefited for the recognition of the quality of UNOSAT's work that the UNOSAT-EMS gives | 2,195,960 | 67% |
| Using UNOSAT-EMS products to add value | For example, the use of mapping examples for master's degree module | 52,630 | 2% |
| **TOTAL** | | 3,269,340 | 100% |

It can be argued that UNOSAT has only been able to win and implement the 19 projects because of the capacity and reputation of the UNOSAT-EMS project and its flexible NMFA funding.

Currently around 60 staff work for UNOSAT, with 10 to 20people comprising the UNOSAT-EMS team.[91] Staff move between the large number of projects and activations that UNOSAT

[91] KII

manages. UNOSAT-EMS staff who took part in the AAR identified staffing as an area that was not working as well as it should. They flagged that UNOSAT-EMS analysts were being asked to work long hours on a 'multitude' of activations at the same time. Difficulties in retaining staff threatens consistency and capacity, which affects clients who prefer to work with the same analyst from one activation to the next.[92] One respondent said that UNOSAT contracting rates are not competitive[93] while another said there were issues relating to the nature of UNOSAT contracts and Swiss law.[94] Another respondent made the point that providing a career structure can help retain mapping staff.[95]

Despite the issues raised, UNOSAT-EMS staff in the AAR (see Annex IX) highlighted responding to an increasing number of requests as something that is going well. This is despite the project receiving less funding than it requested from the NMFA. The trade-off is cuts to funding to pursue the project's outcome 3 and outcome 4 (see Finding 31).

### EQ4.3: Were the objectives achieved on time so far and was the UNOSAT-EMS delivered in a timely manner in emergency situations?

**Finding 31 on project performance with respect to targets and timeliness**

**The project's first annual report[96] indicates that it has surpassed all its first-year targets for achieving its four outcomes identified in its theory of change, see Figure 2 and Finding 15 on project achievements and factors affecting project performance. Targets for Outcomes 3 and 4 are modest, see Finding 20 and Finding 37. Most respondents to an online survey though that UNOSAT-EMS products were on time - see Finding 3 for more details.**

### EQ4.4: To what extent have the mapping initiatives contributed to better humanitarian assistance in the long term?

**Finding 32 on the extent to which the mapping initiatives have and will contribute to better humanitarian assistance in the long term**

**UNOSAT's EMS and Copernicus EMS' main contribution is to produce short-term impacts as described in Finding 33 that the project has near-immediate impact with bespoke outputs that quickly become obsolete . Both mapping services will contribute to better humanitarian assistance in the long term if requests for their products increase over time and their quality, relevance and timeliness stay the same or improve. Their long-term impact will be increased by capacity development carried out elsewhere, e.g., as part of the NORAD-funded project described under Finding 13.**

Online survey findings (see Finding 3 on relevance of UNOSAT-EMS products) suggest that with every activation, the UNOSAT-EMS generates timely, relevant, and high-quality geospatial analysis that contributes to better situational awareness and as a result better humanitarian assistance. As one OCHA interviewee said, OCHA's situation assessments would be worse at many levels without the UNOSAT-EMS' products (see Finding 26 on

[92] KII
[93] KII
[94] KII
[95] KII
[96] 20231009_NMFA Year 1 Report Final.pdf

OCHA). Requests for UNOSAT-EMS products are increasing. If these requests continue to increase, and if UNOSAT-EMS product quality, relevance and timeliness stay the same or improve, the UNOSAT-EMS will continue to contribute to better humanitarian assistance over time.

It is reasonable to expect that capacity development of the people who make requests of the UNOSAT-EMS, and then use the resulting products to inform decision-making, will contribute to better humanitarian and peace, justice, and human rights assistance in the long term. Such capacity development is being carried out as part of the NORAD-funded project described under Finding 13. The capacity development provided by the EMS is largely in the form of 'learning by doing.'

# EQ5. Likelihood of Impact: What are the potential cumulative and/or long-term effects expected from the project, including contribution towards the intended impact, positive or negative impacts, or intended or unintended changes?

## EQ5.1: What is the likelihood of UNOSAT-EMS impact?

**Finding 33 that the project has near-immediate impact with bespoke outputs that quickly become obsolete and as such the standard project theory of change does not apply for Outcome 1 in particular**

**The standard theory of change that describes how most projects contribute to impact does not fit the core business of the UNOSAT-EMS. The UNOSAT-EMS has impact within days, not years, depending upon the extent to which its situational analysis outputs influence life or death decisions made by disaster managers in the first phase of a disaster.**

This question presupposes that the UNOSAT-EMS project is like most other projects that develop products that are adopted by intended beneficiaries who then derive benefit from their use. In this standard theory of change, the benefits increase over time as the level of use and number of users increase. If the project is successful, then its products will be 'scaled up' by introducing them in other areas. Impact – how the status quo reacts to the growing use of the product – typically takes years to play out.

This generic project theory of change does not work for the core purpose of the UNOSAT-EMS project, which is to provide high quality, relevant and near-real-time situation analysis during the first phase of an emergency. This part of the project relates to the first two outcomes in the project's logical framework, which are aimed at bringing emergency situations back to normal, not to change the status quo. The UNOSAT-EMS' products guide the taking of almost immediate decisions made by disaster managers as the emergency unfolds. These decisions, such as evacuation orders based on flood information, can save many lives in hours and days. The UNOSAT-EMS' outputs are extremely time bound; they become obsolete as flood levels fall and the recovery begins. The UNOSAT-EMS is contributing to near-immediate impact when its products influence the taking of life-saving decisions during an emergency response. This is in stark contrast to normal projects that take years to achieve impact.

An OCHA interviewee[97] agreed with this perspective:

> "Short-term outcomes that save lives can and should be seen as a valuable outcome in and of itself. In our system with the SDGs and our leadership, we constantly feel we have to justify them as some bigger thing when actually saving lives and alleviating suffering is an incredibly important thing to do, and it is one of the things that we do relatively well as the UN system."

**Finding 34: UNOSAT-EMS has likely had indirect impact through strengthening the UN and national emergency response systems through 'learning by doing' with the many users of its products. This evaluation did not look very deeply into UNOSAT-EMS' capacity development contributions because capacity development is not part of the project's theory of change. Perhaps it should be.**

**Finding 35 on the possibility and desirability in attributing significant decisions made during disasters to UNOSAT-EMS products**

**Despite their usefulness and high regard, it has proven very difficult for this evaluation to directly attribute UNOSAT-EMS products directly to life-saving decisions. This is because such decisions are taken based on multiple pieces of information. Box 3 provides examples given by interviewees of where UNOSAT-EMS products played an important role in decision-making. The phrases describing EMS contribution are underlined. The verbs are 'help', 'enable,' 'realise,' and 'guide,' strongly suggesting that UNOSAT-EMS products play an important contributary function within Emergency Response Systems. While it might be possible in some circumstances to go further to unpack exactly when and where UNOSAT-EMS products were used, and to what effect, such inquiry would take up resources that could likely be better spent responding to the emergency in the first place. It is the view of this evaluation that the UNOSAT-EMS is already doing a good enough job in documenting its contributions, see Finding 28 that the project's M&E system is fit for purpose and does not need to do more to establish that UNOSAT-EMS products are useful and valued in both the humanitarian and peace, justice and human rights arenas**.

### Box 4: Examples of UNOSAT-EMS products contributing to decision-making during emergencies

**Safe extraction of foreigners in Khartoum to their embassies (2023):** Thousands of foreign nationals, including two UNOSAT staff, were caught up in the outbreak of violence in Khartoum. UNOSAT self-activated to monitor where fighting was taking place to help with the safe extraction of their staff from a hotel to the French Embassy. Similar support was extended to other embassies, including Norway. Simultaneously, UN colleagues in Sudan sought information on the conflict's developments, airport damage, and other factors. UN Headquarters in New York, through the UNOCC, engaged in *enhanced monitoring* utilizing UNOSAT's products for reporting and disseminating information across the UN system. Subsequent activations witnessed UNOSAT sharing over 20 geospatial-derived products, including security and damage assessments, in response to requests for support from entities such as the Arab Bank for Economic Development in Africa (BADEA), headquartered in Khartoum.

**Pakistan Floods (2022)**: The frequent nationwide flood extent maps enabled tracking of impacted areas to guide response priorities and planning.[98] The flood analysis informed key

[97] KII
[98] KII

meetings, response plans and advocacy efforts by OCHA and government disaster authorities.

**Mozambique Cyclone Idai (2019)**: Initial UNOSAT analysis revealed the scale of flooding, which was not possible to identify on the ground because of power cuts and damage to roads. The early satellite imagery allowed OCHA to realise early that the situation was unique, thus helping OCHA to identify the level of response needed, which in turn supported OCHA's flash appeal to mobilize resources.[99] EMS products can also be used for advocacy. What OCHA often does is combine UNOSAT imagery with an aerial physical assessment where someone has carried out a reconnaissance.

**A complex emergency in South Sudan:** UNOSAT worked with OCHA to identify damage to houses during an outbreak of ethnic violence. This helped OCHA to understand and gain hard evidence of was happening which informed their assessment response, which involved sending teams out to where satellite images had identified damage.

**Sudan dam placement:** Analysis of potential dam flooding by UNOSAT guided decisions by UNICEF on dam placement to avoid increasing community risks.[100]

**Sudan flash flooding:** UNOSAT provided analysis on the extent of the flooding and the estimated number of people potentially affected with 24 hours. The information helped plan the humanitarian response with partners.[101]

**Flooding in Thailand (2021):** UNOSAT flood maps shared with Thai agencies helped counter misleading media narratives and address embassy questions on actual situation.[102] Moreover, the flood extent maps, exposure statistics, and dashboard helped humanitarian and government agencies plan their emergency response and to target aid more effectively. The humanitarian and government agencies found the daily updates particularly useful allowing them to monitor the trend of flood evolution and to prepare for its impact as well as identifying areas requiring humanitarian assistance. The provincial government used satellite analysis from UNOSAT received from the UNRCO to map agricultural damage for forecast and preparedness for farmer compensation and loss of agricultural production during the harvest season (July - October). The daily updates also helped to compare the evolution of the floodings with the 2010 flooding, to understand better the scope of the response that would be needed (request from UNRCO and other UN agencies). Furthermore, the evidence-based flooding scenarios, created and based on the UNOSAT figures, rectified any misinformation about the extent of the floods that was being disseminated by the media. As a great example of a joint undertaking between a national agency, GISTDA and UNOSAT performed comprehensive analyses of the situation, which were forwarded to the responsible national agencies and line ministries involved in the disaster response. These joint analyses were also posted on GISTDA's website.

**OCHA's response to typhoons in the Philippines:** The Philippines is hit by 18 to 20 typhoons a year, making it one of the most frequently and severely affected countries in the world.[103] For remote islands that are inaccessible after a typhoon, satellite imagery from UNOSAT provides the only damage information available initially. This helps OCHA make an initial assessment of the potential severity of impacts and needs in those locations. At the same time, the EMS' flood maps help OCHA identify the worst-affected communities and

[99] KII
[100] KII
[101] KII
[102] KII
[103] WorldData.info

infrastructure. OCHA makes this information available in a Consolidated Rapid Assessment Report, published on reliefweb.int within a week of the typhoon's landfall. This focuses response efforts on the highest priority areas in the aftermath of a typhoon. The satellite imagery supplements and corroborates the ground-level data collected by OCHA assessment teams.

**Syria-Turkey earthquake 2023:** OCHA, who played a key role in consolidating information, highlighting priority needs, mobilizing resources, and coordinating the emergency response across Turkey and Syria after the devastating earthquakes, relied on various sources of information, including UNOSAT's emergency mapping service to analyze humanitarian impacts and guide relief efforts. According to the interviewees UNOSAT's products were essential for humanitarian responses. They highlighted the importance of this information for their internal analysis considering that in the case of some regions including Turkey and Syria, their personnel did not have the capacity to do the analysis on their own. For OCHA to assess priority needs in north-west Syria, the source of information used was REACH Rapid Assessment..[104] This report was based on UNOSAT's information, however, since REACH is a joined initiative between IMPACT Initiatives and UNOSAT, the UNOSAT logo or reference was not included.

**Finding 36 on the potential impact of the UNOSAT-EMS' work to explore and adopt innovative ways of speeding up the analysis of satellite imagery**

**The potential for AI models to speed up the analysis of satellite imagery is large. The project has exceeded the expected use of Flood AI in the first year of the current cycle. Nevertheless, there is an apparent reduction in research to develop and adopt other AI models, see Finding 20. This may be of concern to the donor which prioritizes innovation in its humanitarian strategy. It might be helpful for the UNOSAT-EMS to develop a research strategy to better engage with private sector partners, see Finding 21.**

The generic project theory of change applies for the UNOSAT-EMS' third outcome which is the increased exploration and adoption of innovative approaches and methodologies, in particular related to AI. However, as described under Finding 20 on an apparent reduced level of activity related to new technology in the current project cycle, the increased number of requests being processed by the UNOSAT-EMS has drawn funding away from developing AI models that can automate and speed up the analysis of satellite images. Working on innovation that increases productivity is a core principle of the donor's humanitarian strategy, see

**Finding 8 on UNOSAT-EMS alignment with the Norwegian Humanitarian Strategy.**

Accurate AI models could greatly increase the number of requests that the UNOSAT-EMS is able to process. The project could perhaps do more in partnership with the private sector, with Google and NVIDIA, with which it has signed MOUs. UNOSAT's counterpart contribution could be its unique data sets to be used to train AI models.

**Finding 37 on progress made to enhance awareness of the value of satellite imagery**

**There is agreement among several interviewees that the EMS is not as well known or visible as it should be, given the quality, timeliness, and relevance of its outputs. This is particularly so with the UNOSAT-EMS' work in complex emergencies where**

[104] https://repository.impact-initiatives.org/document/reach/4a432aaf/REACH_NWS-NGO-Forum_Earthquake_RNA_Situation-Overview_15-February-2023.pdf

**confidentiality is required. Too much awareness may lead to too many requests, threatening the UNOSAT-EMS' currently very good reputation. The awareness outcome indicators seem ill-matched to purported ambition. More could be done to request that UNOSAT-EMS and other UNOSAT mapping projects, such as REACH, products are referenced in the reports to which they contribute. Two of the main users of UNOSAT mapping products, including the UNOSAT-EMS- generally do not acknowledge the use of these products.**

The UNOSAT-EMS' fourth logical framework outcome – to enhance awareness of the value of satellite imagery - contributes to amplifying the first outcome – to enhance evidence-based decision making based on the analysis of satellite images.

At least five interviewees[105] said that the UNOSAT-EMS is not as well known or visible as it should be given the usefulness of its work. This is despite strong appreciation for the value and quality of the UNOSAT-EMS among those who regularly use its outputs. Interviewees highlighted lower awareness among some UN agencies about the UNOSAT-EMS' applicability in complex emergencies compared to natural disasters.[106] As the backbone of UNOSAT, the EMS has contributed to UNOSAT's strong reputation built up over its 20 or so years of operation.

Project success to better publicize its work resulting in more requests carries with it the risk that the UNOSAT-EMS may become overloaded, with quality and timeliness suffering as a consequence. This is one of several vulnerabilities faced by the project, that is dealt with under Finding 41.

Outcome 4 targets are set at modest levels. The yearly visits to the UNOSAT website are set to increase by 5 per cent per year from year 1 levels. The average number of views of products published on the UNOSAT website are 75 in year 2 and 80 in year 3. UNOSAT-EMS staff are expected to participate in just three public events in the first year, increasing to nine by year 3. UNOSAT should be mentioned by major news outlets twice per year. The three targets applicable at the end of year 1 have all been easily surpassed. From October 2022 to May 2023, according to Google Analytics 24.970 page views were registered for 8 UNOSAT mapping products. Fifty-five per cent related to tropical cyclones in Madagascar and Vanuatu, and 45 per cent related to floods in Algeria, Chad, Somalia and South Sudan.

Table 5 - Google analytics page views UNOSAT-EMS products

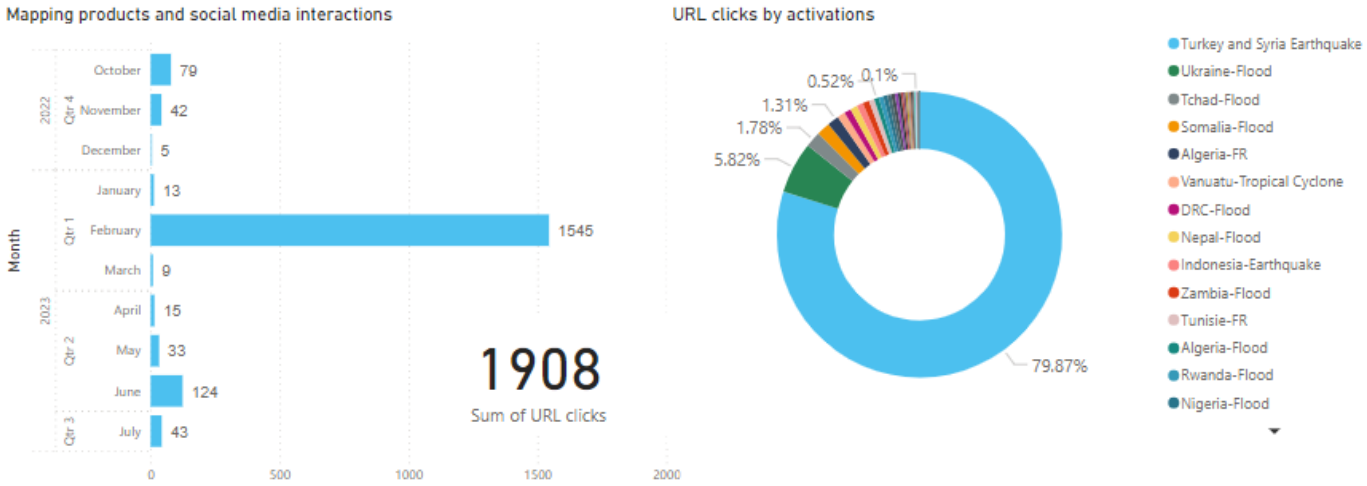
| Country | Activation | Type of event | Date | Products ID | Total Pageviews | |
|---|---|---|---|---|---|---|
| **Algeria** | **FL20230526DZA** | Floods | May 2023 | 1 | 1593 | 6.38% |
| **Chad** | **FL20221019TCD** | Floods | Nov 2022 | 1 | 2918 | 11.69% |
| **Madagascar** | **TC20230221MDG** | Tropical Cyclone | Feb 2023 | 1 | 3759 | 15.05% |
| **Somalia** | **FL20230327SOM** | Floods | May 2023 | 1 | 3186 | 12.76% |
| **South Sudan** | **FL20220424SSD** | Floods | Oct 2022 | 1 | 3555 | 14.24% |
| **Vanuatu** | **TC20230227VUT** | Tropical Cyclone | Mar 2023 | 3 | 9959 | 39.88% |
| **Total** | | | | **8** | **24970** | |

Regarding the social media interactions of UNOSAT-EMS, on average for each link published 13 clicks were registered. The mapping products that caught most attention were those related

[105] KII
[106] KII

to the Turkey and Syria earthquake registered in the first quarter of 2023, which led the evaluation to choose it as a case study. Over 20 links were published obtaining a total of 1,545 clicks which represents around 80 per cent of the total clicks in the period of analysis.

Figure 8 - UNOSAT-EMS products and social media interactions




It is not clear that the indicators are useful proxies for the change the UNOSAT-EMS purports to achieve, which is a significant increase in the project's visibility to potential donors or staff working in disaster management systems likely to make request for project services.

One area where visibility of the UNOSAT-EMS can be improved is through better referencing of EMS products in the situational reports that use them. This was identified as an issue in the Syria case where OCHA, by far and away the largest requestor of UNOSAT-EMS products, issued more than 25 situation reports from February to November 2023 (see Annex I case study 4). It is hard to find any reference made to UNOSAT in any of these reports though UNOSAT is being recognized in OCHA Twitter posts (see Annex I case study 1). REACH, collaborating and using UNOSAT's mapping services as part of a side project, only mentioned UNOSAT as a member of the REACH consortium (see Annex I case study 4).

### EQ5.2: To what extent has the UNOSAT-EMS initiated a real difference to the partners' work and improved humanitarian assistance and protection of human rights and to the end beneficiaries? Have there been any unintended positive or negative benefits? Have there been any cumulative effects?

**Finding 38 on the extent to which the UNOSAT-EMS has made a real difference to its partners' work**

**While definitively quantifying impact is challenging, qualitative evidence indicates clear added value of UNOSAT analysis in strengthening partners' humanitarian response and protecting human rights. The analysis provides data and otherwise unavailable visibility of events taking place on the ground, guiding critical, and sometimes lifesaving decisions in the context of disasters and in complex emergencies.**

The UNOSAT-EMS has made an important difference to its partners' work in humanitarian assistance:

- The report shows that mapping products have enabled partners like OCHA and UNHCR to gain timely situational awareness and evidence to inform coordination, planning, and advocacy in emergency situations.
- Multiple examples are provided of how partners have used the maps and analysis to guide key decisions around prioritizing response, placing infrastructure, estimating needs for appeals, deciding on farmer compensation, etc. Phrases like "enabled tracking", "helped realize", and "guided decisions" indicate the analysis contributed significantly.
- While attribution is difficult due to many factors influencing decisions, partners affirm that outcomes would often be "worse" without the UNOSAT inputs that provide unique, early visibility.
- The iterative mapping process and tailoring of outputs to partners' specific needs makes the products more relevant and actionable in partners' existing response workflows.
- The UNOSAT-EMS, which has been running since 2003, has generated a lot of data that can help its research and development partners to train AI models able to automate aspects of satellite analysis.

**Finding 39 on unintended consequences**

**There is no clear evidence found by the evaluation of major unintended consequences - either positive or negative - for the UNOSAT-EMS' partners thus far, thanks in part to the fact that the EMS' products are developed to meet requestors' needs which likely reduces the chance of unintended affects.**

Based on what this evaluation could find, there is no clear evidence of major unintended positive or negative benefits for partners working with the UNOSAT-EMS. There are a few points worth noting:

- The products and analysis are designed to directly respond to partners' specified needs and requests during emergencies. This tailored approach likely reduces the chance of unintended effects.
- Coordination through GDACS helps avoid potential duplication of mapping efforts, which could otherwise cause confusion for partners. This suggests an unintended positive benefit, to a certain point, see Finding 27 on Copernicus EMS.
- There is a reputational risk if UNOSAT fails to keep up with user demands, hurting partner perceptions and future collaboration. However, no evidence is presented that this has occurred yet.
- Better referencing of the UNOSAT-EMS' products in partners' public reports could improve awareness but may also increase demands on the Service beyond its capacity.
- The discreet nature of sensitive analysis in complex humanitarian contexts makes unintended effects hard to identify by outside evaluators.

**Finding 39 on cumulative effects**

**The UNOSAT-EMS has not contributed much to cumulative effects, in part because of the nature of its products to become obsolete.**

The evaluation finds no clear evidence of cumulative effects, in part because mapping products are timebound and become obsolete as disaster situations evolve. This dynamic does not lend itself to building cumulative effects of time, see Finding 33 that the project has near-immediate impact with bespoke outputs that quickly become obsolete  However, the

credibility and partnerships built through repeated delivery of valued mapping products has had some benefits in terms of trust, goodwill and, 'learning by doing.'[107] Capacity building of national agency staff, for example as part of the NORAD project, can enhance partners' autonomous use of geospatial data, however this is not part of the UNOSAT-EMS project.

# EQ6. Likelihood of Sustainability: To what extent are the project's results likely to be sustained in the long term? How is environmental sustainability addressed in the project?

## EQ6.1: To what extent are the project's results likely to endure beyond the implementation of the activities in the mid- to long-term and under which conditions?

**Finding 40 on likelihood that the UNOSAT-EMS will continue providing it outputs in the mid- or long-term**

**For the project to continue to deliver Outcomes 1 & 2 will require flexible funding higher than the current budget provided by NMFA of $1.4 million per year. The niche that the UNOSAT-EMS has found for itself is so important to the UN that if the UNOSAT's EMS were to fail, the UN would need to find a replacement. A high-ranking Norwegian stakeholder[108] described the UNOSAT-EMS as a 'common good' for the UN, indicating NMFA holds the project in high esteem.**

## EQ6.2: What are likely to be the major factors which influenced the achievement or non-achievement of sustainability of the mapping initiatives?

**Finding 41 on project vulnerabilities**

**The UNOSAT-EMS has two vulnerabilities: 1) that only one donor, NMFA, is funding the project; and 2) a reputational risk if demand for mapping services outstrips analysts' capacity to meet it, leading to disappointed potential clients or a reduction in product relevance, quality and timeliness, or both.**

In the current project cycle (2022 to 2025) the UNOSAT-EMS is funded by the Norwegian Ministry of Foreign Affairs, as it was in the previous phase (2019 to 2021). Before that the project was funded by NORAD. The previous independent evaluation of the Service identified the over reliance on a single donor – Norway – as a threat to the sustainability of the Service.[109]

NMFA is asking that the project bring in other donors. The project has approached Switzerland, Denmark, Qatar and Germany, so far without success. An interviewee said they thought the UNOSAT-EMS finds it hard to compete for humanitarian funding with organizations that work directly with those affected by disasters.[110]

An OCHA interviewee suggested that UNOSAT-EMS funding could be included in OCHA's flash appeals to respond to a disaster, to reimburse the project for work it had already done. A project representative said that this had been attempted in the past and found it to be

[107] KII
[108] KII
[109] https://unitar.org/sites/default/files/media/file/independent_evaluation_of_unosat_rapid_mapping_service_final_report.pdf, p. 13
[110] KII

unreliable.[111] They also said that it was important for the EMS to have its own budget to work with OCHA and other clients as partners rather than hired help.

A number of ideas as to how to better secure and increase UNOSAT-EMS funding are listed under Recommendation 2.

With respect to reputational risk, the user survey and interviews carried out for this evaluation show that the UNOSAT-EMS is held in high regard in terms of the relevance and timeliness in response to requests. The number of requests has increased by 13 per cent from 2021 to 2023. So far, the project has adjusted by deprioritizing research and development (outcome 3, see Finding 20). This will only work for so long before quality or timeliness fall. Another threat is the increasing difficulty in hiring and retaining good geospatial analysts.

# Conclusions

All conclusions apply to both UNOSAT-EMS workstreams.

## Relevance

**Conclusion 1: The project is helping both its own partners and its host organisation – UNITAR – to support Member States to implement the 2030 Agenda for Sustainable Development through providing highly relevant and bespoke products.**

The UNOSAT-EMS is helping UNITAR to help member states achieve the Sustainable Development Goals 1, 13, 11, 16 & 17. At the same time, the UNOSAT-EMS is supporting UNITAR's strategic objectives in the areas of peace, planet and prosperity. By iteratively carrying out spatial analysis requested by partners responding to humanitarian and complex emergencies, the UNOSAT-EMS ensures that its products are relevant to its partners. A survey found that the UNOSAT-EMS' products were seen by users as relevant, of good quality, and timely.

*Finding 1 on the UNOSAT-EMS' contribution to helping Member State's implement the 2030* Agenda for Sustainable Development
*Finding 2 on the UNOSAT-EMS' support to UNITAR's strategic objectives*
*Finding 3 on relevance of UNOSAT-EMS products*

**Conclusion 2: The project was not designed nor is being implemented according to an explicit human-rights-based, disabilities or gender mainstreaming strategy but rather as per the Humanitarian Programme Cycle. Nevertheless, the UNOSAT-EMS is relevant to supporting people made vulnerable by emergencies, including women and children. It is also relevant to countries in special situations.**

While the UNOSAT-EMS cannot directly assess gender from satellite imagery, its products can help users estimate the extent to which already vulnerable people, including women and marginalized groups, have been affected by humanitarian and complex crises, enabling them to plan relief efforts accordingly. Nearly 90 per cent of survey respondents said that UNOSAT mapping products and services contributed to improving assistance and support for these vulnerable groups. While the UNOSAT-EMS does not have an explicit gender strategy, it could benefit from reviewing the gender dimensions of disaster risk and resilience as well as human rights and gender-related concerns in situations of conflict and instability and strategize regarding its application This engagement could help strengthen the EMS' approach to

[111] KII

gender-sensitive humanitarian assistance and support and continue to attract female analysts and other staff.

The UNOSAT-EMS is most useful for poorer countries that do not have their own space fairing capacity, many of which are countries in special situations.

*Finding 4 on GEEW*
*Finding 19: The project does not currently incorporate GEEW strategy in the design and implementation of the project*, see Finding 4.

**Conclusion 3: The UNOSAT-EMS was found to follow environmental principles and operates in environmentally sustainable ways without being designed to do so, to the extent that it received a GEO Award in November 2022 in recognition of its use of Earth observations to support sustainable development.**

The UNOSAT-EMS project was given the GEO Participating Organization Award at GEO Week 2022 in November in recognition of the productivity, innovation, novelty, and exemplary efforts in the use of Earth observations to support sustainable development. The project operates in several environmentally friendly ways including the use of existing satellites rather than special flights made by aeroplanes or drones to obtain geospatial data. While the EMS is not explicitly designed according to any environmental framework, it does align with six out of twelve Blue Marble operating principles.

*Finding 5 on environmental frameworks*
*Finding 17 on environmental-sustainability and -friendliness*

## Coherence

**Conclusion 4: The EMS is particularly useful to the entities it is embedded in – UNOSAT and UNITAR; its closest user - OCHA; and its donor – NMFA.**

The UNOSAT-EMS is a valuable tool for both UNOSAT and UNITAR. It helps build recognition for UNOSAT mapping services with an estimated return of $1.4 for every $1 spent. The UNOSAT-EMS provides a specialized service that client organizations are not able to do themselves. It is particularly complementary to OCHA.

The UNOSAT-EMS aligns well with the Norwegian Humanitarian Strategy by contributing to the protection of civilians. The Norwegian Ministry of Foreign Affairs takes high-level government visitors to the UNOSAT Operations Room in Geneva to show how Norway's Strategic Partnership Model is working in practice.

Finding 6 on if and how the UNOSAT-EMS complements UNITAR and UNOSAT
Finding 8 on UNOSAT-EMS alignment with the Norwegian Humanitarian Strategy

**Conclusion 5: The UNOSAT-EMS has established itself in a key role at the centre of the UN emergency response system, especially for disaster response, one that will be difficult to replicate or replace.**

UNOSAT has established a niche for itself in the UN emergency disaster response system, particularly for disaster response, by providing a comprehensive service that starts with an activation request and ends with sharing its products through a distribution list, SMCS and the HDX. The iterative process, which relies on long-established relationships, makes the UNOSAT-EMS difficult to replicate or replace. The UNOSAT-EMS is highly respected, trusted and valued among other members of the UN emergency response system.

*Finding 9 on the UNOSAT-EMS' support to the UN's emergency response system.*

**Conclusion 6: UNOSAT establish MOUs as a way of developing their relationships with various organizations, to provide better emergency response. Some are renewed while some not, reflecting the ebb and flow of relationships over time.**

UNOSAT has current MOUs with 14 organisations of which about half are within the UN emergency response system. UNOSAT also has partnerships with two large multinational companies – Google and NVIDIA, and with Wuhan University, to explore the use of technology, in particular AI, to enhance earth observation and disaster response. UNOSAT also has MOUs with governments in several countries, including Pacific Island states and Lao PDR, where offices were established. A standing MOU is not a requirement for an organization to activate and receive support from UNOSAT-EMS

*Finding 12 on UNOSAT's use of MOUs with its partners to help the UNOSAT-EMS complement and foster synergies*

## Effectiveness

**Conclusion 7: The UNOSAT-EMS is performing ahead of expectations, using resources as planned. However, three interacting factors threaten achievement of its overall targets: loss of funding, difficulty to hire and retain good analysts, and reputational risk if demand for mapping services outstrips supply and quality suffers.**

The project is providing high quality and timely information to inform decision-making in situations of natural disasters and conflict. It has achieved or surpassed all its first-year targets. The project is on track to achieve its output and outcome targets, however, there are three factors that could threaten project performance: loss of funding, shortage of analysts, and lack of capacity to respond to increasing numbers of requests.

*Finding 15 on project achievements and factors affecting project performance.*
*Finding 16 that the UNOSAT-EMS is providing high quality and timely information to inform decision-making in situations of natural disasters and conflict.*
*Finding 30 on use of project human and financial resources*
*Finding 31 on project performance with respect to targets and timeliness*

**Conclusion 8: This evaluation agrees with the level of response made by project management to the recommendations reached by the previous independent evaluation in 2018 and does not recommend any remedial action.**

The previous independent evaluation, carried out in 2018, made six recommendations, two of which were fully implemented and four were partially implemented.

*Finding 18 on the extent to which recommendations made by a previous independent evaluation have been implemented.*

**Conclusion 9: The project is using new technology to meet its goals, but it could do more and would benefit from a research strategy.**

New technology, including AI models, has the potential to significantly accelerate satellite imagery analysis carried out by the project. Despite this, the innovative new technology targets for the current UNOSAT-EMS cycle are modest compared to the previous cycle likely due to a funding cut and the project becoming more cognizant of the shortcomings of AI.

*Finding 20 on an apparent reduced level of activity related to new technology in the current project cycle*
*Finding 21: On the need for the UNOSAT-EMS to have a research and development strategy*
*Finding 36 on the potential impact of the UNOSAT-EMS' work to explore and adopt innovative ways of speeding up the analysis of satellite imagery*

**Conclusion 10: The co-location of the UNOSAT-EMS project with ESCAP in Bangkok, with UNOCC in New York and with CERN in Geneva has brought benefits for all concerned. This structure works well.**

Benefits include the UNOSAT-EMS helping ESCAP Member States and UNOCC do their jobs by managing activations and responding to requests coming from their respective constituencies. Being based in different time zones helps with 24/7 response to activation requests made to UNOSAT. The UNOSAT-EMS has benefited from co-location at CERN through the consistency and longevity of their hosting, provision of the OpenLab as an innovation platform and excellent access to data storage and software, connectivity and technical expertise.

*Finding 22 on benefits from the UNOSAT-EMS' Asia and Pacific regional team being co-located with ESCAP in Bangkok*
*Finding 23 on the benefits of UNOSAT being co-located with UNOCC in New York*
*Finding 24 on IT benefits from UNOSAT's partnership with CERN*
*Finding 25 on CERN providing a research platform for UNOSAT*

**Conclusion 11: The UNOSAT-EMS benefits and is of benefit to a number of organizations working on disaster relief, including OCHA and Copernicus EMS.**

OCHA is the UNOSAT-EMS'' largest client, accounting for over half of all activations from August 2022 to July 2023. The EMS benefits OCHA by providing initial assessments of disaster scale to inform flash appeals; inputs into OCHA documents; and discreet access to satellite imagery and analysis for human rights activities in complex emergencies.

Copernicus EMS is another organization that offers a free disaster mapping service. The two services coordinate to maximize disaster coverage and avoid duplication of effort through the SMCS.

*Finding 26 on OCHA*
*Finding 27 on Copernicus EMS*

**Conclusion 12: The project's current M&E system is fit for purpose despite not implementing the recommendation made in the 2018 independent evaluation to adopt user-based real-time impact assessment based on UN-ASIGN.**

The M&E system effectively monitors project targets, captures user feedback. The project's products are inputs into decision-making processes in which many other factors are considered. It is practically difficult, and may be distracting, to try to attribute significant decisions made in response to disasters to UNOSAT-EMS products.

*Finding 28 that the project's M&E system is fit for purpose and does not need to do more to* establish that UNOSAT-EMS products are useful and valued in both the humanitarian and peace, justice and human rights arenas.

## Efficiency

### Conclusion 13: The UNOSAT-EMS project appears to be cost-effective and utilizing funding and human resources effectively, although some staff complain of being overloaded.

The UNOSAT-EMS' cost per request has remained relatively stable, increasing only by 10 per cent from 2020 to 2023, in line with inflation. The cost is likely to be an order of magnitude less than for Copernicus EMS, the other major emergency mapping service.

The project is using its human and financial resources as planned. It is responding to unpredictable and growing demand by asking its analysts to work on multiple activations simultaneously with some complaints about having to work too many hours. The project is attracting additional funding opportunities, see Conclusion 4.

*Finding 29 on the UNOSAT-EMS' cost-effectiveness*
*Finding 31 on project performance with respect to targets and timeliness*

## Likelihood of impact

### Conclusion 14: The UNOSAT-EMS'' primary contribution lies in generating short-term impacts, particularly in the immediate aftermath of emergencies.

The normal project theory of change, built around more and more use of project outputs, does not apply because the nature of UNOSAT-EMS products is that they quicky become obsolete. The products play an important role in informing time-critical decisions made by disaster managers during the initial response phase. While attributing direct life-saving outcomes to the UNOSAT-EMS' products is challenging due to the multifaceted nature of decision-making processes, its influence on life-or-death decisions is evident through user feedback and case studies. Rather than investing resources in further unpacking the exact timing and impact of each product, as has been emphasised in the past, see Conclusion 12, this evaluation recommends focusing resources on the immediate response and the UNOSAT-EMS' existing efforts to document its contributions.

There are certain caveats to this conclusion: the normal project theory of change applies to the UNOSAT-EMS' contribution to technology development, including the use of UNOSAT-EMS products to train AI models; and the short-term saving of lives can have long-term impact based on what the people who were saved go on to do. There is also the point that the UNOSAT-EMS has had long-term impact as a result of operating for 20 years. The latter is outside the scope of this evaluation which was asked to look primarily from the start of the current funding cycle in August 2022.

For the project to continue to produce and increase impact in the future depends on several factors including: increasing project funding; increasing product demand while maintaining product quality; and continuing documentation of Mapping Service's contributions to raise awareness of the project's work.

*Finding 32 on the extent to which the mapping initiatives have and will contribute to better humanitarian assistance in the long term*
*Finding 33 that the project has near-immediate impact with bespoke outputs that quickly become obsolete and as such the standard project theory of change does not apply for Outcome 1 in particular*
*Finding 35 on the possibility and desirability in attributing significant decisions made during disasters to UNOSAT-EMS products*

**Conclusion 15: It is reasonable to believe that through the UNOSAT-EMS' several cycles it has helped build the capacity of the UN and national emergency response systems. This was not investigated deeply in this evaluation because UNOSAT-EMS does not include capacity development in its theory of change.**

*See Finding 9 on the UNOSAT-EMS' support to the UN emergency response system*
*See Finding 32 on the extent to which the mapping initiatives have and will contribute to better humanitarian assistance in the long term.*

## Likelihood of sustainability

**Conclusion 16: The UNOSAT-EMS is not as well known or visible as it should be, despite the quality and relevance of its products. Visibility is particularly important among potential donors and potential requestors of EMS products.**

Lack of awareness of what the UNOSAT-EMS can do is particularly true for its work in complex emergencies, where confidentiality is required. There is a concern that too much awareness could lead to too many requests and overload the UNOSAT-EMS, compromising its quality and timeliness.

The project's current awareness-raising efforts, such as increasing website visits and participating in public events, are not well-aligned with the goal of increasing visibility to potential donors and disaster management staff. Additionally, there is a need for better referencing of UNOSAT-EMS products in the reports that use them.

*Finding 37 on progress made to enhance awareness of the value of satellite imagery*

**Conclusion 17: The UNOSAT-EMS has made a significant contribution to its partners' work in humanitarian assistance**

The project has done so by providing timely and relevant situational awareness and analysis. This information has helped partners to make critical decisions, prioritize response efforts, and allocate resources effectively. While it is difficult to definitively quantify the impact of the UNOSAT-EMS, qualitative evidence suggests that it has played an important role in improving humanitarian response and protecting human rights.

*Finding 38 on the extent to which the UNOSAT-EMS has made a real difference to its partners' work*

**Conclusion 18: The direct cumulative impact of the UNOSAT-EMS is limited due to the time-bound nature of its products. However, there is evidence of indirect impact as a result of 'learning by doing,' see Conclusion 15.**

Despite this, the project has built credibility and partnerships through repeated delivery of valuable products, which has fostered trust, goodwill, and a culture of "learning by doing". Additionally, capacity building initiatives, such as the NORAD project, can enhance partners' ability to utilize geospatial data independently, but these efforts fall outside the scope of the UNOSAT-EMS project.

*Finding 39 on cumulative effects*

**Conclusion 19: While relatively stable over the last 20 years the project's funding is reliant on a single donor - Norway. To better secure the project's long-term sustainability, the UNOSAT-EMS is seeking funding from other donors.**

Despite project steps to seek alternative funding from Switzerland, Denmark, Qatar and Germany, no donors have come forward. This is despite the critical niche the project fills, and its clear value to the UN emergency response system. See Recommendation 2.

*Finding 40 on likelihood that the UNOSAT-EMS will continue providing it outputs in the mid- or long-term*
*Finding 41 on project vulnerabilities*

# Recommendations

The evaluation findings led to six recommendations, all applying to both UNOSAT-EMS workstreams:

### 1. Improve project visibility and inter-agency humanitarian evaluations of responses.

The UNOSAT-EMS management team should agree with users to better reference EMS products. This also applies to other clients and users from side projects, co-funded projects and spin-offs, such as REACH's situational reports. Users can build on good practices from OCHA on referencing UNOSAT-EMS products to improve visibility of the UNOSAT-EMS. In return, UNOSAT-EMS could also be more pro-active and share products delivered by partners that are based on UNOSAT-EMS products to showcase what areas of use may consist of.

UNOSAT-EMS should consider reviving an internal UN-wide GIS publishing platform to share non-public analyses for user access and reporting. This could enable partners to better leverage UNOSAT inputs.

The UNOSAT-EMS' M&E facility should request to be part of future inter-agency humanitarian evaluations of responses to natural disasters, to use the opportunity to include questions about the use of the UNOSAT-EMS' products, in particular influence on decisions that concerned vulnerable groups (i.e. farmers, women, youth, elderly, etc.) in poorer countries. Answers to these questions should be used to inform future planning and awareness raising. Despite the confidential nature, collect more feedback data from the peace, security and human rights use of products.

### 2. Broaden the UNOSAT-EMS' funding base.

Develop a strategy to ensure sustainable funding for the UNOSAT-EMS. This could entail:

- Raising visibility on the UNOSAT-EMS as a 'public good' for the UN's emergency response system and campaign for pledged support.
- Devising creative methods for budgeting the UNOSAT-EMS' costs as part of other UNOSAT projects.
- Exploring work with private sector companies to provide free of charge AI model work while considering ethical standards and limitations. Seek funding for the UNOSAT-EMS' Outcome 3 on technology developed separately from the private/business sectors.
- Analyse the donors' appetite for supporting sub-projects (example Norad project) that have synergies with the UNOSAT-EMS.

- Looking for funding to support UNOSAT Rapid Mapping Partner Initiative. The latter's intention to help improve the way basic information is communicated through a more standardized set of data formats, as well as standardizing the different follow-up protocols used by different analytical providers, may be attractive to some donors.

## 3. On technology development

The UNOSAT-EMS management team should develop a research and development strategy that makes full use of its MOUs with NVIDIA, CERN and Google and its links to Wuhan University and the DISHA Initiative. The strategy could entail:

- Undertake a benchmarking study to analyse GIS capacities of partner organizations and define a plan on how to support institutions that intend to grow their own capacities.
- The technological developments that the UNOSAT-EMS will need to embrace to remain relevant and competitive within its niche, for example providing more integrated and complete situational awareness, while becoming faster and more accurate.
- Ways in which UNOSAT can leverage its historical data sets for use in training AI models.
- Options for products that are more interactive, such as live maps, moving away from static products unless users request those.
- The extent to which the UNOSAT-EMS should engage in AI model development, possibly in the framework of UN Global Pulse and the DISHA Initiative.

## 4. On benefiting gender and groups made vulnerable

UNOSAT-EMS should provide guidelines about further disaggregation of satellite imagery-derived products that could be reproduced by its users.

It is impossible to see gender and other affected population characteristics from space, however geospatial analysis combined with other population data, for example census data, can identify where vulnerable groups are situated and how badly they are affected. This can be used to target relief differentially, according to need. Currently, EMS users are doing this disaggregation after receiving UNOSAT-EMS products. Therefore, to maintain the "rapid" quality of the UNOSAT-EMS, UNOSAT should provide guidelines about further disaggregation of satellite imagery-derived products that could be reproduced by its users, e.g., linking damage assessments analysis with the number of affected population disaggregated by gender or sex, given the gender dimensions of disaster risk and resilience and gender-related concerns in situations of conflict and instability, number of children and older persons, etc; or type of infrastructure damaged such as schools and farming plots (disaggregated by plot size), and the intersection between these different axes. Integrating gender analysis into the mapping service is crucial to understand the differential impacts of disasters on women, men, girls and boys. For example, mapping location and the extent of the damage (homes, schools, hospitals or health infrastructures, among others and overlaying with this sex-disaggregated population data, can help to identify which groups are most affected and include the analysis in the damage assessment for a better informed humanitarian assistance. When done by the UNOSAT-EMS team, some of this data could be added to the final products made available to the public.

While the UNOSAT-EMS does not have an explicit gender strategy, it could strengthen its approach to gender-sensitive humanitarian assistance and support by undertaking and learning from impact stories with focus on women and groups made vulnerable.

### 5. On a partnership strategy

The UNOSAT-EMS should define a partnership strategy and map partners according to the joint interest and areas of work to increase awareness of active MoU and partnership opportunities. This may include:

- Regularly reviewing MoUs that require being renewed.
- Regularly scheduling meetings with partners and users to review common interest and potential joint work.
- Making use of stakeholder mapping exercises (see Annex XIII) to inform the team about existing partnerships.
- Inform partners about new service delivery and products and new AI initiatives in the view of creating additional side-projects.
- Consider partnering with UN Women in order to further strengthening the awareness that disaster and complex emergency impacts often reflect, and reinforce, gender inequality and how to overcome this in the area of GIS data analysis.

### 6. On capturing capacity development in the project's theory of change as an unintended outcome

The UNOSAT-EMS should consider capacity development as an unintended outcome and seek to capture unintended results even if the project is not funded to build capacity of other institutions. Doing so will ensure the EMS' contributions to strengthening emergency response systems and institutional capacities will be acknowledged in subsequent evaluations.

## Lessons Learned

The following lessons were identified by the evaluation as being relevant beyond UNOSAT-EMS:

### 1. Short-term and long-term impacts resulting from emergency response:

Realise and account for the difference between short-term and long-term impacts resulting from emergency response is important. Emergencies – resulting from both natural disasters and conflicts – require a particular type of product that supports time-critical decisions that can save many lives. These outputs can contribute to substantial impacts within days, before becoming obsolete. This is a different class of output than is produced by development projects, for which most M&E systems are based. Standard assumptions about the need to show long-term impacts do not apply and using them unchallenged will potentially lead to a waste of valuable resources. Short-term impacts should be recognized as being generated from a different theory of change than the default development programme theory of change. Short-term emergency response impacts should be recognized as an end in themselves (Conclusion 14 and Conclusion 18).

### 2. Complementarity and niche:

Identifying a unique niche or service that complements and adds value to the work of partners and stakeholders is key. The UNOSAT-EMS established itself in a key role within the UN emergency response system, providing a comprehensive service that is difficult to replicate and therefore helps ensure the service's sustainability (Conclusion 5).

**3. Partnerships, relationships and one UN:**
Cultivating strong partnerships and relationships with key stakeholders and user organizations is important. The UNOSAT-EMS benefited from long-standing relationships and established mechanisms for coordination and collaboration (Conclusions 5 and 6). The UNOSAT-EMS provides a good example of 'One UN' working in practice through working to achieve objectives shared by other UN agencies.

**4. Capacity building:**
While not a primary focus, projects can indirectly contribute to capacity building and knowledge transfer over time through repeated engagement and "learning by doing". Such indirect outcomes and impact should be included in their theories of change (Conclusion 15).

**5. Visibility and awareness:**
Continuously work on raising awareness and visibility among potential donors, partners, and users can help to ensure sustained funding and effective utilization of services (Conclusion 16).

**6. Funding Diversification:**
Overdependence on a single donor can threaten long-term sustainability. Actively seek to diversify funding sources to mitigate risks (Conclusion 19)

# Annexes

## Annex I: Case studies

### Case Study 1: Pakistan

**2022 Pakistan Floods case study**

**The context**

Pakistan was hit by floods between June and October 2022. While flooding is not unusual in Pakistan, the 2022 floods were heavier and caused more death than usual monsoon rains and melting glaciers and may be a consequence from climate change. According to OCHA, rains breaking the records of last 30 years and 7,000 glaciers have contributed immensely to water level rising in dams and rivers resulting in flash floods.[112] The damage caused is immense:

- over 33 million people have been affected by the disastrous floods in 116 districts.
- 1,717 people have died including 639 children and 12,867 were injured.
- 436 bridges were damaged or destroyed, 13,115 roads damaged, 2,114,546 houses damaged, 1,163,635 livestock animals have perished.
- 2,000 health facilities have been affected and tens of thousands of people suffer from diarrhea, malaria, acute respiratory infections, skin and eye infections and typhoid.
- 4.4 million acres of crops and orchards have been affected.[113]

Consequently, people were facing extreme difficulties in meeting their basic needs.

**About this case study**

This programme effects case study examines the causal links between the UNOSAT mapping and observed effects. It draws on document review (reliefweb publications, UNOSAT website, OCHA documents, activation table), key informant interviews and survey responses. A limitation of this case study is that it is not informed (first-hand) by the experiences of the local government in using the UNOSAT products to coordinate their response but by OCHA personnel sharing the products with the government.

**The mapping**

OCHA aims to support fast decision-making at the onset of a disaster, such as flooding. OCHA and other UN or national partners are using state-of-the-art modeling and secondary data in order to answer the following four key questions:

- How many people will be affected? How many of those people are particularly vulnerable?
- What is the potential scale of the emergency and how big will the response have to be?
- Do we need deployments, field offices, emergency funds?
- What are the priority geographic areas? What are the priority sectors and needs?

In the first days of a sudden onset crisis a number of critical operational decisions must be made regarding the emergency response. These decisions must be made before it is possible

[112] Pakistan Monsoon Floods 2022 Islamic Relief Pakistan (12 October, 2022) - Pakistan | ReliefWeb
[113] Ibid

to send rapid assessment teams into the affected area.[114] Satellite imagery is hence optimal to provide the first set of information.

When the flooding occurred in Pakistan, OCHA Pakistan via OCHA Regional office has reached out to UNOSAT and made at least 17 requests between August 2022 and October 2022 which led to UNOSAT activating the Space Charter. An additional 10 products were requested between November 2022 and May 2023 in the context of the floods. Analysis categories consisted of exposure / preliminary impact, coordination, data sharing-analysis and preliminary situation assessments (satellite based). A total of 27 products were delivered in various formats, including maps, excel files, vector / image sharing, PowerPoint. Information that could be extracted from those products encompassed population exposure estimates, AOI/satellite data acquisition, hazard delineation, landcover assessment, damages & losses and disaster monitoring. OCHA has then supplemented the UNOSAT outputs with additional narratives and context and shared these through a number of publications on Reliefweb.int and on Twitter (now called X). Moreover, at the national level, OCHA shared UNOSAT maps and customized analysis with Pakistan's National Disaster Management Authority (NDMA) and with Pakistan's Humanitarian Country Team and Inter-Sector Coordination Team in order to inform their response priorities. At the provincial level, OCHA's Information Management Officers extracted localized UNOSAT data for their provinces to share with Provincial Disaster Management Authorities (PDMAs). OCHA coordinated information sharing and analysis between UNOSAT, NDMA/PDMAs, and humanitarian coordination teams. In summary, UNOSAT provided foundational flood data to OCHA, who contextualized it and shared tailored UNOSAT outputs with government and humanitarian partners to enable data-driven decision making.

**The effects**

**1) The contribution to the response plan**

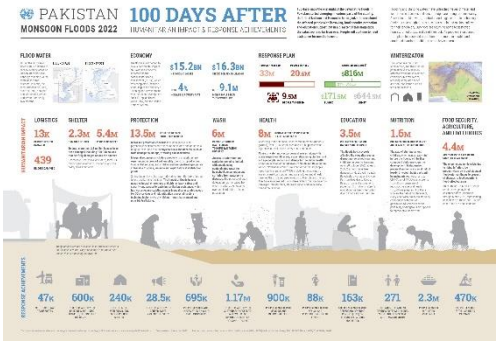
*"It was a vital component of the response plan." Key informant interviewee*

According to key informants from OCHA, the frequent flood mapping done by UNOSAT during the Pakistan floods supported the overall **response planning** (see 2022 floods response plan Pakistan) and advocacy in the following ways:

- UNOSAT provided weekly, then biweekly and monthly nationwide flood extent analysis using satellite imagery. This gave a comprehensive overview of the evolving flood situation across Pakistan, especially because information was only available at the provincial but not at the national level at that time.
- The repeated mapping allowed OCHA and the national government to track which areas were still flooded and prioritize the response accordingly.
- It supported planning for public health interventions in areas with stagnant water. They were also used for prioritizing response.
- The nationwide analysis could not have been done that frequently by other means given Pakistan's large size.
- OCHA used the maps and statistics in their public communications and social media posts


[114] OCHA, Disaster Impact Model, Technical Paper, 20 June 2022

to advocate for continued assistance and funding support and to correct any misinformation being circulated by the media which had previously underestimated the extent of the floods.




In summary, the regular flood mapping enabled ongoing tracking and prioritization of the response, helped related planning efforts, and provided imagery for advocacy purposes.

**2) The importance of UNOSAT's flood extent maps for OCHA**

- The initial UNOSAT maps provided a foundation for structuring OCHA's decisions and response plan, as other assessment data was not yet available.
- OCHA used the maps to estimate affected populations and identify vulnerable groups to target response priorities.
- The maps were a vital component of OCHA's Humanitarian Country Team and Inter-Sector Coordination Group meetings, which made decisions on response priorities.
- Individual agencies like WFP and IOM also made use of UNOSAT maps for their own analysis and reporting.
- UNOSAT maps fed into OCHA's interim and mid-term reports on the humanitarian response plan.
- OCHA asked for updated UNOSAT maps monthly to track flood water recession and continuing needs.
- The maps were used in OCHA's resource mobilization efforts and donor briefings to highlight the scale of needs.
- At the provincial level, localized UNOSAT analysis was used in Provincial Inter-Sector Coordination meetings to guide response.

In summary, UNOSAT flood analysis has been significant in informing critical OCHA products, planning and coordination with national and provincial partners in the early stages of the emergency response.

"[UNOSAT's] flood extent maps played a very vital role in in not only structuring the United Nations decisions in response to the on-set emergency, it also shaped the government decisions and response."

**3) Overcoming key challenges faced during the disaster response:**

UNOSAT mapping helped overcome some key challenges that included:
Type of floods:

- The response plan anticipated river flooding, but instead there was widespread flash flooding which was not predicted. This meant pre-planned response priorities were no longer valid.
- Flash floods quickly receded so were not captured well in maps. But they still caused devastation not visible once waters receded.

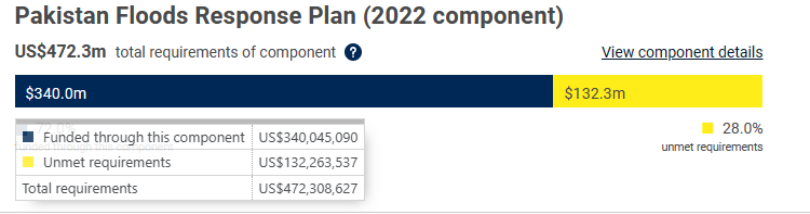
Low donor funding:

- The scale of humanitarian needs was extremely high.
- The initial response from donors was "really low" compared to the magnitude of needs.

Political issues around population data:

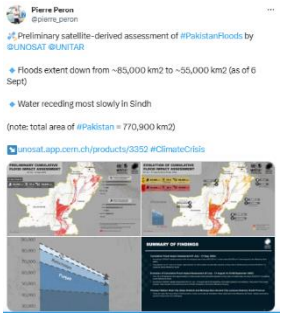
- The government did not have updated census population figures and outdated population statistics going back to 2017 made it difficult for OCHA to accurately estimate the scale of needs.

In summary, unanticipated flash flooding, inadequate donor funding, and limitations around population data from the government posed challenges to an effective and well-targeted disaster response, according to an interviewee.

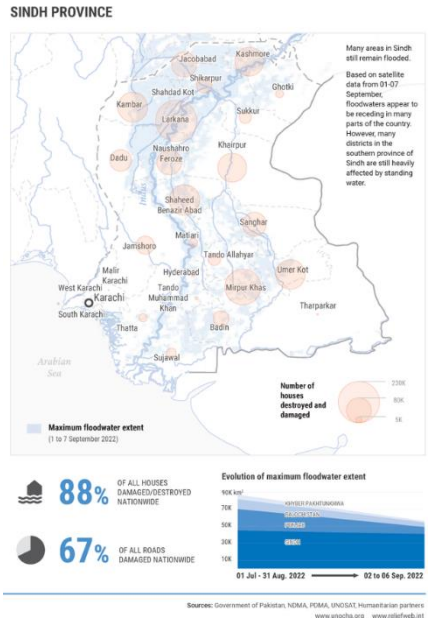



Source: [Pakistan Floods Response Plan | Financial Tracking Service (unocha.org)]

### 4) Support to the government disaster authorities at both national (NDMA) and provincial (PDMA) levels




As mentioned above, OCHA shared UNOSAT products and additional analysis with the National Disaster Management Authority (NDMA) and the Provincial Disaster Management Authorities (PDMAs). Moreover, in some instances, OCHA staff were co-located with the PDMA's emergency operations center to enable direct sharing of maps and analysis. According to OCHA, the products were used to inform national-level decisions made by the NDMA and to identify priority areas for response on provincial level. In summary, OCHA leveraged its relationships with NDMA and PDMAs to share UNOSAT data and products, which helped guide disaster management decisions at both national and provincial levels.




The Government of Pakistan and supported by the Asian Development Bank, the European Union, the United Nations, and the World Bank, the PDNA provided an initial estimate of damages, losses, and needs resulting from the disaster. Key evidence cited in the [Pakistan Floods 2022 Post-Disaster Needs Assessment] includes remote data collected through high resolution satellite imagery, synthetic aperture radar (SAR), publicly available data, and international organizations.[115]

**Feedback from survey respondents**

Two survey respondents shared feedback on the Pakistan Floods mapping products which they rated as highly relevant to their organization's work in disaster response. This can be illustrated by the following examples:

*"I was able to develop a flood dashboard, was able to map school on the GIS layers provided by UNOSAT. Didn't have to go in the field to find out what schools were flooded, I could just layer it." UNICEF*

*"UNOSAT analysis of the nationwide flood extent and population exposure was very useful to understand the scale and extent of the flood impact in Pakistan and also the analysis tables*

[115] [PDNA-2022.pdf (pc.gov.pk)]

*were very helpful to validate the estimates from the government. The time-series analysis was a critical information for prioritization of response and plan for public health issues." OCHA*

**Visibility**

OCHA quoted the use of UNOSAT products in its publication and social media posts.

OCHA products and advocacy built on UNOSAT analysis:

- Flood water extent after 100 days - https://twitter.com/pierre_peron/status/1592357833995350017
- Evolution of flood water extent - https://reliefweb.int/report/pakistan/pakistan-2022-monsoon-floods-humanitarian-response-snapshot-13-september-2022 https://twitter.com/pierre_peron/status/1570741223044026368
- Bi-weekly flood extent analysis (page 6) - https://reliefweb.int/report/pakistan/revised-pakistan-2022-floods-response-plan-01-sep-2022-31-may-2023-04-oct-2022
- https://twitter.com/pierre_peron/status/1569663594928775171

**Conclusion**

UNOSAT's mapping products together with OCHA's contextual information helped inform provincial, national and international decision-making. The frequent nationwide flood extent maps enabled tracking of impacted areas to guide response priorities and planning. The flood analysis informed key meetings, response plans and advocacy efforts by OCHA and government disaster authorities.

## Case Study 2: Sudan

Human Security and Human Rights Issue – The Case of Sudan

**Focus: UNOSAT's support to providing security for foreign nationals to leave Sudan**

In 2023, the ongoing conflict in Sudan marked a significant activation for UNOSAT.

The tumultuous events unfolded on 15 April 2023, when intense fighting erupted between the Sudanese military and the paramilitary force known as the Rapid Support Forces (RSF). Khartoum, the capital, and various regions of Sudan became battlegrounds, with the RSF launching a sudden assault on the Sudanese Armed Forces (SAF) headquarters complex, situated adjacent to Khartoum International Airport. The ensuing combat effectively closed the airport, prompting immediate lockdowns at national embassies, UN, and international governmental and non-governmental organization facilities across Khartoum and Sudan. The crisis intensified as UN staff and foreigners found themselves caught in crossfires, necessitating a crisis response. Given that Khartoum was considered a family duty station, the presence of embassy and UN staff with dependents further complicated the situation.

UNOSAT's response was multifaceted, encompassing crisis mapping, damage assessments, and support for various UN entities such as UN Operations and Crisis Centre (UNOCC), UN Office for the Coordination of Humanitarian Affairs (UNOCHA), and UN Refugee Agency (UNHCR). The UNOSAT-EMS played a pivotal role in coordinating efforts amid the complex dynamics of the crisis. The need for enhanced monitoring and coordination became imperative as the conflict unfolded. UNOSAT had to navigate the intricate challenge of having its own team members in harm's way, leading to the agency's self-activation for emergency event monitoring. The swift and diverse actions undertaken by UNOSAT included the release of a

damage map for Khartoum on 16 April 2023. Ensuring the safety of UNOSAT team members involved image analysis for their evacuation from a hotel to the nearby French Embassy. Similar support was extended to other embassies, including Norway.

Simultaneously, UN colleagues in Sudan sought critical information on the conflict's developments, airport damage, and other factors. UN Headquarters in New York, through the UNOCC, engaged in *enhanced monitoring,*[1] utilizing UNOSAT's products for reporting and disseminating information across the UN system. Subsequent activations witnessed UNOSAT sharing over 20 geospatial-derived products, including security and damage assessments, in response to requests for support from entities such as the Arab Bank for Economic Development in Africa (BADEA), headquartered in Khartoum.

The conflict's toll in Sudan and its population became increasingly evident, with thousands killed or injured and nearly doubling of internal displacement since onset of conflict. There is an estimated 3.8 million newly displaced people contributing to a total of nearly 7.1 million internally displaced people (IDPs), asylum seekers, and refugees as of September 2023.[2] In response to this humanitarian crisis, the UNOSAT-EMS continued to support UNOCC, UNOCHA, and UNHCR with images and analysis, aiding the crisis response arm of UN in closely monitoring the evolving situation. The multifaceted efforts of UNOSAT underscored the crucial role of geospatial information in responding to and managing complex humanitarian emergencies. UNOSAT's involvement in Sudan lasted from April to the end of August 2023, with continuous updates to UNOCC after this period making use of more rapid analysis, such as potential burned towns, aligning with the high-intensity phase of the conflict.

[1] A term for close monitoring of events
[2] According to International Organization for Migration (IOM)

**Coordination efforts for planning and decision-making: UNOSAT's collaborations with UNOCHA, UNOCC, and UNHCR**

From August to November 2023, UNOSAT has undertaken extensive emergency response initiatives in Sudan, operating under the auspices of the NMFA. These efforts involved the analysis of satellite imagery to monitor the locations and movements of military and militia units, aircraft bases, and hardware operations. The real-time intelligence derived from this analysis proved invaluable for UN partners engaged in crisis response activities. The adaptable and responsive funding from the NMFA has allowed UNOSAT to swiftly shift its focus, leveraging satellite imagery analysis to support the humanitarian and security aspects of the crisis in Sudan throughout those months.

**UNOCHA**

The collaborative partnership between UNOCHA and UNOSAT is characterized by iteration, which is crucial for the former's precise information needs in humanitarian response planning and advocacy. Initially, requests are made, but as analysis progresses, adjustments become necessary. This iterative approach allows for refining focus areas and ensuring the accuracy of the obtained data. The ability to engage in a back-and-forth dialogue with UNOSAT is paramount for OCHA. This degree of engagement is fundamental for OCHA to tailor the analysis to their evolving informational requirements, contributing to effective humanitarian response planning and advocacy efforts.

The distinction between utilizing UNOSAT for natural disasters and complex emergencies or conflicts involves the necessity for confidentiality and sensitivity in the latter. UNOSAT's

adeptness in navigating complexities and maintaining impartiality, especially in conflict zones, is commended, allowing certain analyses to remain private upon request. In complex emergencies such as in Sudan, there is a preference for performing satellite analysis within the UN channels rather than relying on external providers. The involvement of external entities introduces the risk of political interests influencing data processing, leading to potential concerns and issues. This inclination stems from the nuanced nature of conflict situations, where careful management of information is paramount for humanitarian efforts.

**UNOCC**

UNOCC operates as a continuous 24/7 hub, providing vital information and situation analysis to aid the UN Secretary-General and senior leaders in decision-making related to peace and security operations. UNOSAT and UNOCC maintain a closely aligned working relationship, with UNOSAT consistently furnishing satellite imagery analysis. This regular provision of analysis contributes to UNOCC's daily integrated operational reports, briefings, alerts, and other products. The collaboration between UNOSAT and UNOCC is particularly crucial in conflict zones, where satellite imagery analysis offers essential insights into troop movements, equipment positioning, displaced persons' locations, and infrastructure damage extent. This information becomes instrumental in supporting UN peacekeeping operations, humanitarian assistance endeavors, and peacebuilding initiatives. UNOSAT leverages its proficiency in satellite imagery, GIS, and technical expertise to enhance the Crisis Center's monitoring, analysis, and response coordination capacities. The incorporation of timely information and visualization products significantly bolsters situational awareness and aids in more informed decision-making within the Crisis Center.

The Research and Liaison Unit (RLU) within UNOCC focuses on producing comprehensive integrated analysis reports that encompass various perspectives on humanitarian, political, security, human rights, economic, and social issues. These reports include visualizations such as maps, charts, and graphs. Satellite analysis contributes a crucial layer of certainty regarding ground events, especially when the UN's physical presence is limited. In tandem, the Watch Room plays a pivotal role in facilitating informed senior leadership decisions through real-time situational awareness. This internal team directly supports the Secretary General by providing situational updates and crisis reporting. The reports generated by the Watch Room are highly valued by senior management and are widely distributed, underscoring their significance in aiding decision-making processes within the UN leadership.

The integration of UNOSAT within the UNOCC team proves advantageous, as it facilitates seamless coordination and access to expertise, simplifying the acquisition of maps, analyses, and necessary expertise promptly for the Secretary General's briefings. Close collaboration also allows for dynamic tailoring of analyses to the team's needs for each report, with UNOSAT providing just-in-time analyses and graphics for integration into high-level briefings under tight deadlines.

In the context of the Sudan crisis, UNOSAT provided timely satellite imagery and analysis, particularly focusing on the destruction and damage in Khartoum following protests. This included a night lights analysis illustrating the extent of disruption. Additionally, UNOSAT monitored conflict-related fires in Darfur during this period. The visual evidence produced by UNOSAT serves as a valuable tool for senior leaders, aiding them in making statements, fostering negotiations between conflicting parties, and guiding humanitarian response efforts. In a specific example from Sudan, the imagery enabled the Secretary General to call for the Special Representative of the Secretary-General (SRSG) to act and issue clear statements.

Nevertheless, the decision-making processes at senior leadership levels remain opaque, making it challenging to quantitatively link imagery directly to specific decisions. While the Watch Room can track whether its alerts lead to spokesperson or Secretary General

statements, correlating imagery to decisions proves difficult. The impact is often seen in deterrence or preventing undesired events, making direct demonstration challenging.

**UNHCR**

UNOSAT received various analysis requests, including assessing damage to buildings in Khartoum, Sudan, post-evacuations, and conducting after-analysis. The resultant satellite imagery analysis is collaboratively shared with UNHCR colleagues in the field, contributing to their efforts in providing support to displaced populations. UNHCR regularly seeks satellite imagery and analysis from UNOSAT to aid their operations, encompassing tasks such as evaluating damage to buildings and verifying informal settlements. Following disasters, UNOSAT delivers timely analysis reports that UNHCR disseminates to field teams, filling the expertise gap within UNHCR by providing essential analysis capabilities.

**Conclusion**

UNOSAT's satellite imagery-derived analysis played an important role in providing reliable information to humanitarian actors in the field and in coordinating actions. Reliability of information lies not only in the quality of UNOSAT's products but also in the trust deposit to UNOSAT to manage sensitive and confidential information. Through its founded relationship with UNOCC, UNOSAT's just-in-time analyses allowed access to information by humanitarian actors, which was used for decision making at high levels advancing coordination of actions for guaranteeing the safety of UN staff on the field, including two UNOSAT staff.

## Case Study 3: Thailand

**The event**

Thailand experienced two major flooding events in 2021. The first occurred in July, when heavy rainfall caused flooding in some provinces, including the capital, Bangkok. The second wave of flooding occurred between end of September and early November, when heavy monsoon rains brought by Tropical Storms Dianmu and Kompasu caused widespread flooding across 32 provinces in Northeastern and Central Thailand. Derived flash flooding affected cultural sites and public and private infrastructures such as railways and temples as well as agricultural land. Between 27 September and 25 October 2021, around 14.3 square kilometers were inundated, according to the UNOSAT and GISTDA monitoring dashboard. This case study focused on the second wave.

More precisely, the case study attempts to describe how UNOSAT-EMS was critical to the humanitarian response to the disaster for the relevant stakeholders identified: GISTDA, OCHA, ESCAP, UNRCO Thailand, and the provincial authorities. To do so, a programme effect case study approach was followed. The analysis builds upon a document review, including the satellite-derived products for this event available at the UNOSAT website, and KII with key stakeholders. A limitation of this case study is that it is not informed (first-hand) by the experiences of the local government in using the UNOSAT products to coordinate their response and by OCHA personnel directly using the products.

**UNOSAT activities**

As a response to the monsoon-derived floods between September and October 2021, UNOSAT Emergency Mapping activated the International Disaster Charter on 28 September 2021 on behalf of UNOCHA, following a request from UNOCHA, ESCAP, and GISTDA on 27 September 2021. UNOSAT monitored the situation across the country (408.9K square

kilometers), with more detail for seven AOI, for a period of about a month from 27 September to 08 November 2021.

The Service created at least 28 satellite-derived products reflecting flood assessments, water extents, amongst others; with key information for humanitarian response such as population exposure estimates and hazard delineation. Some of the analysis was performed with support from AI/ML algorithms, given the scope (national-wide) and long duration of the event. Automated analysis with machine learning methods was used for the detection of water extents for satellite data obtained from Sentinel-1.

A flood monitoring dashboard[116] was created together with GISTDA. The dashboard presents the daily evolution of the water extent and aggregated population exposure to flooding at Province, District and Subdistrict levels from 27 September to 27 October 2021. Besides the satellite based preliminary situation assessments and exposure or preliminary impact analysis, UNOSAT also carried out coordination and data sharing activities.

UNOSAT's products provided the necessary information to evaluate the extent of the flooding through the identification/delineation of flooded areas (provinces), severity of flooding, and tracking of flood progression with continuous monitoring. Information provided by UNOSAT also allowed the identification of affected population and damaged infrastructure and croplands.

**UNOSAT's support to humanitarian response**

The UNOSAT products played a valuable role in supporting humanitarian response to the floodings in Thailand of 2021. The information contained in the products enhanced the requesters (UNOCHA, GISTDA, ESCAP) and other users (provincial authorities) understanding of the extent of the flooding and of the AOI across provinces – information at the provincial/district/community level - where humanitarian assistance needed to be prioritized. UNOSAT products supported the response of humanitarian organizations, such as UNOCHA, and the government at both the national (through GISTDA) and provincial levels (through information disseminated by the UNRCO).

More specifically, UNOSAT contributed to alleviating the disaster caused by flooding in Thailand in 2021 in the following ways:

- The flood extent maps, exposure statistics, and dashboard helped humanitarian and government agencies plan their emergency response and target aid more effectively, especially through the daily updates on the situation, which helped the government and agencies to monitor the trend of flood evolution and to prepare for its impact as well as identifying areas requiring humanitarian assistance.
- The provincial government used satellite analysis from UNOSAT received from the UNRCO to map agricultural damage for forecast and preparedness for farmer compensation and loss of agricultural production during the harvest season (July - October).
- The daily updates also helped to compare the evolution of the floodings with the 2010 flooding, to understand better the scope of the response that would be needed (request from UNRCO and other UN agencies). Furthermore, the evidence-based flooding scenarios created and based on the UNOSAT figures, rectified any misinformation about the extent of the floods that was being disseminated by the media.
- GISTDA and UNOSAT performed comprehensive analyses of the situation, which were forwarded to the responsible national agencies and line ministries

[116] https://unosat-geodrr.cern.ch/portal/apps/dashboards/4f878691713a40f3b8ef3140e63c9f6d

involved in the disaster response. These joint analyses were also posted on GISTDA's website.

The use of the UNOSAT products to inform Thailand's humanitarian response benefited from:

- The institutional support provided by the UNRCO. The dashboard created by UNOSAT and GISTDA and early assessments performed by UNOSAT were embedded in the UN Thailand website to institutionalize dissemination of the information. Moreover, the UNRCO ensured the dissemination of the daily monitoring information with the provincial authorities. This support was provided as a recognition of UNOSAT having the UN mandate to provide satellite analysis for decision-making for the UN system.
- Additionally, UNOSAT Asia-Pacific Regional Liaison Office in Bangkok added presence with the UN local agencies such as ESCAP and UNRCO, which were key to dissemination and visibility of the products generated for the disaster.
- Close collaboration with a national entity (GISTDA) helped endorse UNOSAT analysis outside the UN system. GISTDA and UNOSAT together presented the projections of flood extent to government authorities and UN agencies. The visibility of the UNOSAT Emergency Service was enriched by the dissemination of the joint products by GISTDA.

**Conclusion**

The evidence-driven rapid analysis provided by UNOSAT using AI/ML algorithms was crucial for a rapid and informed response planning and operations of the 2021 Thailand's floodings. The UNOSAT products were used to inform the response to affected populations, e.g., farmers, of both UN agencies and government authorities. UN agencies and provincial authorities were reached mostly through the labor of the UNRCO, with high leverage in the country, and national level authorities through GISTDA, who was one of the agencies requesting an activation of the Charter through UNOSAT.

## Case Study 4: Turkey and Syria

**Introduction & Rationale**

On 6 February 2023, a devastating earthquake struck southern Turkey and northern Syria, resulting in tragic loss of life and widespread destruction across the region. The earthquake exacerbated needs in Syria and Turkey protracted humanitarian crisis, affecting over fifteen million people.[117]

UNOSAT's Emergency Mapping service aims to enhance evidence-based decision making in humanitarian assistance and responses providing valuable information to different stakeholders including UN agencies. As one of the major natural disasters and complex humanitarian crisis this case study aims to analyze UNOSAT's critical role in the emergency response to the Syria-Turkey earthquake. It examines the timeliness, relevance and use of UNOSAT's mapping products and services during this disaster, based on document review, activation data, user feedback survey, interviews, and media information. The case study synthesizes information from primary and secondary sources. The sources provide both qualitative insights and quantitative evidence regarding UNOSAT's emergency mapping service for the earthquake.

117 https://news.un.org/en/story/2023/02/1133177#:~:text=After%20a%20massive%20earthquake%20hit%20southern%20T%C3%BCrkiye%20and,still%20believed%20to%20be%20buried%20under%20the%20rubble.

**UNOSAT's Emergency EMS Response**

Few hours after the Syria-Turkey earthquake, the International Federation of Red Cross and Red Crescent Societies (IFRC) activated UNOSAT's Emergency Mapping service[1]. UNOSAT triggered the International Charter: Space and Major Disasters to collect satellite images of Syria. UNOSAT delivered 25 products including damage assessments, preliminary reports, a live map platform and an assessment of UNESCO's heritage site damage. To assess the damage, in collaboration with the University of Wuhan, optical nighttime data was used to show the disaster loss in the affected areas, before and after. This type of product was referenced by the users during the interview, implying that UNOSAT has already implemented the technique for other projects and maximizing their partnership.

UNOSAT's products were delivered to over 90 email recipients, including UN agencies, NGOs, Red Cross/Crescent, the media, inter alia.[2] Activation reached a large network of disaster responders via the International Charter and GDACS coordination systems. UNOSAT shared vector data and analysis files to facilitate integration into partner systems.

This emergency mapping response also demonstrated effective coordination between satellite analysis providers. Copernicus Rapid EMS focused its efforts on Turkey, while UNOSAT took the lead on analysis for Syria. This division of areas avoided duplication and enabled the two organizations to provide comprehensive coverage of the vast affected region[3].

The product was published following the earthquakes in Syria and Turkey in early 2023 and attracted high interest. [4]

**How the products have contributed to the humanitarian responses**

The UN Secretary General after his visit in mid-February called it "one of the worst natural disasters of recent decades". The UN coordinated international search and rescue teams to look for survivors in the rubble. It also worked to provide emergency food, shelter, and medical care. Key UN agencies mobilized humanitarian relief efforts in both countries including IOM, OCHA, UNDSS, UNFPA, UNHCR, UNICEF and WHO.

OCHA played a key role in consolidating information, highlighting priority needs, mobilizing resources, and coordinating the emergency response across Turkey and Syria after the devastating earthquakes. OCHA relied on various sources of information, including UNOSAT's emergency mapping service to analyze humanitarian impacts and guide relief efforts. According to the interviewees UNOSAT's products were essential for humanitarian responses considering that they provided analysis of satellite imagery rather than just imagery. They highlighted the importance of this information for their internal analysis considering that in the case of some regions including Turkey and Syria, their personnel did not have the capacity to do the analysis on their own.

Since the natural disaster, OCHA published over 25 situational reports[5] on the relief web. The priority needs included emergency shelter, water/sanitation, food, and health services. To understand needs, OCHA drew on assessments by UN clusters, NGOs, and local authorities, using different sources of information including GIS data on earthquake impact and population data. In the case of priority needs in north-west Syria, the source of information used was REACH Rapid Assessment.[6] This report was based on UNOSAT's information, however, since REACH is a joined initiative between IMPACT Initiatives and UNOSAT, the UNOSAT logo or reference was not included. Moreover, other OCHA reports as well included maps from other providers including USGD, AFAD and ADAM.
According to feedback from users who utilized or activated the mapping service for the Syria Earthquake, UNOSAT's products were very well aligned to their organizational goals and priorities[8]. This illustrates UNOSAT's strong alignment to partner needs.

As a result of the coordination, OCHA reported that between 6 February and 31 May 2023, around three million people were reached with humanitarian assistance, including child protection, gender-based violence protection, health and education intervention, among others.[9]

## Conclusions

UNOSAT made important contributions during the Syria-Turkey earthquake response:

- In terms of efficiency, UNOSAT collaborated with partners in mapping services and academia to enhance analysis products.
- Regarding relevance, UNOSAT's timely analysis informed decision-making and enabled a rapid humanitarian response.
- For coherence, users reported that UNOSAT products aligned well with organizational needs.
- For effectiveness, OCHA used UNOSAT extensively for advocacy, reporting, damage assessment, and planning field operations. However, greater collaboration on data sharing and editing could further strengthen this partnership and UNOSAT's visibility.

## Lessons Learned

It will be important to make UNOSAT's work and products more visible, highlighting their key contribution in the humanitarian response. According to different users, UNOSAT's satellite imagery analysis served as a primary source for internal humanitarian analysis after the earthquakes. However, some public reports did not sufficiently reflect or mention UNOSAT as a source.

## Recommendations

Consider reviving an internal UN GIS publishing platform to share non-public analyses for user access and reporting. This could enable partners to better leverage UNOSAT inputs.

# Annex II: Terms of Reference

**Independent Midterm Evaluation of the "United Nations Satellite Centre (UNOSAT) EMS - Evidence-based information support to humanitarian assistance, peace and security using satellite imagery and geospatial technologies" project**

**Background**

1. **The United Nations Institute for Training and Research (UNITAR)** is a principal training arm of the United Nations, with the aim to increase the effectiveness of the United Nations in achieving its major objectives through training and research. UNITAR's mission is to develop individual, institutional and organizational capacities of countries and other United Nations stakeholders through high quality learning solutions and related knowledge products and services to enhance decision making and to support country-level action for overcoming global challenges.

2. **The United Nations Satellite Centre (UNOSAT), hosted by UNITAR,** is a technology-intensive centre delivering imagery analysis and satellite solutions to humanitarian and development organizations within and outside the United Nations, with the aim to contribute to evidence-based decision-making in areas such as humanitarian relief, human security and resilience, strategic territorial and development planning using geo-spatial information technologies.

3. The United Nations Satellite Centre (UNOSAT) EMS - Evidence-based information support to humanitarian assistance, peace and security using satellite imagery and geospatial technologies (in short "UNOSAT EMS") project provides satellite image analysis during humanitarian emergencies related to disasters, complex emergencies and conflict situations. The service has been created to meet the demand of United Nations Office for the Coordination of Humanitarian Affairs (OCHA) and other humanitarian agencies and NGOs part of the Inter-Agency Standing Committee on humanitarian coordination hosted by the UN (IASC) for mapping and satellite derived analysis in wake of disasters and complex emergencies. With a 24h/7days a week year-round availability to process requests, UNOSAT delivers satellite imagery maps, reports and data ready for direct inclusion in Geographic Information Systems (GIS) according to needs.

4. Typical situations for which the **UNOSAT EMS** is activated include floods, earthquakes, storms, landslides, volcanoes, oil spills, chemical waste, refugee and Internally Displaced Persons (IDP) camp mapping, conflict damage assessment and situation analysis. Requests for mapping in complex emergencies are increasing, and often include monitoring situations over time and thus requires additional support from UNOSAT as compared to a typical sudden onset natural disaster. The evolution of IDP situations and assessments during conflict situations are examples of this. However, natural disasters still represent significant activities at UNOSAT, in particular floods, which often include the need for monitoring over time. The capacity of providing frequent imagery analysis updates as situations unfold has become one of the key features of UNOSAT's EMS and shows that the service is fully operational and predictable. UNOSAT benefits from a variety of sources for its satellite imagery: Free and open source, commercial vendors, International Charter Space and Major Disasters (natural and technological disasters only), in-kind donations.

5. The expected impact of the project is to improve humanitarian assistance and protection of peace, justice, security and human rights. Four outcomes are expected to contribute to the project's goal: i) enhanced evidence-based decision making in humanitarian assistance and protection of peace, justice, security, and human rights in the context of disasters and conflict; ii) reinforced synergy and coordination during emergency situations through information products dissemination to both humanitarian and human rights communities, and use of web-based platforms and tools to support coordination, planning and decision making; iii) increased exploration and adoption of innovative approaches and methodologies in the use of satellite imagery and geospatial information, including artificial intelligence and deep learning implications; and iv) enhanced awareness of the value of satellite imagery analysis to support evidence-based decision making in humanitarian assistance and protection of peace, justice, security and human rights.

6. The project is subject to an independent evaluation as per UNITAR Evaluation Policy. The evaluation plan calls for a mid-term evaluation of the project. The evaluation shall also build on the

independent evaluation[118] undertaken of the earlier phase of the project). Lessons from the evaluation shall inform possible future phases of the project.

**Purpose of the evaluation**

7. The purpose of this evaluation is to assess the progress being made towards the achievement of planned targets; to identify good practices as well as any challenges that the project has encountered; to issue recommendations, and to identify lessons to be learned on design, implementation and management. The evaluation's purpose is thus to meet accountability requirements, and provide findings, conclusions, recommendations and lessons learned to contribute to the project's improvement, strategic direction, and broader organizational learning. The evaluation should not only assess how well the project has performed, but also seek to answer the 'why 'question by identifying factors contributing to (or inhibiting) successful delivery of the results.

8. The evaluation will include an assessment of all six OECD evaluation criteria (relevance, coherence, effectiveness, efficiency, likelihood of impact and likelihood of sustainability of the project) and cross-cutting topics such as gender, disability and human rights, and environmental considerations. In addition to serving as accountability function, the evaluation's purpose is also to be as forward-looking as possible to inform strategic decisions on the design and planning of possible future phases and focus areas of this or similar projects.

**Scope of the evaluation**

9. The midline evaluation will cover the project's first year starting from August 2022 to July 2023. Although the scope of the evaluation does not include the previous phases of the project (since 2003, 2016-2017, 2017-2019 and 2019-2021), funded by the same and another donor, the evaluator should take into account the findings and the implementation of the recommendations of the past independent evaluation and look back at previous phases for assessing the impact criterion. The evaluation should provide forward-looking recommendations to inform possible future phases or the development of similar projects.

**Evaluation criteria**

1. The evaluation will assess project performance using the OECD evaluation criteria: relevance, coherence, effectiveness, efficiency, likelihood of impact and likelihood of sustainability. The evaluation questions related to gender equality and the empowerment of women dimensions are marked with "GEEW". Questions related to environmental sustainability are marked with "ENVSUSE". Disability and human rights considerations should also be considered throughout the evaluation.

   - ***Relevance:*** *Is the project on track in reaching its intended users (beneficiary organizations) and are activities relevant to the beneficiaries' needs and priorities, and designed with quality?*
   - ***Coherence:*** *To what extent is the project coherent with relevant policies (institutional and national) and complementing other projects or services available?*
   - ***Effectiveness:*** *How effective has the project been in delivering results so far and in making progress towards the intended outcomes?*
   - ***Efficiency:*** *To what extent has the project delivered its results in a cost-effective manner and optimized partnerships?*
   - ***Likelihood of Impact:*** *What are the potential cumulative and/or long-term effects expected from the project, including contribution towards the intended impact, positive or negative impacts, or intended or unintended changes?*
   - ***Likelihood of Sustainability:*** *To what extent are the project's results likely to be sustained in the long term? How is environmental sustainability addressed in the project?*

**Principal evaluation questions**

[118] https://unitar.org/results-evidence-learning/evaluation/independent-evaluation-unosat-rapid-mapping-service

2. The following questions are *suggested* to guide the design of the evaluation, although the criteria applied to the outcomes and the final questions selected/identified will be confirmed by the evaluator following the initial document review and engagement with project management with a view to ensuring that the evaluation is as useful as possible with regard to the project's future orientation.

**Relevance**

a. *To what extent is the project aligned with the Institute's efforts to helping Member States implement the 2030 Agenda for Sustainable Development (particularly Goal 1, 13, 16 and 17) and the UNITAR strategic framework (2022-2025)?*
b. *To what extent is the UNOSAT EMS and its different (and new) products, as designed and implemented, relevant to the institutional* ***needs and priorities*** *of the respective partner institutions working in the area of humanitarian assistance and protection of peace, justice, security and human rights?*
c. *Are the activities and outputs of the UNOSAT EMS consistent with the requesting parties'* ***goals and objectives****?*
d. *How relevant is the project to supporting gender equality and women's empowerment and meeting the needs of other groups made vulnerable, including countries in special situations?* ***(GEEW)***
e. *How well does the project align to environmental frameworks, e.g., Blue Marble principles? (****ENVSUSE****)*

**Coherence**

f. *To what extent does the UNOSAT EMS complement other humanitarian assistance related projects and services provided by UNITAR Divisions and UNOSAT and by other organizations? How well is the project building on lessons learned and experience from the previous three phases and its 20 years of existence?*
g. *How well does the UNOSAT EMS align with the Norwegian Humanitarian Strategy and the Strategic Partnership Model?*
h. *To what extent is coordination with the UN Operations and Crisis Centre (UNOCC) and hence at the Executive Office of the Secretary General, as well as with other UN agencies (OCHA, UNHCR, UNICEF, WHO, ICRC, IFRC, UNESCO, OHCHR amongst others), the ICC and the REACH Initiative and the Satellite Mapping Coordination System (SMCS) set up in the framework of the Global Disaster Alerts and Coordination System (GDACS), the Humanitarian Data Exchange (HDX) and creation of the UNOSAT Satellite Image bank leading to synergies and reducing potential duplication?*
i. *How well does the project complement and foster synergies with other existing actors carrying out analysis, such as academia, the private sector and governments? What is the project's specific niche and added value in a world of constantly changing actors and services offered by other providers?*

**Effectiveness**

j. *To what extent is the project on track in achieving planned outputs and outcomes?*[1] *What are the factors positively or negatively affecting the project's performance?*
k. *To what extent is the UNOSAT EMS on track in achieving the planned objectives and results to provide better information for informed decision-making in situations of natural disasters and conflict?*
l. *To what extent is environmental sustainability taken into account when operating the UNOSAT EMS?* ***(ENVSUSE)***
m. *To what extent have relevant recommendations from the previous independent evaluation been taken into account/implemented in the project design and implementation?*
n. *To what extent are a human rights-based approach, disabilities and a gender mainstreaming and inclusiveness strategy incorporated in the design and implementation of the project?* ***(GEEW)***
o. To what extent is the project making effective use of innovation and new technologies including Artificial Intelligence (AI), machine learning and algorithms to achieve its outcomes? Is the project effective in adjusting its products offered?
p. *To what extent have the project's structure and partnerships been effective?*
q. *To what extent is the project's monitoring and self-evaluation effective in assessing user-based real-time impact (see recommendation from previous independent evaluation) and updating indicators and targets for outcome and impact?*

**Efficiency**

r. *To what extent have outputs been produced in a cost-efficient manner (e.g., in comparison with alternative approaches)?*
s. *Were the objectives achieved on time so far and was the UNOSAT EMS delivered in a timely manner emergency situations?*
t. *To what extent were partnership modalities, including the hosting at CERN, conductive to the delivery of the mapping? Were the project's resources (human and financial) used as planned and fully utilised?*
u. *How environment-friendly (natural resources) has the project been?* ***(ENVSUSE)***

**Likelihood of impact and early indication of impact**

v. *To what extent has the UNOSAT EMS initiated a real difference to the partners' work and improved humanitarian assistance and protection of human rights and to the end beneficiaries?*
w. *What other observable end-results or organizational changes (positive or negative, intended or unintended) have occurred or are likely to occur?*
x. *What cumulative effects have the mapping initiatives made to the partners work in humanitarian assistance and to the end beneficiaries?*
y. *What has happened as a result of the mapping and other activities?*
z. *How have the end-users benefitted from the UNOSAT EMS?*

**Likelihood of sustainability and early indication of sustainability**

aa. *To what extent are the project's results likely to endure beyond the implementation of the activities in the mid- to long-term and under which conditions?*
bb. *To what extent have the mapping initiatives contributed to better humanitarian assistance in the long term?*
cc. *What are likely to be the major factors which influenced the achievement or non-achievement of sustainability of the mapping initiatives?*
dd. *How has environmental sustainability been considered during the project design and first part of implementation? (ENVSUSE)*

**Gender equality and women empowerment (GEEW)**

The evaluation questions with gender equality and women empowerment dimensions are marked with **"*GEEW"*** *in the above. Disability considerations should also be considered throughout the evaluation.*

**Environmental Sustainability in Evaluation (ENVSUSE)**

The evaluation questions with the evaluation sustainability dimension are marked with "***ENVSUSE"*** in the above.

**Evaluation Approach and Methods**

3. The evaluation is to be undertaken in accordance with the UNITAR Evaluation Policy, the operational guidelines for independent evaluations, the United Nations norms and standards for evaluation, and the UNEG Ethical Guidelines The evaluation will be undertaken by a supplier or an international consultant (the "evaluator") under the supervision of the UNITAR Planning, Performance Monitoring and Evaluation Unit (PPME). PPME shall support the evaluation team in gathering background documentation and other data collection processes.

4. In order to maximize utilization of the evaluation, the evaluation shall follow a participatory approach and engage a range of project stakeholders in the process, including the project partners, the UN Country Teams, the participants, the donor and other stakeholders. Data collection should be triangulated to the extent possible to ensure validity and reliability of findings and draw on the following methods: comprehensive desk review, including a stakeholder analysis; surveys; review of the log frame (reconstructed) baseline data and the theory of change; key informant interviews; focus groups; and, if possible, field visits. These data collection tools are discussed below.

5. The evaluator should engage in quantitative and qualitative analysis in responding to the principal evaluation questions and present the findings qualitatively or quantitatively as most appropriate.

**Suggested data collection methods:**
*Comprehensive desk review*

The evaluator will compile, review and analyse background documents and secondary data/information related to the project, including a results framework indicator tracking review. A list of background documentation for the desk review is included in Annex C.
If baseline data available allows for it, the evaluator should consider using quantitative approaches to assess the impact assessment related evaluation questions.
The evaluator should also consider whether Outcome mapping / Outcome harvesting / outcome evidencing, process tracing, contribution analysis, episode study, or other theory-based approaches to evaluate outcomes, are suitable tools for answering the evaluation questions.

***Stakeholder analysis***

The evaluator will identify the different stakeholders involved in the project. Key stakeholders at the global and national level include, but are not limited, to:

- Beneficiary and requesting organizations (UNOCHA, UNHCR, WHO, UNICEF, WFP, IOM, UNDP, UN EOSG, UNOCC, UN ESCAP, UN OHCHR, IFRC, ICRC, ICC, NRC) and governments.
- The donor (Norwegian Ministry of Foreign Affairs);
- UN Country Teams or local/national governments benefitting from the service;
- UNITAR project implementation team (M&E expert, project manager, GIS experts, etc).
- Etc.

***Survey(s)***
With a view to maximizing feedback from the widest possible range of project stakeholders, the consultant will develop and deploy a survey(s) to EMS requestors following the comprehensive desk study to provide an initial set of findings and allow the evaluator to easily probe during the key informant interviews.

***Key informant interviews***

Based on stakeholder identification, the evaluator will identify and interview key informants. The list of contacts is available in Annex A. In preparation for the interviews with key informants, the consultant will define interview protocols to determine the questions and modalities with flexibility to adapt to the particularities of the different informants, either at the global, at the national or local level.

***Focus groups***

Focus groups should be organized with selected project stakeholders at the local levels to complement/triangulate findings from other collection tools.

**Field Visit**

A field visit may be envisaged if useful for case study data collection.

**Case Studies**

The evaluation shall develop 3-4 case studies, focusing on specific emergencies/countries/regions and/or crosscutting themes. The evaluation shall use a combination of quantitative and qualitative data. Case studies can be particularly useful for understanding how different elements fit together and how different elements (implementation, context and other factors) have produced the observed impacts. Different types2 of case studies shall be explored:

- Illustrative: This is descriptive in character and intended to add realism and in-depth examples to other information about a program or policy. (These are often used to complement quantitative data by providing examples of the overall findings).
- Exploratory: This is also descriptive but is aimed at generating hypotheses for later investigation rather than simply providing illustration.
- Critical instance: This examines a single instance of unique interest, or serves as a critical test of an assertion about a program, problem or strategy.
- Program implementation. This investigates operations, often at several sites, and often with reference to a set of norms or standards about implementation processes.
- Program effects. This examines the causal links between the program and observed effects (outputs, outcomes or impacts, depending on the timing of the evaluation) and usually involves multisite, multimethod evaluations.
- Cumulative. This brings together findings from many case studies to answer evaluative questions.

**Gender and human rights**

6. The evaluator should incorporate human rights, gender, disability, and equity perspectives in the evaluation process and findings, particularly by involving women and other disadvantaged groups subject to discrimination. All key data collected shall be disaggregated by sex, country status/classification, disability, and age grouping and be included in the draft and evaluation report.

7. The guiding principles for the evaluation should respect transparency, engage stakeholders and beneficiaries; ensure confidentiality of data and anonymity of responses; and follow **ethical** and professional standards (UNEG Ethical Guidelines).

**Timeframe, work plan, deliverables and review**

8. The proposed timeframe for the evaluation spans from June/July 2023 (initial desk review and evaluation design) to December 2023 (submission of final evaluation report). An indicative work plan is provided in the table below.

9. The consultant shall submit a brief evaluation design/question matrix following the comprehensive desk study, stakeholder analysis and initial key informant interviews. The evaluation design/question matrix should include a discussion on the evaluation objectives, methods and, if required, revisions to the suggested evaluation questions or data collection methods. The Evaluation design/question matrix should indicate any foreseen difficulties or challenges/limitations in collecting data and confirm the final timeframe for the completion of the evaluation exercise.

10. Following data collection and analysis, the consultant shall submit a zero draft of the evaluation report to the evaluation manager and revise the draft based on comments made by the evaluation manager.

11. The draft evaluation report should follow the structure presented under Annex D. The report should state the purpose of the evaluation and the methods used and include a discussion on the limitations to the evaluation. The report should present evidence-based and balanced findings, including strengths and weaknesses, consequent conclusions and recommendations, and lessons to be learned. The length of the report should be approximately 30 pages, excluding annexes.

12. Following the submission of the zero draft, a draft report will then be submitted to Project Management to review and comment on the draft report and provide any additional information using the form provided under Annex G by 24 November 2023. Within two weeks of receiving feedback, the evaluator shall submit the final evaluation report. The target date for this submission is 14 December 2023. Subsequently, PPME will finalize and issue the report, and present the findings and recommendations to Project Management and other invited stakeholders.

Indicative timeframe (Preference from Project Management to start before the midterm of the project in order to share results as part of 20 year anniversary of the service): June 2023 – December 2023

| Activity | June 2023 | July 2023 | August 2023 | September 2023 | October 2023 | November 2023 | December 2023 |
|---|---|---|---|---|---|---|---|
| Evaluator selected and recruited | | | | | | | |
| Initial data collection, including desk review, stakeholder analysis | | | | | | | |
| Evaluation design/question matrix | | | | | | | |
| Data collection and analysis, including survey(s), interviews and focus groups and field visit | | | | | | | |
| Zero draft report submitted to UNITAR | | | | | | | |
| Draft evaluation report consulted with UNITAR evaluation manager and submitted to Project Management | | | | | | | |
| Presentation of emerging findings, recommendations and lessons learned | | | | | | | |
| Project Management reviews draft evaluation report and shares comments and recommendations | | | | | | | |
| Evaluation report finalized and management response by Project Management | | | | | | | |
| Dissemination and publication | | | | | | | |

**Summary of evaluation deliverables and indicative schedule**

| Deliverable | From | To | Deadline* |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Evaluation design/question matrix | Evaluator | Evaluation manager | 30 July 2023 |
| Comments on evaluation design/question matrix | Evaluation manager | Evaluator | 4 August 2023 |
| Zero draft report | Evaluator | Evaluation manager | 18 October 2023 |
| Comments on zero draft | Evaluation manager | Evaluator | 25 October 2023 |
| Draft report | Evaluator | Evaluation manager | 3 November2023 |
| Presentation of emerging findings, recommendations and lessons learned | Evaluator/evaluation manager | Programme Management | To be defined |
| Comments on draft report | Programme Management | Evaluation manager | 24 November 2023 |
| Final report | Evaluator | Evaluation manager | 14 December 2023 |
| Dissemination and publication of report | Evaluation manager | | 28 December 2023 |

*To be adjusted depending on the contract signature and to be agreed upon with the

Evaluation Manager.

**OPTIONAL:** A reference group is considered a good practice in independent evaluations. Members of the reference group could be a representative from project management, from the donor (Norway MFA) and several representatives from the requesting (Pakistan) or partner organizations (OCHA) for example. These stakeholders would then be included throughout the evaluation phases and would e.g., be able to provide comments on the draft report.

**Communication/dissemination of results**

13. The evaluation report shall be written in English with the Executive Summary in English. The final report will be shared with all partners and be posted on an online repository of evaluation reports open to the public.

**Evaluation management arrangements**

14. The evaluator will be contracted by UNITAR and will report directly to the Director of the Strategic Planning and Performance Division and Manager of Planning, Performance Monitoring, and Evaluation Unit (PPME) (‘evaluation manager’).

15. The evaluation manager reports directly to the Executive Director of UNITAR and is independent from all programming related management functions at UNITAR. According to UNITAR’s Evaluation Policy, in due consultation with the Executive Director/programme management, PPME issues and discloses final evaluation reports without prior clearance from other UNITAR Management or functions. This builds the foundations of UNITAR’s evaluation function’s independence and ability to better support learning and accountability.

The evaluator should consult with the evaluation manager on any procedural or methodological matter requiring attention. The evaluator is responsible for planning any meetings, organizing online surveys and undertaking administrative arrangements for any travel that may be required (e.g., accommodation, visas, etc.). The travel arrangements, if any, will be in accordance with the UN rules and regulations for consultants.

**Evaluator Ethics**

16. The evaluator selected should not have participated in the project’s design or implementation or have a conflict of interest with project activities. The selected consultant shall sign and return a copy of the code of conduct under Annex F prior to initiating the assignment and comply with UNEG Ethical Guidelines.

**Professional requirements**

17. The evaluator should have the following qualifications and experience:

- MA degree or equivalent in evaluation, social, environmental or development studies, or a related discipline. Knowledge of and experience in technology-based programming is desired.
- At least 7 years of professional experience conducting evaluation in the field of humanitarian programming, protracted conflict, resilience and disaster risk reduction, or similar areas. Experience undertaking evaluations related to technology based programming (e.g. GIS), mapping or satellite imagery would be a strong asset. Knowledge of United Nations Norms and Standards for Evaluation.
- Excellent research and analytical skills, including experience in a variety of evaluation methods and approaches.
- Excellent writing skills.
- Strong communication and presentation skills.
- Cross-cultural awareness and flexibility.
- Availability to travel.
- Fluency in oral and written English.

**Annexes:**

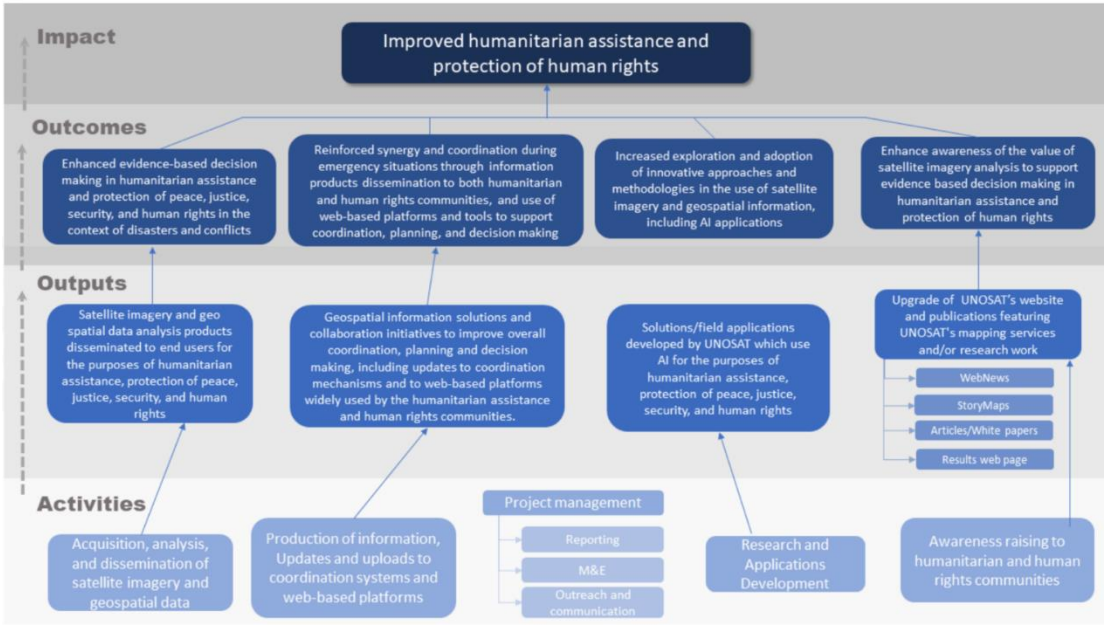
A. **List of contact points**
B. **Event data available on the UNITAR Event Management System**
C. **List of documents and data to be reviewed**
D. **Structure of evaluation report**
E. **Project logical framework**
F. **Audit trail**
G. **Evaluator code of conduct**

## Annex III: List of interviewees

| Gender | Name | Title and Organization |
|---|---|---|
| Female | Ms. Gita Sabharwal | UN Resident Coordinator, Thailand |
| Female | Ms. Gemma Connell | Head of Regional Office for Southern & Eastern Africa - UNOCHA |
| Male | Mr. Punya | Regional Information Management Officer: UNOCHA - Regional Office for Asia and the Pacific, Bangkok |
| Male | Mr. Mir Nauman Tahir | Information Management Officer OCHA |
| Male | Mr. Keran Wang | Chief, Space Applications Section, Information and Communications Technology and Disaster Risk Reduction Division |
| Male | Ms. Tanita Suepa | Director of Stakeholder Engagement and Outreach Office |
| Female | Ms. Chiara Proietti | European Commission, DG Joint Research Centre, Directorate for Space, Security and Migration, Disaster Risk Management Unit. |
| Male | Mr. Luca Pupulin | Executive Director of IMPACT Initiatives and REACH. |
| Male | Mr. Vincent Annoni | Senior Officer, Information Management & Data Analysis- Disasters, Climate and Crises Department (Prevention, Response and Recovery) |
| Female | Ms. Monica Kjollerstrom | Coordination Officer, UNOCC |
| Female | Ms. Silvia Bolzan | leads the Research and Liaison Unit (RLU) in UNOCC |
| Male | Mr. Sebastian Krolikiewicz | Operational Data Systems & Support Section (ODSS) Global Data Service (GDS), UNHCR |

| | | |
|---|---|---|
| Male | Mr. Pierre Vernier | Operational Data Systems & Support Section (ODSS)<br>Global Data Service (GDS), UNHCR |
| Female | Ms Lena Eskeland | Senior Adviser<br>Permanent Mission of Norway in Geneva |
| Female | Ms Rannveig Skofteland | NMFA Humanitarian Section (Oslo Office) |
| Female | Ms. Titi Moektijasih | Humanitarian affairs officer/analyst OCHA Indonesia |
| Male | Mr. Tomás López de Bufala | Wash manager UNICEF Ukraine - previously UNICEF Sudan |
| Female | Ms. Natavadee Sraprathum | APTERR - Emergency monitoring and information officer |
| Female | Ms. Filiz Yildirim | OCHA Istanbul |
| Female | Ms. Manja Vidic | Head of OCHA Philippines |
| Male | Mr. Joseph Addawe | Information Manager of OCHA Philippines |
| Male | Mr. Einar Bjorgo | UNOSAT Director |
| Male | Mr. Luca Dell'Oro | Chief, Disaster Risk Management and Climate Resilience Section, UNOSAT |
| Male | Mr. Manuel Fiol | Associate Programme Officer at UNOSAT |
| Male | Mr. Khaled Mashfiq | Specialist and Regional Liaison at UNOSAT Bangkok |
| Male | Mr. Lars Bromley | Specialist of Human Security Section at UNOSAT (based in NYO) |
| Male | Mr. Olivier Vandamme | Chief, Business Exploration, Strategic Planning and Coordination Section<br>United Nations Satellite Centre (UNOSAT) |

## Annex IV: Project Theory of Change



## Annex V: Survey questionnaire


This survey is part of the independent midline evaluation underway for UNOSAT's **Emergency Mapping Service**. Its primary objective is to collect perspectives and feedback from partners, specifically of recipients and users of the products and services offered under this programme.

We highly value your feedback and invite you to take this brief online survey, which should take approximately **15 minutes or less** to complete. Your anonymity will be maintained throughout the process. All responses will be treated with the utmost confidentiality. Your personal information and organizational affiliation will not be linked to the results, and your individual responses will not be disclosed. The survey results will only be presented in an aggregated, non-attributable format. The survey will be open until **5 October 2023.**

We appreciate your participation in this survey!

When you are ready to begin, just click on the "OK" button below.


* 1. What is your gender?

- ◯ Female
- ◯ Male
- ◯ Non-binary
- ◯ I prefer not to disclose my gender

* 2. What is your nationality?

* 3. Over the past two years, have you **requested/activated or used** any UNOSAT products through the Emergency Service?

- ◯ Yes, I have requested/activated it myself
- ◯ Yes, I am part of a team that has requested/activated
- ◯ Yes, I have used the products (received via email distribution from colleagues or from platform/website)
- ◯ Yes, I (my team) requested/activated AND used
- ◯ No, I (my team) have neither requested/activated nor used
- ◯ Other (please specify)

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## About products and services

* 4. How **frequently** have you requested/activated/used mapping products and services from UNOSAT over the past two years?

- ◯ Once
- ◯ Twice
- ◯ Three to five times
- ◯ More than five times

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About products and services

**In this section, we request that you indicate distinct experience(s) you either regard as good or bad product(s) or service(s) from UNOSAT, specifically in terms of ease of coordination processes, timeliness, or quality of services or products received. If you made multiple requests for different events, kindly refer to one event of your choice in this and the subsequent questions. Whenever your experience was different for different requests, you may want to use the comment fields to highlight the difference.**

* 5. For which type of natural or man-made hazard did you request/activate/use mapping service/product from UNOSAT?
Tick all that apply.

- [ ] Floods
- [ ] Tropical cyclone
- [ ] Volcano
- [ ] Fire
- [ ] Oil spill
- [ ] Technological disaster
- [ ] Human rights and security
- [ ] Other (please specify)

* 6. When (month, year) did the hazard(s)/disaster(s) occur?

7. Which type(s) of product(s) did you receive?
Tick all that apply.

- [ ] Map
- [ ] Live WEB map
- [ ] Report
- [ ] Vector / Image sharing
- [ ] Other (please specify)
- [ ] Table/Excel
- [ ] Powerpoint
- [ ] Dashboard

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Utilization

* 8. Has your organization used UNOSAT products and services for the purpose of:
Tick all that apply.

- [ ] Informed decision-making
- [ ] Enhanced coordination with other actors
- [ ] Reduced response/assessment time
- [ ] Heightened awareness raising/information sharing
- [ ] Research
- [ ] Communication
- [ ] Other (please specify)

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## User satisfaction

* 9. How would you rate the overall quality of the mapping products and services delivered by UNOSAT?

- ◯ Very good
- ◯ Good
- ◯ Acceptable
- ◯ Bad
- ◯ Very bad

Please explain your response here

* 10. On a scale of 1 (slow) to 4 (quick response), how timely is UNOSAT's **initial response** to mapping requests?

1 Response time 4

* 11. How satisfied or dissatisfied are you with the **timeliness of delivery** for UNOSAT's mapping products and services?

- ◯ Very satisfied
- ◯ Satisfied
- ◯ Neutral
- ◯ Dissatisfied
- ◯ Very dissatisfied

Please explain your response here

* 12. On a scale of 1 (not relevant) to 4 (highly relevant), how would you rate the relevance of UNOSAT's mapping products and services to your organization's work in:

| | Relevance |
|---|---|
| Disaster response | |
| Human rights and conflict-related monitoring | |
| Achieving SDG goals | |

* 13. How well or poorly do UNOSAT's mapping services and products align with your organizational goals and priorities?

- ◯ Very well
- ◯ Well
- ◯ Poorly
- ◯ Very poorly

Please explain your response here

* 14. Were there any products or services you were expecting from UNOSAT that were not provided?

- ◯ No
- ◯ Yes (please specify)

* 15. On a scale of 1 (not at all useful) to 4 (very useful), how would you rate the overall usefulness of UNOSAT's mapping products and services over the past year?

1 Overall usefulness 4

16. Please suggest any way in which UNOSAT could improve the efficiency of their services.

17. How could UNOSAT's mapping products and services be made more relevant to your work or your organization?

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## Impact of the service

* 18. Please rate the extent to which UNOSAT's mapping products and services have complemented or added value to your organization's work.

- ◯ Extremely complementing/value-adding
- ◯ Adequately complementing/value-adding
- ◯ Moderately complementing/value-adding
- ◯ Not at all complementing/value-adding

Please explain your response here

19. Please provide an example of how UNOSAT's mapping products and services were critical to your operations in the past and how they have made a difference to your work or the end-beneficiaries (if applicable). Be as precise as possible.

20. Please estimate the monetary value (in US dollar) of the benefits identified in the previous question, above. Please limit your answer to an estimate of one activation/request, in case of multiple activations/requests. For example, if the benefits were staff cost savings for improved coordination or more efficient decision making, what is the estimated US dollar value of those savings? Or if the benefits were material developed for training, what is the estimated US dollar value if the material had to be developed elsewhere? Please provide the aggregate monetary value for all benefits identified.

0 1,000,000

* 21. Do you think the provision and use of geospatial data through UNOSAT mapping products and services contributed to improving assistance and support for women and groups made vulnerable in the humanitarian settings you work in? Please provide specific examples or anecdotes if possible in the corresponding space.

Yes

No

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Added value of the service

* 22. Does you organization use other mapping service providers?

- ◯ No, we have not used other mapping service providers
- ◯ Yes, we have used other mapping service providers (please specify below which ones)

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Added value of the service

* 23. How would you compare the other provider's product and service delivery in terms of quality and time?

Quality

Time

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On coordination

* 24. Did UNOSAT coordinate with your GIS department or Space Agency to avoid duplication and maximize partnerships?

- ◯ Yes, UNOSAT coordinated with us
- ◯ No, but I initiated
- ◯ No coordination was done by me nor by UNOSAT
- ◯ Not applicable to me as my organization does not have a GIS department nor a space agency

25. What are the main challenges or obstacles faced by your organization when coordinating emergency responses, and how are these challenges being addressed?

26. How could UNOSAT's coordination with your organization be improved?

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## Future requests

* 27. On a scale of 1 (not likely at all) to 4 (very likely), how likely are you to continue using UNOSAT's mapping products and services over the long-term?

Likelihood of continued use of service

1 4

* 28. What factors may influence your continued use of UNOSAT's products and services in the future?

Tick all that apply.

- [ ] Ease of access
- [ ] Data accuracy and quality
- [ ] Relevance to our needs
- [ ] Timeliness
- [ ] Data interoperability
- [ ] Availability of technical support
- [ ] Innovative Technology
- [ ] Other (please specify)

* 29. Would you recommend UNOSAT as a mapping service provider to other organizations in the humanitarian assistance or human rights fields?

Yes, why?

No, why not?

30. How could UNOSAT improve the effectiveness of its mapping service (or the degree to which the Mapping Service products and services, technology, process, or solutions perform its intended functions, achieves its intended goals or produces its desired results)?

31. Do you have any other suggestions on how UNOSAT could increase the sustainability and long-term impact of their mapping services (e.g., communication, products, services)?

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Follow-up

* 32. Would you agree to be contacted to discuss at more length your experience?

- ◯ No
- ◯ Yes, please provide your email address here


**You have reached the end of the survey. Thank you for your participation!**

## Annex VI: List of Documents Consulted

- First annual narrative and finance reports
- Legal Agreement
- Logical framework and outcome areas
- Project theory of change
- Project description and project workplan
- UNOSAT list of activations
- UNOSAT website google analytics and social media statistics
- Memorandum of Understanding with partners
- Strengthening Capacities in the use of geospatial information for improved resilience in Asia-Pacific and Africa project documentation
- UNOSAT Imagery Analysis Signature Handbook (IASH)
- Midterm review of the Norwegian Humanitarian Strategy and Strategic Partnership Model
- EOC/OSOCC Assessment & Analysis Cell Course powerpoint presentation
- UNOSAT annual donor meeting material (2022. 2023)
- 2014-2022 previous phase documentation
- List of purchase requests
- Sendai Framework reporting
- UN resolution E/2021/L.22
- Independent evaluation of the Rapid EMSMapping Service 2018
- OCHA, Disaster Impact Model, Technical Paper, 20 June 2022
- Website content, including, UN, reliefweb, Copernicus, Gidsta, Twitter (X), etc.:
    - https://earthobservatory.nasa.gov/images/148983/thailand-swamped-by-monsoon-flooding
    - https://disasterscharter.org/en/web/guest/activations/-/article/flood-large-in-thailand-activation-734-
    - https://storymaps.arcgis.com/stories/81a75d0c1b76448ebfde7d0a24536530
    - https://reliefweb.int/disaster/fl-2021-000147-tha
    - https://ahacentre.org/wp-content/uploads/2022/07/ARMOR-3rd-Ed.pdf
    - https://www.gistda.or.th/news_view.php?n_id=5025&lang=EN
    - Pakistan Monsoon Floods 2022 Islamic Relief Pakistan (12 October, 2022) - Pakistan | ReliefWeb
    - 2022 floods response plan Pakistan
    - Pakistan Floods Response Plan | Financial Tracking Service (unocha.org)
    - Pakistan Floods 2022 Post-Disaster Needs Assessment
    - PDNA-2022.pdf (pc.gov.pk)
    - Flood water extent after 100 days - https://twitter.com/pierre_peron/status/1592357833995350017
    - Evolution of flood water extent - https://reliefweb.int/report/pakistan/pakistan-2022-monsoon-floods-humanitarian-response-snapshot-13-september-2022
    - https://twitter.com/pierre_peron/status/1570741223044026368
    - Bi-weekly flood extent analysis (page 6) - https://reliefweb.int/report/pakistan/revised-pakistan-2022-floods-response-plan-01-sep-2022-31-may-2023-04-oct-2022
    - https://twitter.com/pierre_peron/status/1569663594928775171
    - 2010 flooding
    - https://unosat-geodrr.cern.ch/portal/apps/dashboards/4f878691713a40f3b8ef3140e63c9f6d

- posted on GISTDA's website
- UN Thailand website
- https://news.un.org/en/story/2023/02/1133177#:~:text=After%20a%20massive%20earthquake%20hit%20southern%20T%C3%BCrkiye%20and,still%20believed%20to%20be%20buried%20under%20the%20rubble
- REACH Rapid Assessment

UNOSAT products:

- https://unitar.org/maps/map/3376
- https://unitar.org/maps/map/3375
- https://unitar.org/maps/map/3374
- https://unitar.org/maps/map/3373
- https://unitar.org/maps/map/3403
- https://unitar.org/maps/map/3401
- https://unitar.org/maps/map/3398
- https://unitar.org/maps/map/3397
- https://unitar.org/maps/map/3392
- https://unitar.org/maps/map/3391
- https://unitar.org/maps/map/3389
- https://unitar.org/maps/map/3386
- https://unitar.org/maps/map/3383
- https://unitar.org/maps/map/3381
- https://unitar.org/maps/map/3380
- https://unitar.org/maps/map/3379
- https://unitar.org/maps/map/3378
- https://unitar.org/maps/map/3377

## Annex VII: Evaluation question matrix

| Questions | Judgement criteria/indicators (mention logframe indicator) | Data collection methods[13] |
|---|---|---|
| **EQ1 Relevance: Is the project doing the right thing?** | | |
| a. To what extent is the project aligned with UNITAR's efforts to helping Member States implement the 2030 Agenda for Sustainable Development (particularly Goal 1, 13, 16 and 17) and the UNITAR strategic framework (2022-2025)? | That the project is producing results with the potential to help UNITAR's efforts to help Member States implement the 2030 Agenda.<br>SDG alignment:<br>• SDG 1: Number of mapping products provided for disaster response and post-disaster needs assessments in the 93 countries in special situation.<br>• SDG 13: Number of risk analysis and preparedness mapping products delivered for climate-related hazards.<br>• SDG 16: Number of mapping products delivered to support human rights, peace and security purposes.<br>• SDG 17: Number of partnerships with UN agencies, NGOs, and other stakeholders leveraged. Number of coordination mechanisms contributing to.<br>UNITAR Strategic Framework Alignment:<br>• Strategic Objective 5: Number of technology-enabled mapping products provided for evidence-based decision making<br>• Number of result areas in Programme Budget | Document review: Data from activation table – need to add SDG and country classification<br><br>Stakeholder mapping, MoU review<br><br>Number of Programme Budget Result areas aligned to Project and SO5. |
| b. To what extent is the UNOSAT EMS and its different products, as designed and implemented, relevant to the institutional needs and priorities of the respective partner institutions working in the area of disaster management and protection of peace, justice, security and human rights? | Indicators that could demonstrate the relevance of UNOSAT's mapping services to partner institutions' needs include:<br>• Percentage of partners that request mapping services each year (repeat business indicating relevance)<br>• Percentage of partners agreeing the services meet a high priority need in surveys<br>• Rated importance of mapping services for partners' work in key informant interviews<br>• Testimonials and examples from partners on how mapping was critical for their disaster response or human rights work<br>• Uptake and usage of services by new partners each year (expanding client base)<br>• Adoption of UNOSAT coordination platforms like GDACS by key humanitarian coordination bodies | Document review: activation table<br><br>Monitoring survey<br><br>KII<br><br>Survey independent evaluation<br><br>impact stories Tonga and South Sudan<br><br>activation table<br><br>KII with UNOSAT and partners<br><br>Online research/use of AI |

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| | • Citations of UNOSAT mapping products in partners' reports, publications, press releases, media | |
| a. How relevant is the project to supporting gender equality and women's empowerment and meeting the needs of other groups made vulnerable, including countries in special situations? (GEEW) | Based on the information provided about the UNOSAT Rapid EMS project, there do not appear to be any explicit indicators related to gender equality, women's empowerment, or vulnerable groups. Some potential indicators that could be relevant include:<br>- Number of partnerships/collaborations with women's groups or organizations focused on vulnerable populations<br>- Number of tailored information products provided on issues specifically affecting women and girls<br>- Number of trainings conducted on utilizing geospatial data for gender-responsive disaster management – no trainings as part of this project<br>- Number of gender-related recommendations provided to partners along with geospatial analysis<br>- Case studies demonstrating how geospatial data helped improve assistance to women and vulnerable groups in humanitarian settings<br>- Policies, plans or interventions of partners that utilized UNOSAT's data to benefit women and vulnerable groups.<br><br>Some process/output indicators could also be relevant:<br>- Existence of a gender strategy/action plan for the project<br>- Resources (funding, staff) allocated to address gender/vulnerable groups<br>- Gender training delivered to UNOSAT project team members. | gender strategy<br><br>Word search in activation table and products<br><br>KII with analysts on standards/guidance used for analysis (gender considerations?)<br><br>Document review: Other UNOSAT projects providing training, also under coherence<br><br>Word search in activation table and products<br><br>2x Independent evaluation survey on requesters views on gender-sensitive mapping products<br><br>And KII<br><br>Gender strategy<br><br>Budget and Financial Report<br><br>UNSWAP report word search<br><br>List of mandatory training certificates I know gender certificates |
| b. How well does the project align and implement according to environmental | Here are some potential indicators that could be used to assess the UNOSAT Rapid EMS project's alignment with environmental | Internet research, e.g. 200-800 watts of electricity as per |

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| | frameworks, e.g., Blue Marble principles? (ENVSUSE) | sustainability frameworks like the Blue Marble principles:<br><br>Environmental consequences of deploying satellite vs. flying into country vs. locals to deploy drones<br><br>CO2 consumption of storages | SMI_Problem7.pdf (nasa.gov)<br><br>Commercial imaging companies are collecting upwards of 100 terabytes (TB) or more per day, every day, 365 days a year, accumulating huge data sets measured in petabytes per company.<br><br>KII |
| | EQ2 Coherence: How well does the project fit? | | |
| c. | To what extent does the UNOSAT EMS complement other humanitarian assistance related projects and services provided by UNITAR Divisions and UNOSAT and by other organizations? How well is the project building on lessons learned and experience from the previous three phases and its 20 years of existence? | Internal coherence:<br>- Number of other UNOSAT projects, e.g. the Norad funded project, providing related services. Synergies? Duplication?<br><br>External coherence:<br>- Percentage of EMS datasets made available on humanitarian data platforms like HDX.<br>- Number of coordinated mapping activations with other providers to avoid duplication.<br>- Number of standard operating procedures or systems aligned across different humanitarian agencies.<br>- Qualitative feedback from partners on how the EMS complements their work.<br>- Examples of EMS methods or products incorporated into partners' initiatives (also Relevance).<br>- Number of collaborative requests, planning processes or needs assessments with partners (also Relevance). | Document review of other UNOSAT projects<br>KII<br><br>Internet research<br><br>Internet research, including SMCS with Copernicus AND KII AND survey IE<br><br>Internet research, including SMCS / KII<br><br>KII<br><br>KII about secondments with UN ESCAP |
| d. | How well does the UNOSAT EMS align with the Norwegian Humanitarian Strategy | - Percentage of UNOSAT analyses used for protection-related issues (civilians, human rights) - indicates it is supporting the prioritized focus on protection. | -Activation table |

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| and the Strategic Partnership Model? 119 | - Number of UNOSAT products shared across disaster response and human rights domains - shows its integrated approach between sectors.<br>- Number of adoption of new technologies like AI for analysis (e.g. FloodAI)- reflects innovation focus.<br>- Reduced time between disaster occurrence, request date and UNOSAT product delivery - suggests capacity for rapid response.<br>- User feedback on utility of UNOSAT products for decision-making - measures effectiveness of its support.<br>- Adoption of standards/metrics Norway requires from humanitarian partners. | (two separate activation tables between HR and disaster)<br>Document review, KII with Lars team<br>From activation table<br>User feedback survey<br>Document review: Norwegian Humanitarian Strategy and project documentation (or using AI) |
| e. To what extent is coordination with the UN Operations and Crisis Centre (UNOCC) and hence at the Executive Office of the Secretary General, as well as with other UN agencies (OCHA, UNHCR, UNICEF, WHO, ICRC, IFRC, UNESCO, OHCHR amongst others), the ICC and the REACH Initiative and the Satellite Mapping Coordination System (SMCS) set up in the framework of the Global Disaster Alerts and Coordination System (GDACS), the Humanitarian Data Exchange (HDX) and creation of the UNOSAT Satellite Image bank leading to synergies and reducing potential duplication? | Qualitative feedback from partners indicates they find UNOSAT's services valuable, timely and impactful.<br>Testimonials highlight the unique benefits of UNOSAT analysis for coordination and decision making.<br>Number of products shared through coordination mechanisms<br>Number of disaster event jointly coordinated through mechanism | Independent evaluation survey and KII<br>KII, Independent evaluation survey and impact stories.<br>SMCS platform, products shared with UNOCC<br>KII |
| f. How well does the project complement and foster synergies with other existing actors carrying out analysis, such as academia, the | Academia:<br>- Number of academic partnerships, MoUs, or collaborations.<br>- Instances of data sharing, joint analysis, co-authored papers etc. | List of MoUs / Report review<br>HR table |

[119] https://www.Norad.no/en/front/funding/Norads-strategic-partnerships-with-civil-society-organisations/

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| private sector and governments? | - Number of student internships or fellowships focused on mapping service.<br>- Citations of academic literature/methods in UNOSAT's work.<br>Private Sector:<br>- Private sector data sources used in UNOSAT analysis.<br>- Number of coordinated mapping efforts during disasters.<br>- Private sector secondments or staff exchanges with UNOSAT. – not to my knowledge<br>- UNOSAT presentations/participation in industry conferences and events.<br>- Agreements with private sector for image provision<br>- Number of images purchased from private sector<br>Government:<br>- Percentage of analyses validated against or incorporating government data.<br>- Instances of collaboration with regional mapping centres or initiatives.<br>- Examples of filling gaps and complementing national efforts.<br>Cross-cutting:<br>- Qualitative feedback from partners on collaboration with UNOSAT.<br>- Co-development of tools, methods, standards etc.<br>- Resource contributions from partners (data, software, algorithms etc.)<br>- Monitoring data on partnerships and observed synergies over time.<br>Other UN organizations with their own GIS capacity covered as part of the question above | Document review: Mapping methodology/handbook (if any of such exists)<br><br>Geo-information for Disaster Management, Peter van Oosterom, Siyka Zlatanova, Elfriede Fendel – 2006 (ISBN 978-3-540-27468-1)<br><br>Managing Crises and Disasters with Emerging Technologies : Murray E Jennex, Feb. P. (2016)<br>FAO's AVHRR-based Agricultural Stress Index System (ASIS) for global drought monitoring, International Journal of Remote Sensing, 37:2, 418-439, DOI: 10.1080/01431161.2015.1126378<br><br>Online search<br><br>Online search<br>MoU<br><br>Purchase request table<br><br>Review of products<br><br>KII independent evaluation survey<br><br>KII, user survey<br><br>List of MoUs |
| **Effectiveness** | | |
| g. To what extent is the project on track in achieving planned outputs, outcomes and impact?[120] What are the factors positively or negatively affecting the project's performance? | Indicators from the Log Frame<br>Key indicators that the project is on track include:<br>Outputs:<br>See annual report<br><br>Outcomes:<br>See annual report<br>- Increase in average website visitors and views per product<br>- New partnerships formed such as with NVIDIA | Web analytics received<br><br>Document review list of MoUs<br>Impact stories, user and independent evaluation survey, case studies<br>Impact stories, user and independent evaluation survey, case studies<br>Independent evaluation survey |

[120] Logframe and project Theory of Change available in Annex E

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| | Impact:<br>- Anecdotal evidence like quotes and testimonials suggest UNOSAT data helps improve disaster response and save lives<br>- Examples given of UNOSAT data being used for legal cases related to human rights violations<br>- Survey data indicates most users find UNOSAT products very or fairly useful for operational planning and decision making in humanitarian contexts. | |
| k. To what extent is the UNOSAT EMS on track to provide better information for informed decision-making in situations of natural disasters and conflict? | See indicators for j | |
| l. To what extent is environmental sustainability taken into account when operating the UNOSAT EMS? (ENVSUSE) | See indicators for question e | |
| m. To what extent have relevant recommendations from the previous independent evaluation been taken into account/implemented in the project design and implementation? | -<br>- Number of recommendations marked as implemented in the 2019 follow-up on implementation of recommendations and subsequent progress reports indicate they have been implemented | Update of management response |
| n. To what extent are a human rights-based approach, disabilities and a gender mainstreaming and inclusiveness strategy incorporated in the design and implementation of the project? (GEEW) | - Availability of mapping products in formats accessible to those with disabilities (e.g. visual impairments)<br>- Inclusion of vulnerability information in analysis where available (considers at-risk groups)<br>- Diversity of UNOSAT staff employed in terms of gender, ethnicity, disabilities (measures inclusive workplace)<br>- Partnering with organizations focused on human rights, women's rights, disabilities to inform approach<br>- Tracking use of products for advocacy on inclusion issues (captures impact) | Review of mapping products on website<br>Review of mapping products on website<br><br>HR table<br><br>List of MoUs |
| o. To what extent is the project making effective use of new technologies including Artificial Intelligence (AI), machine learning and algorithms to achieve its outcomes? | - Number of operational AI/ML tools, models or pipelines deployed (measures extent of adoption)<br>- Percentage of images analysed by AI algorithms vs. manually (automation rate)<br>- Reduction in analyst processing time enabled by AI (productivity gain)<br>- Accuracy metrics for AI output vs. human analysis (validates quality) | Document review and KII with Lars' team<br><br>Activation table<br><br>Activation table<br><br>KII with Lars' team<br>Financial reports year 1 And budget |

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| | - Number of research projects focused on applying AI/ML (level of innovation)<br>- Percentage of budget allocated to AI development (investment level)<br>- Feedback from users on value-add or issues with AI-generated products<br>-<br>- Citations of UNOSAT AI approaches in academic literature (reputation) | Independent evaluation survey, KII with users<br><br>Online literature search |
| p. To what extent have the project's structure and partnerships been effective? | - Renewal rate of MoUs with partners - shows ongoing collaboration<br>- Hosting at CERN provides stable or increasing in-kind support to UNOSAT through office facilities, IT infrastructure, and internet connectivity<br>- Secondments/embedding achieved yearly - deepens partnerships – see above<br>- Financial or operational contributions from partners - leveraging partnerships<br>- Use of platforms like GDACS-SMCS - coordination enabled<br>- Reductions in duplicate mapping efforts due to coordination - efficiency gains<br>- Number of joint research initiatives - partnership-driven innovation | List of MoUs<br><br>CERN MoU details<br><br>List of MoUs<br>Online search and KII<br>KII<br><br>Stakeholder mapping |
| q. To what extent is the project's monitoring and self-evaluation effective in assessing user-based real-time impact (see recommendation from previous independent evaluation) and updating indicators and targets for outcome and impact? | - Existence of a systematic user feedback mechanism tied to monitoring outcomes<br>- % of products/activations with documented user feedback collected<br><br>- Clear outcome-level indicators defined and tracked over time<br>- % of outcomes indicators with collected baseline and progress data<br>- X# of impact stories and case studies developed annually<br>-<br>- Evidence of monitoring usage and effects of products by end users<br>- X% of targets and indicators updated annually based on results<br>- % of reporting focused on outcomes/impact versus outputs<br>- Existence of a results-based M&E framework beyond activities<br>- X% budget allocated to monitoring and evaluation | User feedback survey, KII with Bia<br><br>Activation table and user survey<br><br>Logframe update<br>Logframe update<br>Online search<br><br>Logframe update<br>Logframe update<br>User and independent evaluation survey<br>Document review (narrative reports)<br>Document review (impact stories)<br><br>Evaluation plan, logframe update, KII<br><br>Budget |
| **Efficiency** | | |
| r. To what extent have outputs been produced in a cost-efficient manner (e.g., in comparison with alternative approaches)? | - Cost per output: Calculating the total cost of producing each output and comparing it to benchmarks, either internal historical costs or external comparable services. A lower cost | Purchase request table |

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| | per output indicates greater cost-efficiency.<br>- Output per staff member: Assessing the number of outputs produced per staff member assigned to the project. A higher output per staff signals greater staff productivity and cost-efficiency.<br>- Cost performance index: Tracking the ratio of earned value (progress made) versus actual costs spent over time. A higher cost performance index indicates outputs are being produced at lower costs than planned.<br>- Schedule performance index: Monitoring the ratio of completed work against the time spent. A higher schedule performance index signals outputs are being completed faster than scheduled, indicating cost-efficiency.<br>- Outputs on budget: Tracking % of outputs completed within the allotted budget. A higher % within budget indicates greater cost control.<br>- Outputs on time: Tracking % of outputs delivered by scheduled timelines. More timely completion indicates costs have not blown out due to delays.<br>- Stakeholder feedback: Gathering feedback from project team members, clients and experts on their perceptions of project cost-efficiency. Useful for qualitative assessment.<br>- Alternatives: using drones, not satellite. Alternative product (live map etc.) – can we calculate general costs per product? | Activation table<br><br>Activation table<br><br>User and independent evaluation feedback, KII<br><br>Financial report year 1<br><br>Narrative report year 1 and logframe update<br><br>Online research using AI on drones and alternatives |
| s. Were the objectives achieved on time so far and was the UNOSAT EMS delivered in a timely manner emergency situations? | Timeliness of mapping product delivery:<br>- The % of mapping products (e.g. maps, reports, data) delivered within agreed or expected timeframes, especially for emergency activations. Higher % indicates greater timeliness.<br>- Activation response time: The time elapsed between receiving a mapping request and starting work on it. Shorter response times indicate ability to mobilize quickly in emergencies.<br>- Mapping turnaround time: The time taken from initial data collection/analysis to final product delivery. Shorter turnaround indicates greater speed of output. | Activation table<br><br>Progress report year 1 and logframe update |

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| | - Schedule performance index: The ratio of completed mapping work vs. time spent indicates if progress is on track. Higher is better.<br>- Adherence to service standards: Comparison of product delivery timeframes against internal standards or service level agreements. Helps assess timeliness.<br>- Progress against workplans: Comparison of completed objectives/activities vs plans indicates if on track.<br>- Achievement of time-bound targets: % of time-specific targets and milestones in project plans that were achieved as scheduled. Higher % is better.<br>- Activation to delivery time graphs: Visual tools plotting time from activation to delivery for each emergency mapping can highlight patterns.<br>Compare to logframe status | |
| t. To what extent were partnership modalities, including the hosting at CERN, conductive to the delivery of the mapping? Were the project's resources (human and financial) used as planned and fully utilised? | - See partnership indicators from p | |
| u. How environment-friendly (natural resources) has the project been? (ENVSUSE) | See indicators for e | |
| **Likelihood of impact and early indication of impact** | | |
| v. To what extent has the UNOSAT EMS initiated a real difference to the partners' work and improved humanitarian assistance and protection of human rights and to the end beneficiaries? | Here are some potential indicators that could help assess the extent to which the UNOSAT EMS is making a real difference to partners and beneficiaries:<br><br>**For Partners:**<br>- % of partners reporting UNOSAT data impacted decision-making or operations (via survey)<br>- Cost savings for partners from using UNOSAT vs. alternative information sources<br>- Reduced data gathering/assessment time for partners with UNOSAT support<br>- Instance of UNOSAT data enabling life-saving decisions or priority setting<br>- UNOSAT data facilitating new or improved policies, procedures, or capabilities of partners | Social media contribution analysis (to find out about other organizations using the maps without being the requester)<br><br>User and independent evaluation survey, impact stories, case studies, KII<br><br>KII with partners<br><br>KII with partners |

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| | - Partners requesting expanded UNOSAT support based on previous value added<br>**For Disaster response:**<br>- Reduced loss of life from disasters where UNOSAT supported response vs. historical baselines: Distaster loss statistics of 2016 Centre for Research on the Epidemiology of disasters CRED disaster loss database (from logframe)<br>- Reduced economic damages from multi-hazards vs baseline (from logframe)<br>- Increased proportion of targeted aid reaching affected people after supported disasters<br>- Accelerated humanitarian response time with UNOSAT mapping support<br>- Number of assessments by OHCHR, COIs and other functions for which OHCHR provides support functions stating positive impact from UNOSTAT analysis (logframe impact indicator)<br>**For Human Rights/peace/security:**<br>- Testimonials from human rights groups on value of UNOSAT data<br>- Expanded mandates given to UNOSAT for human rights support based on previous impact<br>The partners' and beneficiaries' own attribution of UNOSAT's unique added value is particularly important. But quantitative outcome indicators can also be revealing if quality baseline and monitoring data is available. This remains a challenge. | KII with partners<br><br>KII with partners<br><br>KII, independent evaluation survey |
| w. What other observable end-results or organizational changes (positive or negative, intended or unintended) have occurred or are likely to occur? | Here are some examples of indicators that could help identify and measure the end-results or organizational changes occurring due to a project like the UNOSAT EMS:<br>**Positive Intended Indicators:**<br>- Increase in partner budget allocations for geospatial analysis over time<br>- Adoption of new policies/procedures by partners integrating geospatial data<br>- New requests from partners for additional UNOSAT services<br>- Testimonials and examples from partners on organizational improvements due to UNOSAT<br>- Citations of UNOSAT work in partners' methodology guides or training programmes<br>- UNOSAT staff invited to provide expert guidance to partners | Online search, KII<br><br>Activation table<br><br>KIIS, impact stories<br><br>Online search, KII<br><br>KII<br><br>Online search<br><br>Online search |

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| | **Positive Unintended Indicators (indicative):**<br>- New collaborations or partnerships referencing UNOSAT as inspiration<br>- Citations of UNOSAT research methodologies in external publications<br>- Increased media coverage highlighting applications of geospatial analysis<br>**Negative Intended Indicators:**<br>- Reduction in GIS analysts or infrastructure of partners over time<br>- Fewer partners accessing alternative geospatial analysis sources<br>**Negative Unintended Indicators (indicative):**<br>- Partners reporting unused/unusable UNOSAT analysis<br>- Duplicative mapping efforts identified between UNOSAT and other providers<br>Also refer to outcome indicators for the intended ones. | Social media analysis, web search<br><br>Independent evaluation survey, KII<br><br>SMCS search (i.e, Copernicus and UNOSAT)<br><br>online search |
| x. What cumulative effects have the mapping initiatives made to the partners work in disaster response and to the end beneficiaries? | **Indicators for Partners:**<br>- Reduced time for needs assessments and situational analysis over successive disasters<br>- Increased use of geospatial data in partner planning, monitoring and reporting processes<br>- Cost savings for partners on disaster mapping/information over time<br>**Indicators for End Beneficiaries:**<br>- Reduced disaster mortality rates in countries supported by UNOSAT over time<br>- Lower disease outbreaks in supported disaster responses compared to historical baselines<br>- Increased % of affected population reached with aid after successive disasters<br>- Reduced displacement and homelessness post-disasters compared to previous disasters<br>**Indicators for Both:**<br>- Quicker time elapsed between disasters and commencement of response over time<br>- Geographic analysis showing high-risk areas now better supported after successive disasters<br>- Media reports highlighting improved disaster response capacity over time since UNOSAT activation<br>Partners would need to track and share their performance data over multiple years. Impact evaluations after major | KII, independent evaluation survey<br><br>KII, evaluation survey<br><br>KII, User survey<br><br>Flagship publication stats, e.g. Global Assessment Report on Disaster Risk Reduction 2022 - Our World at Risk: Transforming Governance for a Resilient Future - World \| ReliefWeb and Global Assessment Report on Disaster Risk Reduction (GAR) (undrr.org) |

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| | disasters could also help identify UNOSAT's cumulative benefits. | Online search |
| y. What has happened as a result of the mapping and other activities? | See indicators above | |
| z. How have the end-users benefitted from the UNOSAT EMS? | See indicators above | |
| **Likelihood of sustainability and early indication of sustainability** | | |
| aa. To what extent are the project's results likely to endure beyond the implementation of the activities in the mid- to long-term and under which conditions? | Here are some potential indicators that could help assess the likelihood of a project like UNOSAT's results and benefits continuing in the mid-to-long term after implementation:<br>- Funding: Levels of sustained/multi-year funding allocated specifically for mapping activities by donors and partners<br>- Diversification of donors<br>- Staffing: Mapping staff retention rates and stability of expert specialized capacity over time<br>- Institutionalization: Proportion of partners with formal policies, procedures and dedicated roles for geospatial analysis<br>- Usage: Continued utilization levels and integration of geospatial data in partners' systems and processes<br>- Mainstreaming: Inclusion of mapping methodologies in partners' core training programmes and guidance<br>- Coordination: Ongoing functioning of mechanisms like GDACS SMCS enabling sustained coordination<br>- Citizen Engagement: Sustained participation and data contribution to mapping via channels like UN-ASIGN<br>- External Environment: Ongoing global prioritization of evidence-based policy driving demand for mapping<br>- Exit Plan: Existence of partner transition plans or mitigation strategies for potential UNOSAT cessation<br>Sustained positive measurements on these types of institutionalizations, capacity, and funding indicators would suggest a higher likelihood of enduring benefits from the project's investments over the longer term. | Historic timeline of donor support<br><br>KIIs<br><br>UN-ASIGN stats<br><br>Online search<br><br>KIIs |
| bb. To what extent have the mapping initiatives contributed to better humanitarian assistance in the long term? | See answers above | |

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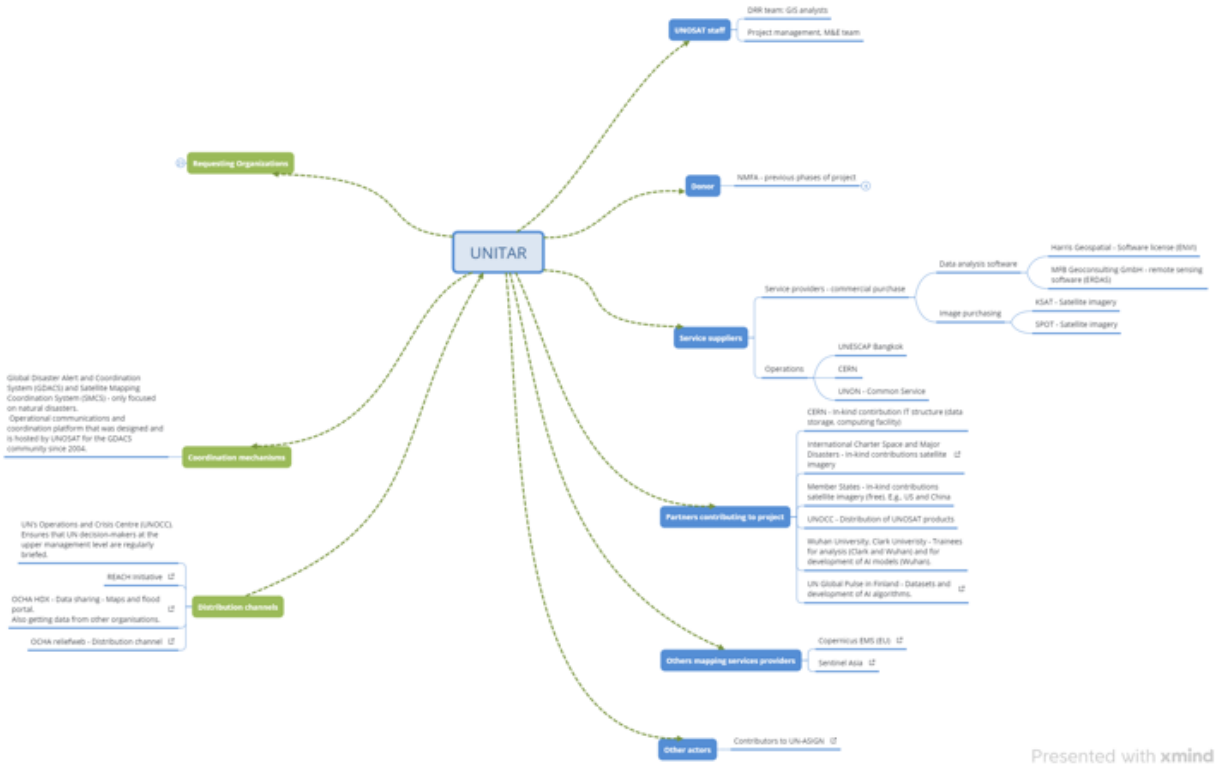
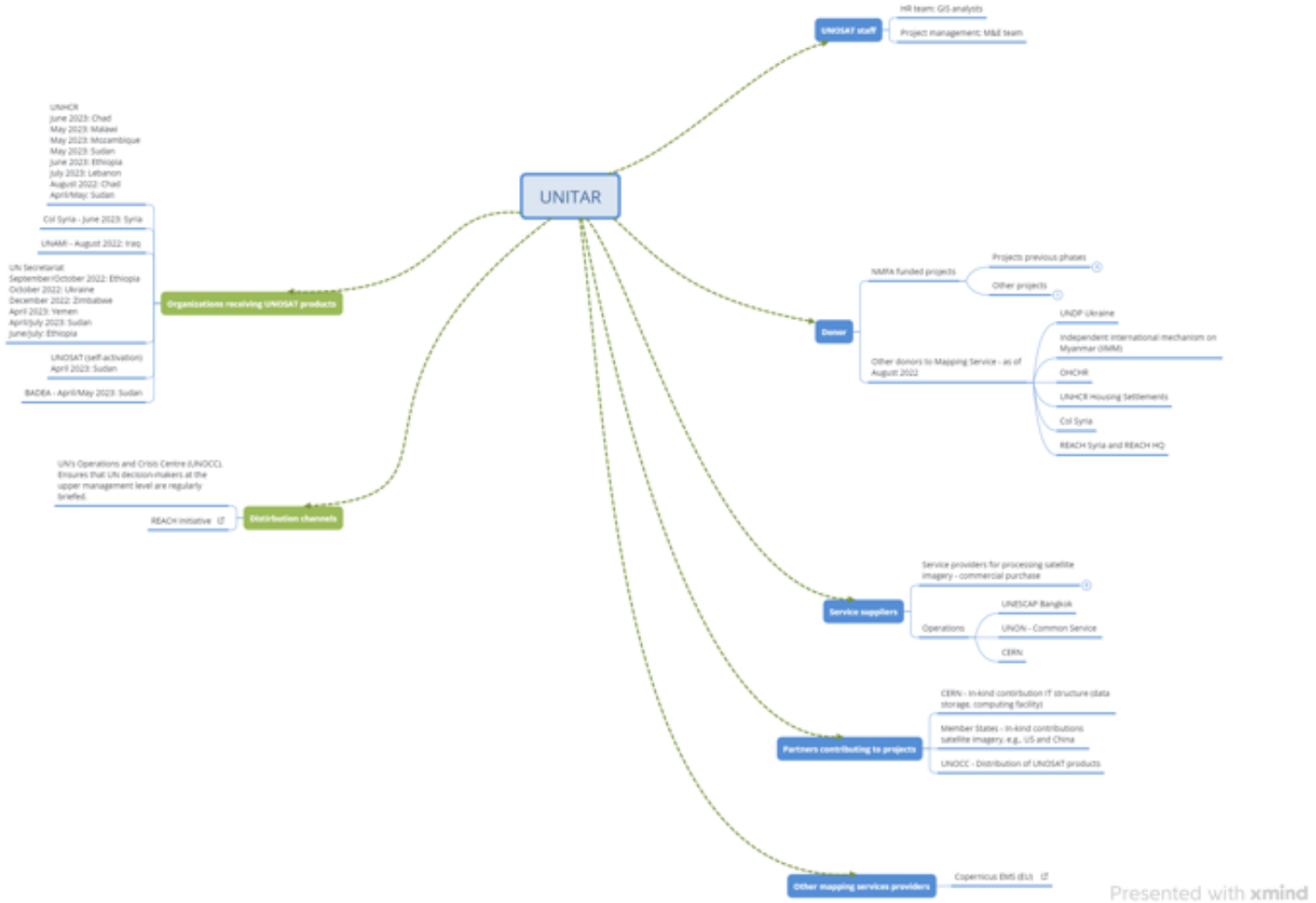
| cc. What are likely to be the major factors which influenced the achievement or non-achievement of sustainability of the mapping initiatives? | Prioritization of indicators in aa | |
| dd. How has environmental sustainability been considered during the project design and first part of implementation? (ENVSUSE) | See indicators for e | |

# Annex VIII: Stakeholder mapping

## Stakeholder mapping- Disaster Response

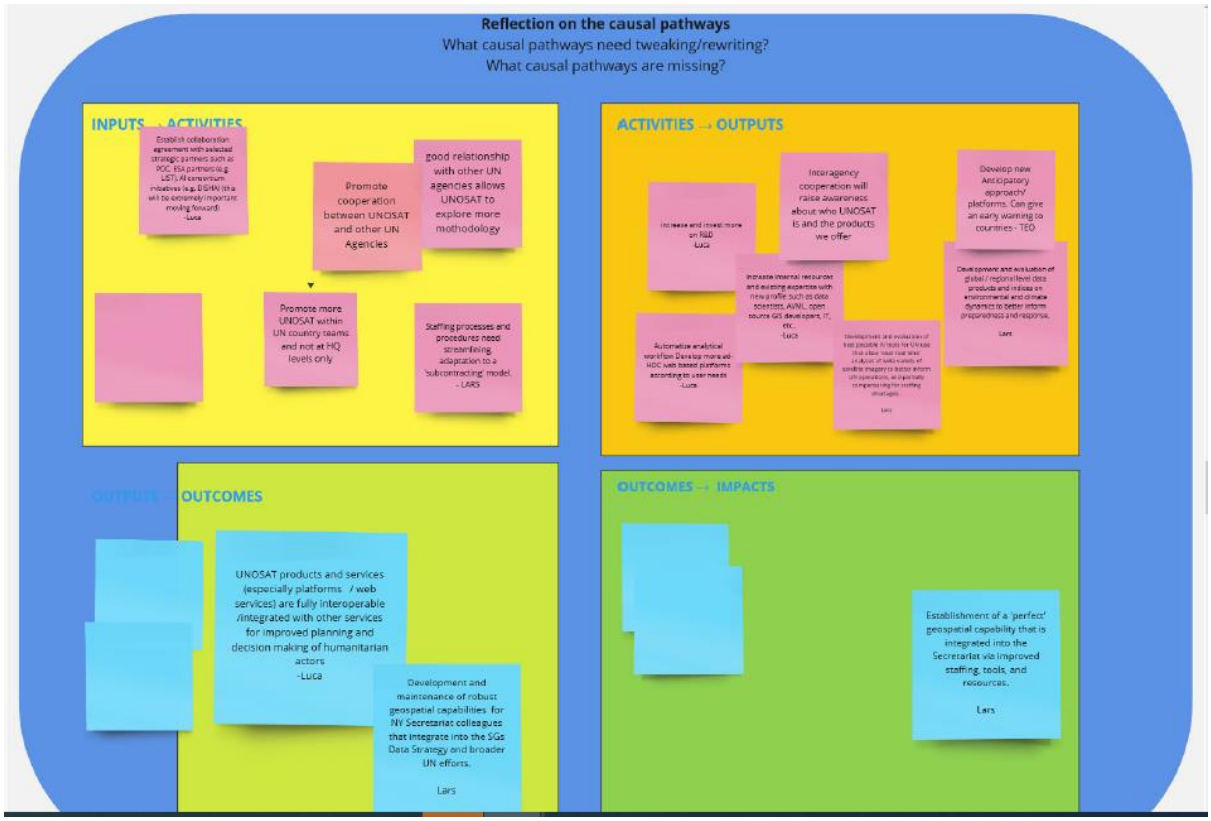


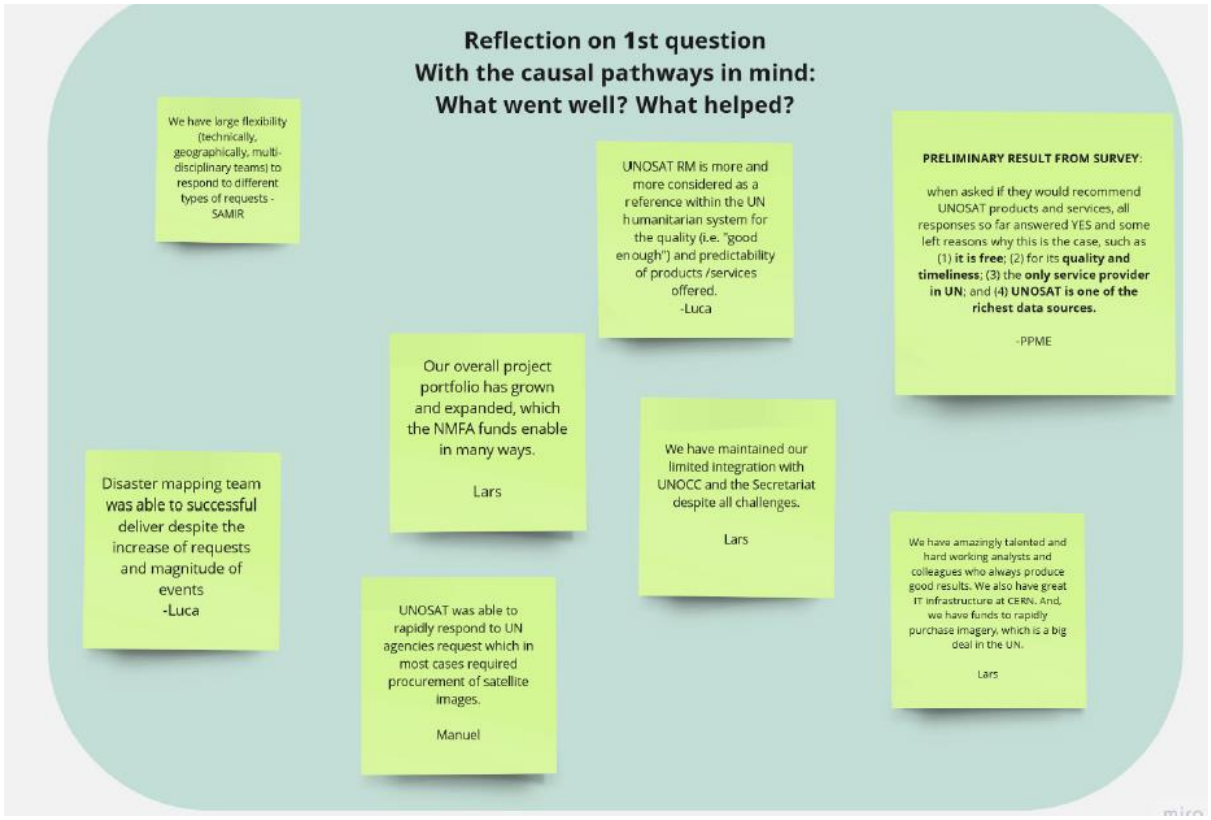
## Stakeholder Mapping - Human Rights

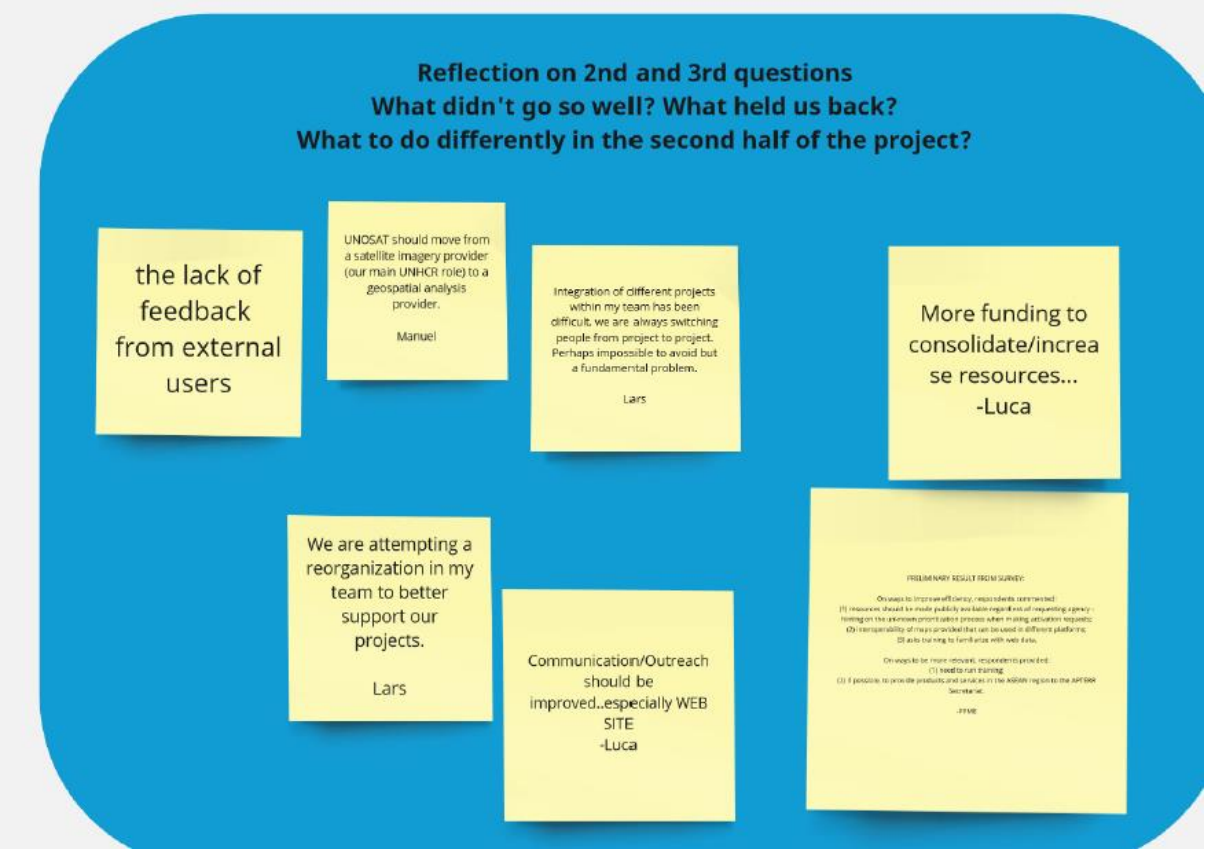


# Annex IX: After Action Reviews outputs

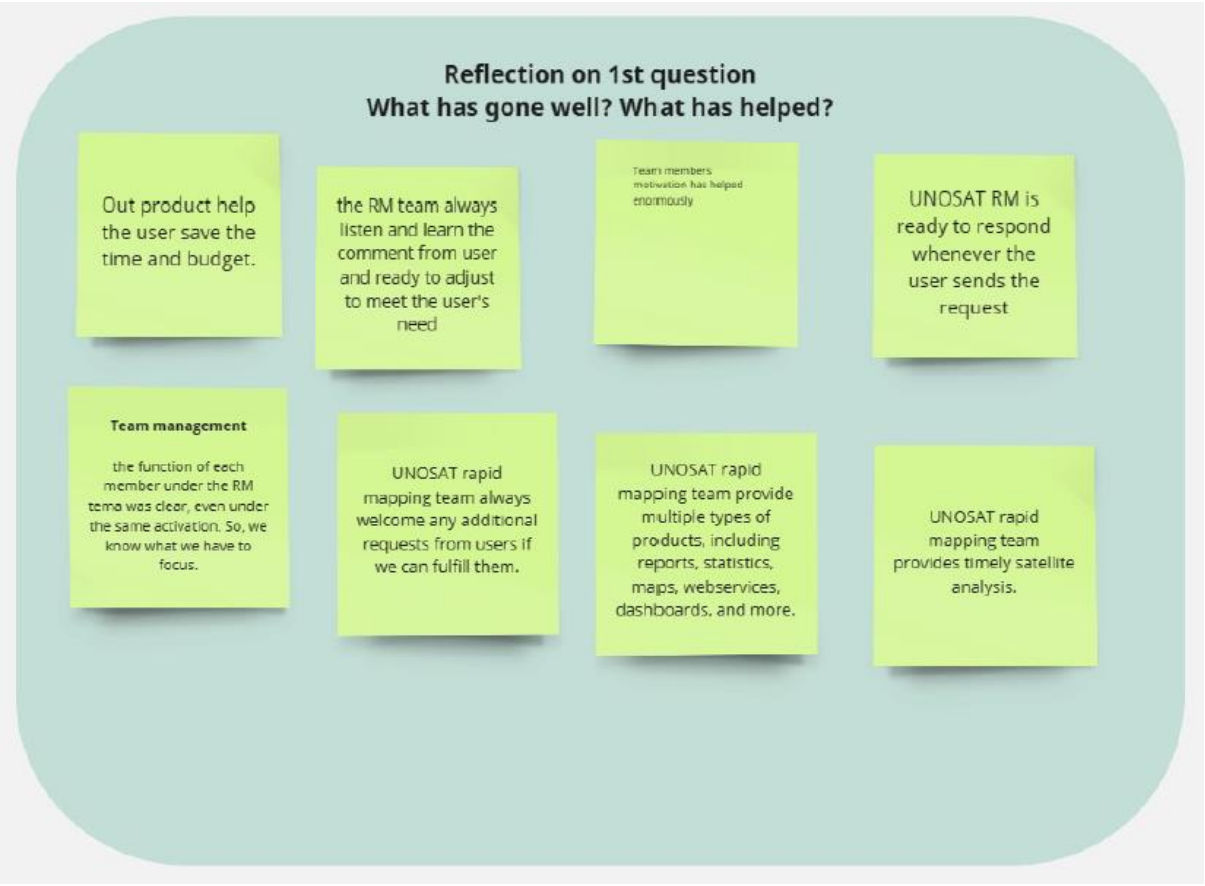
## After action review I on 27 September 2023






**After action review II on 20 October 2023**


Reflection on 1st question
What has gone well? What has helped?
Out product help the user save the time and budget.
the RM team always listen and learn the comment from user and ready to adjust to meet the user's need
Team members motivation has helped enormously
UNOSAT RM is ready to respond whenever the user sends the request
Team management
the function of each member under the RM temo was clear, even under the same activation. So, we know what we have to focus.
UNOSAT rapid mapping team always welcome any additional requests from users if we can fulfill them.
UNOSAT rapid mapping team provide multiple types of products, including reports, statistics, maps, webservices, dashboards, and more.
UNOSAT rapid mapping team provides timely satellite analysis.


Reflection on 2nd question
What didn't go so well? What held us back?
As my responsibility is to analyze the imagery data, in general, the data is ready to use from open sources. However, in some case, the data may be missing or not up to date, and it takes some time to modify it before using it.
The huge extra hours all over the reporting period to address the multiple requests. Low staffing capacity was compensated with motivation of the team!
The variety of data sources and uncontroable data source may affect to the quality of the product.
The UNOSAT rapid mapping team has a limited number of resources to handle multiple activations as times.


Reflection on 3rd questions
What to do differently in the second half of the project?
Develop automated models and increase the number of resources to enhance the capability of handling multiple activations simultaneously
Developing the closer relationship with a local agency to support the analysis.
In terms of the dataset from open sources, we encounter some issues related to missing data or data of poor quality. UNOSAT has made modifications to the data in certain countries (the conditions for using each dataset vary based on geography and the specific model). This presents a valuable opportunity to retain this data in our database, allowing us to use and enhance it for future reuse, particularly in countries that have experienced recurring disasters.

## Annex X: Evaluation code of conduct

**Annex: Evaluation Consultant Code of Conduct and Agreement Form**

**The evaluator:**

1. Must present information that is complete and fair in its assessment of strengths and weaknesses so that decisions or actions taken are well founded.
2. Must disclose the full set of evaluation findings along with information on their limitations and have this accessible to all affected by the evaluation with expressed legal rights to receive results.
3. Should protect the anonymity and confidentiality of individual informants. They should provide maximum notice, minimize demands on time, and respect people's right not to engage. Evaluators must respect people's right to provide information in confidence, and must ensure that sensitive information cannot be traced to its source. Evaluators are not expected to evaluate individuals, and must balance an evaluation of management functions with this general principle.
4. Sometimes uncover evidence of wrongdoing while conducting evaluations. Such cases must be reported discreetly to the appropriate investigative body. Evaluators should consult with other relevant oversight entities when there is any doubt about if and how issues should be reported.
5. Should be sensitive to beliefs, manners and customs and act with integrity and honesty in their relations with all stakeholders. In line with the UN Universal Declaration of Human Rights, evaluators must be sensitive to and address issues of discrimination and gender equality. They should avoid offending the dignity and self-respect of those persons with whom they come in contact in the course of the evaluation. Knowing that evaluation might negatively affect the interests of some stakeholders, evaluators should conduct the evaluation and communicate its purpose and results in a way that clearly respects the stakeholders' dignity and self-worth.
6. Is responsible for his/her performance and his/her product(s). They are responsible for the clear, accurate and fair written and/or oral presentation of study limitations, findings and recommendations.
7. Should reflect sound accounting procedures and be prudent in using the resources of the evaluation.

**Evaluation Consultant Agreement Form**[1]

**Agreement to abide by the Code of Conduct for Evaluation in the UN System**

**Name of Consultant:** Boru Douthwaite

**Name of Consultancy Organization (where relevant):** _____

**I confirm that I have received and understood and will abide by the United Nations Code of Conduct for Evaluation and I declare that any past experience, of myself, my immediate family or close friends or associates, does not give rise to a potential conflict of interest.**

Signed at *place* on *date* Westport, Ireland on 17 July, 2023

Signature: _____

[1] www.unevaluation.org/unegcodeofconduct

ETHICAL GUIDELINES FOR EVALUATION

# PLEDGE OF ETHICAL CONDUCT IN EVALUATION

UNEG United Nations Evaluation Group

**By signing this pledge, I hereby commit to discussing and applying the UNEG Ethical Guidelines for Evaluation and to adopting the associated ethical behaviours.**

## INTEGRITY

**I will actively adhere to the moral values and professional standards of evaluation practice as outlined in the UNEG Ethical Guidelines for Evaluation and following the values of the United Nations. Specifically, I will be:**

- **Honest and truthful** in my communication and actions.
- **Professional,** engaging in credible and trustworthy behaviour, alongside competence, commitment and ongoing reflective practice.
- **Independent, impartial and incorruptible.**

## ACCOUNTABILITY

**I will be answerable for all decisions made and actions taken and responsible for honouring commitments, without qualification or exception; I will report potential or actual harms observed. Specifically, I will be:**

- **Transparent regarding evaluation** purpose and actions taken, establishing trust and increasing accountability for performance to the public, particularly those populations affected by the evaluation.
- **Responsive** as questions or events arise, adapting plans as required and referring to appropriate channels where corruption, fraud, sexual exploitation or abuse or other misconduct or waste of resources is identified.
- **Responsible** for meeting the evaluation purpose and for actions taken and for ensuring redress and recognition as needed.

## RESPECT

**I will engage with all stakeholders of an evaluation in a way that honours their dignity, well-being, personal agency and characteristics. Specifically, I will ensure:**

- **Access to** the evaluation process and products by all relevant stakeholders – whether powerless or powerful – with due attention to factors that could impede access such as sex, gender, race, language, country of origin, LGBTQ status, age, background, religion, ethnicity and ability.
- **Meaningful participation and equitable treatment** of all relevant stakeholders in the evaluation processes, from design to dissemination. This includes engaging various stakeholders, particularly affected people, so they can actively inform the evaluation approach and products rather than being solely a subject of data collection.
- **Fair representation** of different voices and perspectives in evaluation products (reports, webinars, etc.).

## BENEFICENCE

**I will strive to do good for people and planet while minimizing harm arising from evaluation as an intervention. Specifically, I will ensure:**

- **Explicit and ongoing consideration of risks and benefits** from evaluation processes.
- **Maximum benefits** at systemic (including environmental), organizational and programmatic levels.
- **No harm.** I will not proceed where harm cannot be mitigated.
- **Evaluation makes an overall positive contribution** to human and natural systems and the mission of the United Nations.

**I commit to playing my part in ensuring that evaluations are conducted according to the Charter of the United Nations and the ethical requirements laid down above and contained within the UNEG Ethical Guidelines for Evaluation. When this is not possible, I will report the situation to my supervisor, designated focal points or channels and will actively seek an appropriate response.**

17 July 2023

(Signature and Date)

## Annex XI Achievement of outcomes and outputs after year 1

Indicators from the Log Frame at output and outcome level for the first year of the 2022 to 2025 project with colour coding (green: achieved or surpassed, red: not yet achieved, grey: not measured or target not defined)

| Outcome 1: Enhanced evidence-based decision making in humanitarian assistance and promotion of peace, justice, security, and protection of human rights in the context of disasters and complex emergencies | | | |
|---|---|---|---|
| Indicator | Actual | Target Year 1 | Observations |
| OC 1.1. Percentage of requesters agreeing that analysis was useful for decision making or operational coordination | 73% | 70% | |
| OC 1.2. Percentage of users agreeing that the format of the products disseminated by UNOSAT meet their needs | 75% | 70% | |
| OC 1.3. Number of activations per year for humanitarian assistance purposes in the context of disasters<br>OC1.3.a. Number activations in preparation to a disaster even<br>OPC1.3.b. Number of activations resulting in live products, updated accordingly to the context of a developing situation<br>OC1.3.c. Number of activations focused on supporting recovery operations | 59<br><br><br><br>2<br><br>14<br><br><br><br>5 | 40<br><br><br><br>2<br><br>4<br><br><br><br>2 | |
| OC 1.4. Number of activations per year for peace, justice, security, and human rights purposes<br>OC 1.4a. Number of requests originated from UNOCC | 13<br><br><br><br>6 | 10<br><br><br><br>5 | |
| Outcome 2: Reinforced synergy and coordination during emergency situations through information products dissemination to both humanitarian and human rights communities, and use of web-based platforms and tools to support coordination, planning, and decision making | | | |
| OC 2.1. Number of organisations part of the network of UNOSAT affiliated centres | 0 | 1 | Reference period: Aug 2022 to Jul 2025 |
| OC 2.2. Number of downloads of products published on Humanitarian Data Exchange (HDX) | 2219 | 1950 | Reference period: 24 weeks |
| Outcome 3: Increased exploration and adoption of innovative approaches and methodologies in the use of satellite imagery and geospatial information, including artificial intelligence | | | |

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|---|---|---|---|
| and deep learning applications | | | |
| OC 3.1. Number of times Flood AI is operational and made available to beneficiaries by different visualization tools (dashboards | 7 | 4 | |
| OC 3.2. Percentage of images processed by AI validated through human in the loop protocol for products released in the context of disaster | 86% | 60% | |
| OC 3.3. Employment of AI to a new field (e.g. object detection | Binary: No | Binary: Yes | |
| Outcome 4: Enhanced awareness of the value of satellite imagery analysis to support evidence-based decision making in humanitarian assistance and protection of peace, justice, security, and human rights | | | |
| OC4.1. Average number of yearly visitors to UNOSAT's website | NA | ND | |
| OC 4.2. Average number of views per product published on UNOSAT's website | NA | ND | |
| OC 4.3. Number of participation in technical events, webinars, lectures, and key notes speeches by UNOSAT representatives presenting results of UNOSAT's analysis and/or research and their application/impact | 14 | 3 | |
| OC 4.4. Average number of views per web news published on UNITAR/UNOSAT's website featuring UNOSAT's mapping services, its results and/or derived products | 864 | 200 | |
| OC 4.5. Number of events whose coverage by major news outlets mentions UNOSAT's services and/or products | 3 | 2 | |
| Output 1: Satellite imagery and geo spatial data analysis products disseminated to end users for the purposes of humanitarian assistance, protection of peace, justice, security, and human rights | | | |
| OP1.1. Number of timely provided/distributed geospatial derived products in anticipation of or following a major disaster distributed for humanitarian assistance purposes<br>OP1.1.a. Number of products distributed in anticipation of a disaster event for the purposes of preparedness<br>OP1.1.b. Number of products shared and updated accordingly to the context of a developing situation | 454<br><br><br><br><br><br><br>7 | 175<br><br><br><br><br><br><br>9 | Last target was not defined for year one, cumulative for year 3. |

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|---|---|---|---|
| OP1.1c. Number of products delivered by the network of UNOSAT affiliated centres | 21<br><br>0 | 18<br><br>ND | |
| OP 1.2. Number of geospatial derived products delivered within requested timeframes for peace, justice, security, and human rights purposes | 59 | 30 | |
| OP 1.3. Number of analyses featuring work performed by UNOSAT presented in innovative ways (story maps, videos) | 2 | 2 | |
| Output 2: Updates to GDACS SMCS and to Humanitarian Data Exchange (HDX) following major events | | | |
| OP 2.1. Implementation of new publishing system | Binary: Yes | Binary: Yes | |
| OP 2.2. Number of major events featured in GDACS Satellite Mapping Coordination System (SMCS) | 31 | 30 | |
| OP 2.3. Percentage of geospatial derived products related to major events shared through Humanitarian Data Exchange (HDX) | 100% of major events | 100% of major events | |
| Output 3: Solutions/field applications developed by UNOSAT which use AI for the purposes of humanitarian assistance, protection of peace, justice, security, and human rights | | | |
| OP 3.1. Number of solutions/field applications developed by UNOSAT which use AI | 0 | 1 | |
| OP 3.2. Number of images processed by AI | 487 | 75 | |
| OP 3.3. Development of an online course on the use of AI for emergency response | Binary: Yes | Binary: Yes | |
| Output 4: Outreach materials featuring UNOSAT's mapping services and/or research work | | | |
| OP 4.1. Web news published on UNITAR/UNOSAT's website featuring mapping services and/or research work performed by UNOSAT | 4 | 4 | |
| OP 4.2. Number of white paper/articles published featuring mapping services and/or research work performed | 0 | ND | |

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|---|---|---|---|
| by UNOSAT | | | |
| OP 4.3. Review and upgrade of UNOSAT Website | Binary: No | Binary: Yes | |
| OP 4.4. Development and update of webpage featuring UNOSAT's mapping services yearly results | 1 | 1 | |