

GEO-PICTURES Berichtszusammenfassung

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Land: Norway

Final Report Summary - GEO-PICTURES (GMES and Earth observation with position-based image and sensor communications technology for universal rescue, emergency and surveillance management)

Executive summary:

Targeted for use in emergencies, GEO-PICTURES has potential to save lives and mitigate disaster effects on environmental disasters. In emergency situations striking humanity, environment and the civil public, it is of paramount importance to communicate from the field what has happened and where as quickly and accurately as possible so that appropriate decisions and actions can be taken. We call this situational awareness. Mobile satellite communication (like BGAN) is often the only reliable means for global coverage following damage to landlines and mobile phone networks, but has limited bandwidth (slow) and thus high cost for multimedia usage that the project has developed solutions for. GEO-PICTURES provides near-real-time input of pictures, video, sensors and assessment results worldwide. The novel emergency management platform has been developed from Oslo with several European and international partners, and form a seamless solution hosted by the United Nations (UN) (UNITAR / UNOSAT) at European Laboratory for Particle Physics (CERN) in Geneva.

The objective of GEO-PICTURES was to provide a powerful humanitarian and environmental emergency management platform for global use, represented by concrete needs from the UN, European Union (EU) civil protection mechanism and Government of Amazonas, as largest environmental areas of concern in the world. UN, with specific expertise in rapid mapping produces real-time situational maps with a combination of space and terrestrial image and sensor information. Completely new, and a missing link in operations, this provided a significant contribution to larger and medium scale emergency management all over the world, and specifically in areas with poor communication infrastructure after the disasters. The EU civil protection regularly used, tested and gave constructive feedback for system improvements during all their training sessions held in Cyprus 3 times a year, during all of the projects duration. GEO-PICTURES has as a result of this maturing evolution been used on several real missions worldwide.

GEO-PICTURES combines state of the art in satellite communication, navigation and Earth observation (EO), based on a core technology with geo-image and sensor communication at up-to-date satellite EO. A main challenge is high-resolution image communications without broadband infrastructure. An innovation award winning core concept (AnsuR ASIGN) has formed an excellent basis for enhancement, further integration and direct use in operations. GEO-PICTURES allows a large number of accurate field observations to be transferred via optimised protocols to a control centre. Geo-observations include photos, video, audio and sensors that measure temperature, moisture, wind; helpful in emergency / disaster management and for improving interpretation of space based remote sensing data.

GEO-PICTURES has also designed small lightweight equipment based on the latest mobile technology; in particular the open Linux based platform Android. This gives disaster management experts an all-in-one tool for rapid damage assessment, in addition to the dedicated camera / computer / communication unit solutions, while at the same time allowing for a modular integration of GEO-PICTURES components into existing systems. It has proven an excellent basis for crowdsourcing, where the public contributes in-situ observations. The consortium also worked with small Unmanned aerial vehicles (UAV) as a platform for observations. GEO-PICTURES can be used for disaster management worldwide, and the solution has already contributed a significant amount of missions. The novel emergency management platform has been developed in Oslo with several partners, and form a seamless solution hosted by UN (UNITAR / UNOSAT) on the CERN campus in Geneva. Lasting impact is secured via UN integration with Global Disaster alert and coordination system (GDACS) and integration into the EU civil protection equipment, as well as lasting CivPro partnerships and AnsuR-UN PPP. The project has exceeded our expectations in terms of performance, impact and success.

Project context and objectives:

A main objective was to provide users with all the required in-situ and space-based information in a timely, seamlessly integrated, secure and user-friendly way for managing disasters and emergencies. The targets were, via development, integration, pilot trials, missions, user feedback and other suitable activities, to obtain:

- observations, in terms of complete solutions for collecting and sending geo-referenced in-field assessment input with high quality digital photos, video, sound and various sensors.
- decisions via operational servers for seamless integration of in-situ with suitable EO / Global monitoring for environment and security (GMES) data, and possibilities for global web-access, for rapid emergency management. Optimised solutions for UN, EU civil protection mechanism and the Government of Amazonas (Brazil).
- actions, with efficient, easy-to-use solutions for making in-situ field data, GMES data, expert advice and other relevant information rapidly available in field;
- optimised communications solutions for satellite and mobile links. Holistically optimised protocols for rapid input via mobile satellite communication systems;
- optimised image compression, management and transfer mechanisms for the target applications;
- online rapid mapping solutions, with a fusion of EO and in-situ images and video;
- rapid and simple multi-mission EO data ordering;
- an overall network architecture and service provider solution for the specific use cases;
- securing a lasting and sustainable impact by a high degree of trials, training, dissemination and direct use during the project development of incrementally improved solutions.

GP followed an iterative development; the system was grown in complexity and features, but even the first versions early in the project were used in live trials and demos with users. The second year had a large number of use cases. GP is user-driven by identified needs for the UN, EU civil protection mechanism and the Government of Amazonas, but also significantly inspired from the novel technological options possible. There was a clear focus on a useful practical solution in the development and demonstration of value-added services meeting user needs. In addition to the management, the work packages of GP were divided into 4 main categories. These were:

WP2 - Getting it all on the right track

- Verified and iteratively revised the user requirements for iterative mapping to technical requirements and system design performed, forming the basis for continuous development and improvement of the solutions. The user requirements, along with the grant agreement with the REA, become like commercial requirements, and development was in principle been done that answer to these.
- Revised and optimised user aspect requirements were mapped to technical requirements and optimised the system design, recognising that when users see and test solutions it is easier to commend and feedback than from no concrete basis. All requirements were Specific-measurable-attainable-realizable-traceable (SMART) (time-bound for development).
- Performed revised system design, using also social media for emergency management. Considered design choices, and continued the Android operated smart-phone development. iPhones versions have also been developed and released. Integration with GDACS, in addition to the Virtual OSOCC for professional integration with emergencies worldwide, and an online Geographical information system (GIS) system for mapping and geographic data feeds. GEO-PICTURES took part in the Joint research centre (JRC) project Arcimas where ASIGN was bench tested with interoperability tests with open standards crisis management systems.

WP3 - Putting it all together

- Performed required project research early in the project, and implemented the most promising findings.
- Done major development for Personal computer (PC)s, smartphones and the on-line ASIGN server and for online mapping. A main task in the project was the actual science and technology (S&T) development. Several sub-projects and individual activity lines were defined. All main developments that were targeted were done and tested in the field, in many cases exceeding the original plans, for e.g. smartphone tracking of professional users and implementation of assessment templates.
- Conducting complete integration and lab-test of the developed units in Geneva and Oslo. As a web-based system, location is free-to-choose, but good Internet connection required. The complete system is now running stable at virtual machines at the CERN campus.

WP4 - Getting the user feedback!

- Verification of achieved objectives was key, and for all trials and tests there were structured user feedback that transformed into new technical requirements that in turn have been mapped to new releases of the SW, following a release plan of around 1 new release per month. The implementation of the user requirements were then tested and verified. In GEO-PICTURES the verification of achieved objectives were, in addition to a technical review, done during several live in-field exercises and continuous dialogue with the user community.
- Key performance indicators were always tested. Key technology issues, new features and functions got special attention. Robustness and interoperability with field user equipment. Tests by technical experts and non-technical users / no special connection to the project all proved valuable.

WP5 - Making it known and last!

- In-field UN and EU civil protection training and exercises supplemented live mission use and presentations to the key UN and EU forums in Geneva and Brussels. Key events in Brazil (Rio and Amazonas) were held, involving civil defense. New routines were influenced for first responders, with obtained impact on national, European and global level. Specifically Norway, Austria, Brazil and Thailand(!). Publications, disseminations, papers, radio, television, webcasts,

articles and material in relevant forums. Validating project technology, with sufficiently many field trials with expert and users were done, collecting feedback for the final phase of development and future work plans. Standardisation, use policy and influencing were done successfully.

Project results:

Scientific and technological results

GEO-PICTURES has proven to be an excellent basis for a complete end-to-end solution, combining state of the art in several areas into a new beyond-state-of-the-art solution and developing new state-of-the-art progress in each of the areas represented by the participants and the work packages.

A major innovation of GEO-PICTURES lies in the holistic combination of modular elements into a complete system, which in turn is so strongly linked to the identified emergency management needs. As such the system comprises a clear technical and scientific progress beyond state of the art in itself. However, several of the individual building blocks independently demonstrate that while being a very user driven project, the technological improvements are impressive enough in their own right. State of the art in satellite communication, emergency communications, image coding and communication, robust communications adapted to unknown channels, satellite-mobile synergies, rapid mapping, access to GMES data, GIS management for emergencies to mention some, add to the clear leap envisioned in state-of-the-art in the management of humanitarian and environmental emergencies.

The main S&T results are as follows:

- The project has extended and improved the GEO-PICTURES field communicator application capable of efficiently sending in-situ data to the in-situ portal. The application now has a fully modular architecture, which allows users to choose which modules are needed and installed.
- A deployment of the GEO-PICTURES Server has been performed at CERN by UNOSAT. This installation combines in-situ data, EO imagery and other data elements into a web-application accessible from anywhere.
- For mobile and all-in-one portable units we have developed the GEO-PICTURES field communicator mobile solution for Android and iPhone devices. This application is a powerful tool for in-situ data collection.
- System tested during Youth Olympic Games, January 2012, with good results. It was also used in a crowd-sourcing form during flooding in Thailand / Bangkok in November 2011.
- The Android solution has been tested by the European Mediterranean Seismological Centre (EMSC), and is now provided as a crowd-sourcing application free for anyone with an Android phone to install and use.
- Implementation of PhotoWMS has made it possible to display in-situ photos as an overlay in any system that supports the Web map service (WMS) standard.
- The project has developed a video streaming solution called ASMIRA for streaming live video with remote-control of the video encoding parameters. This solution allows users to optimise the video transmission for the network conditions, and can prioritise between interactivity and image quality.
- The project has developed a model for cross-layer optimisation of video streaming. This optimisation model especially targets BGAN and third-generation (3G) network scenarios.

GP results include the benefit of a large user feedback via an online survey that was active throughout the project. There was a large dissemination activity in the UN and EU, including global meeting and demos at the Global GDACS in Bergen, Norway in May 2011, Acrimas integration at JRC in March 2012, final large trial in Austria February 2012, two trials in Brazil in October / November 2011, and live missions in Haiti (with UAV in Jan 2012) and Pakistan, Cyprus, Thailand, Africa. With Johanniter-Unfall-Hilfe e.V., and DMAT, GEO-PICTURES was used at main trainings several times a year (EU Assessment mission course (AMC)s, EU modules basic courses, EUTAC trainings). AnsuR has also continued to support a version of ASIGN (as our basis for the GP work) to the Norwegian civil protection, and used it with the Police and civil protection during the large offshore SkageEx exercise in 2011. Further, the 'European Earthquake Centre', EMSC, and AnsuR have continued the partnership where the mobile version of GP is to be used for geo-referenced visual input right after disasters.

Potential impact:

During the second year the GEO-PICTURES consortium members disseminated information about the project in various ways, in line with the plan.

The good work of the first year in the fields of dissemination has been continued, the focus moved a little bit more to publications in professional journals, television spots and presence in social networks. Objectives of these actions have been increasing the publicity as well as communicating the accomplished missions, exercises and trials of GEO-PICTURES.

A significant step ahead was the development and realisation of special GEO-PICTURES trainings in MANAUS, RIO DE JANEIRO and GRAZ. Needless to say, the 'normal' trainings during the EU civil protection AMC in Cyprus have been improved and continued.

DMAT in particular also gave a good number of presentations in the global disaster management community.

Thanks to GEO-PICTURES, UAB could advance in related technical fields of research. All results have been integrated immediately into the project and also published in science journals.

A large number of presentations and demonstrations were given, including publications at popular conferences. Additionally information about GEO-PICTURES was provided on the Internet, e.g. the project webpage (www.geo-pictures.eu) and the websites of project partners.

The worldwide web also contains articles and remarks about the project published by third persons.

Over 300 hits were found using GEO-PICTURES and Seventh Framework Programme (FP7), in the first year, while we find over 700 in the second year.

'GEO-PICTURES' and 'AnsuR' produced over 500 hits after the first year, and 2310 at the time of writing this report in the second year.

GEO-PICTURES and UNOSAT produced over 6170 hits at the time of writing this report in the second year.

GEO-PICTURES alone had 21 700 hits at the time of writing first year report and has 48 500 at the time of writing this report one year later. However, this also includes non-related material. GEO-PICTURES and project finds 56 500 hits.

Several publications in newspapers and professional journals complement the spectrum of dissemination activities.

Many in-field training events with 'training of trainers' were conducted, focusing especially on EU civil protection experts. The number of GEO-PICTURES trained persons increased strongly in the second year of the project.

UN has used the systems with 'training-on-the-job', mostly, as in the first year. The impact of GEO-PICTURES concerning the European and global disaster management has continued to growing. GEO-PICTURES has been integrated in several EU civil protection trainings and field exercises. The Norwegian directorate for civil protection and emergency planning still has ASIGN for use of GEO-PICTURES for global United Nations Disaster Assessment and Coordination (UNDAC) missions in future, and has gotten more training.

The European Mediterranean Earthquake Centre uses a cognate version of GEO-PICTURES also in the second year, called Richter. In this case the focus is on the Crowdsourcing version.

Details for each task

Task: Targeting news routines for first responders in EU civil protection and UN domains

JUH, DMAT and UNOSAT acted as mediator to disseminate information about GEO-PICTURES and the status of the project to the EU civil protection and UN experts. The Brazil partners, ABT, SECT and UEA did the same to the civil protection, government and other state authorities in their country.

UN, with AnsuR, is lecturing about the solution at the master of disaster management programme in Copenhagen.

AnsuR, DMAT and JUH participated to the JRC organised interoperability test for new smartphone enabled in-field tools.

Task: Impact in national and European and global level assessment teams

The impact of the project is significant, and the technology is already in use by UN and DMAT and JUH in missions. It is disseminated via the UN/UNOSAT website.

The EU civil protection is at the moment in concluding discussions on the introduction of GEO-PICTURES in missions, because of the very good experiences during the real mission in Cyprus.

Austrian police forces in Tyrol and Styria have requested a concrete proposal for the use of GEO-PICTURES.

Other German and Norwegian are using GEO-PICTURES already; the Brazil / Amazonas civil protection is very interested.

Task: Global impact in disaster management

The UN is operating globally and has had large impact with the system after several missions. Brazil and Thailand are two specific countries that are showing large interest as well.

Since most of the disaster management and civil protections organisations are working at a global level, some of this impact is the same as the European impact.

Nevertheless, the GEO-PICTURES server moved to CERN and is supervised by AnsuR and UNOSAT. Several UN organisations consider the introduction of GEO-PICTURES.

Task: Conference publications

Thanks to the big consortium and the different fields of action of the project partners, GEO-PICTURES has been presented during many conferences, expositions, trade shows and so on.

Accordant publications have been created and disseminated. For further information please see the D5.1-2 report.

Task: Popular dissemination

For general information a GEO-PICTURES flyer was used. In preparation of special events, e.g. the training in MANAUS, specific leaflets have been distributed.

Especially after the training, exercise and test events in Brazil and Austria, the radio and television media have been very interested in the project and broadcasted several programs.

A large article was published in Bangkok times after the use for crowdsourcing in late 2011.

Task: Website demonstrations

The project website has been maintained.

Additionally to the main GEO-PICTURES web site, the consortium members are informing about the project on their homepages.

Many external organisations reported about GEO-PICTURES on their web sites. See the earlier list from Google wrt number of hits.

Due to the actions of AnsuR and UNOSAT during the THAILAND floods, social network groups, blogs and web sites in this region discussed GEO-PICTURES, its function and background.

Task: In-field training

AnsuR, DMAT, JUH, UNOSAT and AnsuR (technical) trained different organisations worldwide.

After introduction of GEO-PICTURES into the interested organisations (see impact task), there will be a bigger need of trainers and training courses. So the focus of this task lies ahead, and is formalised through a 'CivPro' initiative for training.

Task: Secure project and technology development is based on experienced field user requirements input

At the beginning of the project questionnaires bundled the ideas and wishes of field users into the user requirements of GEO-PICTURES.

Later, with the release of the first test version, the collecting and integrating of the opinions of field users about GEO-PICTURES was a constant and recurring process.

At every presentation or demonstration potential users have discussed GEO-PICTURES. This was not always an easy job for the person who runs the presentation, but it was perfect for the project and helped a lot to get GEO-PICTURES to that, what it is today: A smart and needed solution.

Task: Perform sufficiently many field trials and training with project expert and several external users

GEO-PICTURES has been tested in many tests under several different circumstances.

The number of uploaded photos (not counting those deleted) bears some kind of witness to this. The results of findings have been promptly integrated into the ongoing development.

For further information see D4.1-3 'Test and evaluation'

GEO-PICTURES has been used in several real missions, e.g. Haiti, Pakistan, Thailand and Cyprus, and made a useful and important contribution to the successful accomplishment of these missions. We should also mention the Youth Olympic Games in Austria.

After exercises as well as missions external experts have provided test and feedback reports on the use of GEO-PICTURES. Their opinions have been integrated as soon as possible into the project.

Task: Secure and take into account feedback from user trials from the field with feedback to final phase of development

As confirmed in the tasks above, every chance to get feedback was seized. The development of GEO-PICTURES was very much influenced by the feedback and comments of the end users.

Task: Contribute with publications, disseminations, papers, articles and other material in relevant forums

More than 60 times, the project partners presented GEO-PICTURES and its chances to experts all over the world.

These presentations have been supplemented with information via all ways: Internet, social networks, newspapers, radio, television, professional journals, and so on.

With this remarkable activity, the consortium management moved in the second year the focus somewhat away from publications, to focus even more in technical work, trials and dissemination with the users there and then - showing GEO-PICTURES is really working.

Task: Collect feedback not possible to implement in GEO-PICTURES for future work plans and enhancement

Like in the first year, this kind of feedback was constantly collected and listed in the D5.1-2 report.

Many suggestions have been integrated into GEO-PICTURES in the second half of the project time and increased the value of GEO-PICTURES.

There are still suggestions for future work and ideas for a possible extension of the project or of the work in some suitable framework.

Significant results

- We made GEO-PICTURES a very well-known EU project in the fields of civil protection and disaster management. GEO-PICTURES is now well-known in the fields of civil protection and humanitarian aid.

- We integrated GEO-PICTURES into the regular training of EU civil protection experts.

- We managed that GEO-PICTURES accomplished an EU and an UN mission successfully.

- UNOSAT (full session) and AnsuR (the ASIGN / GP topic) Lecturing at the Master of Disaster Management.

- Deployment with the Norwegian civil protection.

- Deployment with EMSC for crowdsourcing.

- Demonstration of UAS / microdrone solution for UN in Geneva.

- Significant scientific exposure for research results.

- EU, UN and other organisations / authorities are considering seriously for a broader official introduction of GEO-PICTURES.

- The system is tested and used in the field and fulfilled totally all expectations.

- GEO-PICTURES is ready to be adjusted to the special needs of the particular organisation and used in field missions - regardless of every day routine in home country or in special mission abroad.

- The project accelerated research and engineering in many fields, e.g. satellite communications, web mapping, video

streaming and more.

WP5.2: Standardisation, use policy, liaisons

Task: The UN and DMAT will influence the use of GEO-PICTURES in UNDAC and global operations

The system was presented to GDACS at the annual meeting in May 2011 by AnsuR and UNOSAT.

GEO-PICTURES rapid web map has been included on GDACS / virtual OSOCC (the UN-OCHA web portal for disaster management information sharing).

GEO-PICTURES rapid web map has been integrated with UNOSAT rapid mapping system used by UN.

Step-by-step introduction to UNDAC, first in terms of demonstrations and currently as part of recommendations for updated hardware in UNDAC mission kits (Android phones and GPS cameras), installation of ASIGN trigger in mission-laptops, near-future training sessions on use of GEO-PICTURES solutions in practice.

ACTED, by mainstreaming integrated web-platform compatible with ASIGN solutions, as part of REACH initiative and by ACTED on-the-ground field mapping.

World Health Organisation (WHO), by providing dedicated crowd-source ASIGN app for Android phone. This is currently in awareness raising stage internally to WHO, but mission deployment expected in 2012.

Thematic extension of GEO-PICTURES applications to also target Disaster risk reduction (DRR) based on the experience from Thailand floods 2011, where local residents documented the flood situation using ASIGN. These photos then serve also as a record of the event for use in risk reduction plans and preparedness.

AnsuR has kept the Norwegian UNDAC Team updated in the ASIGN and GEO-PICTURES developments.

Task: JUH and DMAT will specifically secure impact in EU civil protection missions

JUH and DMAT have implemented GEO-PICTURES as part of the EUCP AMC training at Cyprus.

DMAT has brought GEO.PICTURES in use at European technical assistance cooperation (EUCPT) assessment mission to Vasilikos, Cyprus July 2011.

Task: The SECT will specifically influence global solutions for environmental emergency management

SECT has approached environmental institutions abroad promoting the GEO-PICTURES. Further integration with environmental disaster management is expected to be recognised worldwide, as they integrated with the UNOSAT services.

TASK: ART and others will contribute the standards for emergency and satellite

AnsuR is progressing well here and are still leading DVB-RCS satellite communications standards. In this capacity AnsuR joined EC initiatives for standardisation of satellite used in emergency and disaster management (CEN / BT / WG202) in first year, and the conclusions are supporting project like GEO-PICTURES.

Inmarsat is another key player in Emergency and Disaster management, and are de-facto standards for mobile satellite solutions. AnsuR is working closely with Inmarsat whom have installed the ASIGN solution in London and whom are inviting AnsuR to exhibit at the Governmental services events. In the global partner event in Barcelona November 2011, AnsuR was one of two partners who were invited to present the ASIGN and GEO-PICTURES solution. This was the largest Inmarsat conference ever.

Task: Collaborate and liaise with other projects and networking in UN, EU civil protection and Brazil

Networking and liaison have been performed throughout the entire project to UN, EU civil protection, Brazil civil protection and other institutions in the emergency response environment.

Specifically we have liaised with FP7 SAFER and later with FP7 ACRIMAS.

Task: Spend sufficient time and effort on standardisation, best practice and use policy influence

This is an overall task that is covered by the others above. A part of the establishment of best practices and the demos, trials and promotions in various settings have played an influential role.

Significant Results

Significant results have been GEO-PICTURES participation in meetings, seminars and conferences in the context of GDACS / OCHA / INSARAG / EU / ACRIMAS and other key players. Other significant results have been the integration of GEO-PICTURES in GDACS / virtual OSOCC disaster management information sharing portal and the use of GEO-PICTURES on EUCPT assessment mission to Vasilikos, Cyprus and in support of UNDAC assessment mission to Brazzaville after explosion emergency, as well as the use during the Youth Olympic Games in Austria.

Conclusions

The overall conclusion is that objectives as defined in description of work have been fully achieved. A lasting impact of the project contributing to standards and use policy has been secured. Other bodies have been providing input through discussions and feedback from test and trials. The GEO-PICTURES system has been included into UN GDACS / virtual OSOCC and in EUCP AMC training. Further, the GEO-PICTURES is in the process of being implemented in Styria civil protection national advanced warning and alarm centre in Austria. With GEO-PICTURES being a research and development project running over two years, the real impact of the activities will only be known in one year's time and beyond. GEO-PICTURES was during the last year capable of providing technical solutions to user requirements that were successfully tested, but to have increased understanding on how GEO-PICTURES actually impacts humanitarian emergency response is too early to fully conclude, although results so far point to a highly positive impact. It will be

interesting to follow the exploitation of the results by various partners and users in the coming years.

List of websites: www.geo-pictures.eu

Verwandte Informationen

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