About INFRA (INtegrated Fire Risk mAnagement)

Background

INFRA (INtegrated Fire Risk mAnagement) aims to incorporate data from observation networks and services, integrate them into a central system and transform them into useful information that can be disseminated to end-users, such as indigenous communities and organizations, and municipalities. The main purpose of this data system is to deliver an information product that benefits the end user.

The INFRA service aims to compact and simplify access to relevant information/products which stem from diverse sources. Most importantly, it makes it possible to manage, integrate, select and transform such sets of information into a tailored product that is useful for the respective users. In this way, INFRA can contribute to GEO goals and priorities (Management and Disaster Risk Reduction) in the Arctic, supporting the whole management chain: from prevention of forest fires to management of shutdown operations, post-event management, and damage assessment. Modularity helps to tailor the service to the user's needs.

The INFRA service is based on several modules and IT platforms, the most important being:

1 – INFRA-AEGIS – A web-GIS platform through which it is possible to present, combine and integrate all the informational layers produced by INFRA, or collected from many other sources and services.

2 – INFRA-SENTRY - A platform through which to distribute information and messages to users that can be easily adapted to specific needs.

Implementing these platforms through the cloud makes them highly flexible. Using them does not demand very advanced hardware/software resources, making them more accessible to users.

The novelty of the INFRA service lies (i) in the attention to the local scale, and (ii) in having developed tools suitable for generating messages that are tailored to the category of users you intend to reach.

More details can be found in the EU project deliverable 4.3 added to these notes together with other material with the aim to provide a sort of “information package”. Spreading information we aim to receive comments and interest to contribute to test INFRA. More important, we aim to receive inputs, suggestions, information for better develop INFRA as a service able to serve needs of indigenous communities, activities and inhabitants of Arctic regions.

Targets and next steps

Interaction with users and the adaptation of products and functions to their needs are fundamental elements of INFRA. Adapting INFRA to the specific needs of different users requires constant development. Through specific surveys/interviews, and by spreading information on the service and working to make it available for the 2024 fire season, we will:

- Assess the relevance of the different information layers for different users and user categories and identify needs for additional layers (i.e. about fire effects on air quality at small spatial scales);

- Collect supplementary information from users/communities (i.e. critical/relevant infrastructures, ground-based early detection systems);
- Interact with wildfire management organizations at community/local/regional level;
- Assess the relevance/value of fire effects and damages;
- Identify communities and/or other users to help test the service;
- Adapt and develop INFRA functionalities and products accordingly

INFRA pilot service and its functionalities

Figure 1 shows the INFRA pilot service scheme that we have implemented, starting from the principles and purposes described in section 2 od deliverable D4.3 and making use of instruments and tools suitably modified and adapted to the specific needs of INFRA.

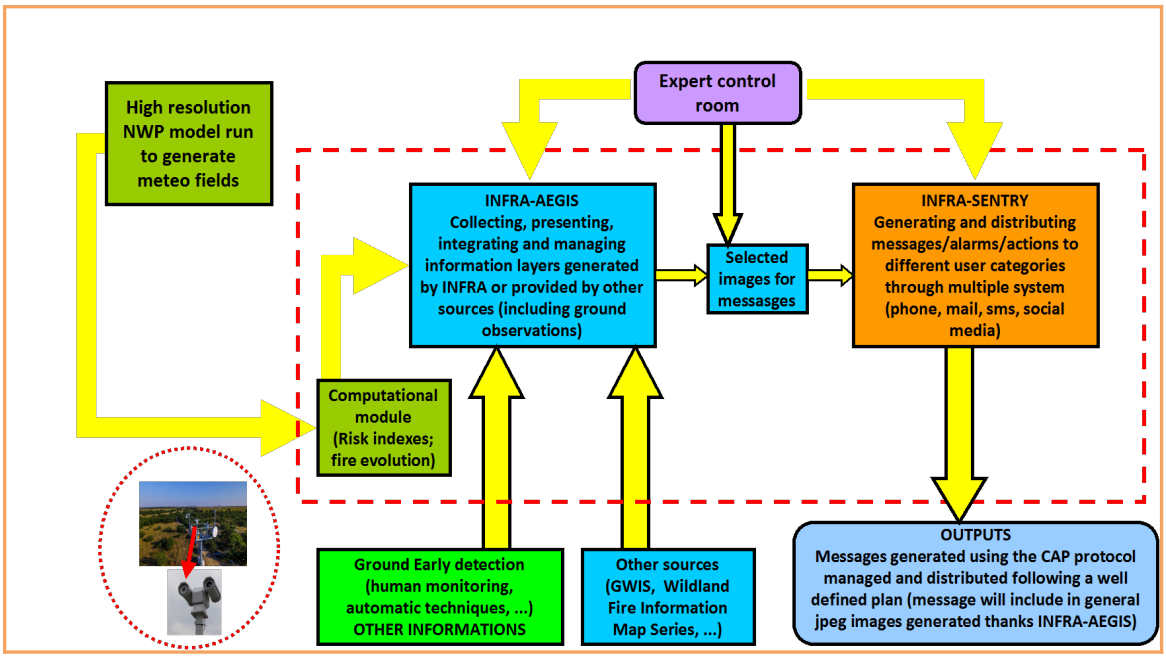

Figure 1 – *Structure of the INFRA pilot service INFRA. Also presented is the data flow from external sources and between components.*

The two main elements of INFRA are the platforms used to implement and manage two macro-functions:

1 - The collection, integration and transformation of information collected from the ground, as well as the products created by INFRA (INFRA-AEGIS);

2 - The dissemination of information through messages and other outputs calibrated to the needs and capabilities of the users INFRA aims to serve (INFRA-SENTRY).

These two platforms and the changes made to the initial tools (AEGIS and SENTRY) to make them fully functional for the purposes of INFRA are illustrated in deliverable D4.3, section 4.2.

The rectangle with red hatching found in Figure 1 indicates the part of the system that is supported by Cloud architecture (see deliverable 4.3, section 4.3).

With the control room box we indicate a 'place' in which experts can sit and make use of INFRA functionalities, providing support and information to professional, semi-professional or non-

professional users. Considering the Cloud architecture adopted, such a control room can be located where it is most convenient/useful. The control room does not require huge hardware and/or large computational capability. A fast and stable internet connection is one necessity for such a control room. Another is the capability to display information continuously on a screen. Needs and characteristics of a control room are presented in section 4.3 of deliverable 4.3, where the topic of how to operate INFRA is discussed, as well as in some extent in the section below..

Operational implementation of INFRA using core platforms

With the aim of highlighting the potential of INFRA and better clarifying how it can be useful to a large audience of potential users, in this section we describe how basic functionalities of INFRA can be used to create an operational service.

Always refers to figure 1 above for a graphic depiction of the service and its data flow.

A BASIC IMPLEMENTATION

Access and use of INFRA-AEGIS alone, can be considered the zero level of use and implementation of INFRA service. The platform provides some features that can be useful to anyone interested in the local scale. Some developments expected between now and June 2024 will increase this usefulness. Dialogue with stakeholders and users will be important to add information content that is increasingly oriented towards their needs and adapted to their capabilities.

In order to allow basic use of INFRA, a version of INFRA-AEGIS with free access (no longer regulated by username and password) will be created by mid-March. Any user will therefore be able to access and use the functions present to acquire their own idea of the situation that is being created. A small quick guide to use and the video tutorial will be made available and will allow you to make the most of the information that INFRA allows you to reach and select through INFRA-AEGIS.

AN IMPLEMENTATION TAILORED ON USERS

The access of any user to INFRA-AEGIS is based on and enhances the first of the two innovations proposed by INFRA, namely **the attention to the local scale.**

If you also want to take advantage of and take full advantage of the second innovation, i.e. generating messages that are tailored to the category of users you intend to reach, then we must necessarily associate the use of INFRA-AEGIS with the use of INFRA- SENTRY. Even in this condition in any case, the INFRA service maintains its ability to directly involve relatively small actors, such as administrations or organizations in small Arctic communities or municipalities in this work derives from the limited resources necessary to set up the service:

(a) The availability of 2-3 people, not necessarily full-time fire and rescue professionals;

(b) A location from which they can access the internet with good speed;

(c) Monitors to report the information that INFRA-AEGIS provides and/or INFRA-SENTRY screens, and a computer (basic) is all that is necessary.

Routine operations would be described schematically through the following steps:

STEP 1

Operators, i.e. people able to give time to the service with modalities determined by those who

want to set up and use it, are able to access the INFRA-AEGIS platform.

STEP2

Using INFRA-AEGIS functionalities, Operators can acquire information on the current fire situation and its evolution, risk status etc. These people can, for example, compare the probability of ignition with the risk state of the vegetation, monitor the distribution and distance of active fires, evaluate fire evolution using the continuous visualization functions for a chosen period of days, and calculate distances and areas. These people can focus on points of interest (areas currently defined as 50 x 50 km in size) and save maps in 'png' format, showing the content produced locally on the computer.

STEP3

Once Operators have a clear idea of the situation, they are able to connect to the INFRA-SENTRY platform and translate what they have assessed into text messages. Their messages may include some or all of the png files previously produced. These images support and clarify the text.

Communication towards users can be standardized and made very robust by preparing models and templates for these messages, which can be recalled and used to produce the information to be distributed.

The time necessary to follow STEPS 1-3 is not huge. This means it is not necessary to have people dedicated to the service at all times. Time investment can be modulated according to the needs and state of the emergency. The overall approach is similar to a weather forecast approach. We believe that, in the long-term it could produce a positive effect in terms of public awareness with respect to wildfires.

INFRA Cloud implementations can be easily duplicated and adapted to the specific needs of many different users, in terms of area of interest, information layers etc.

The distribution chain is established from the start by identifying the contacts and/or groups to be reached, as well as the technical methods by which they will be reached (text messages, phone calls, e-mail, social media). The different contacts and groups can be assigned or assume tasks and roles in the system and therefore be reached by very specific messages that refer to their role and task. A specific characteristic of INFRA is that it delivers information to a more local and less centralized level, making its adaptation and adjustment to local requirements easy: messages are attuned to the needs of local users, making use of the most suitable language/format.

To adapt service for a specific user, the only necessary steps are:

1 - To collectively identify the area of interest;

2 - To collect - via the form provided in Appendix I - information on target people to reach with messages and information;

3 - To define a template/format for messages and agree on a language to use and any information that you won't distribute. Information content can be tailored for each different user category;

4 - Identify/secure experts who will act as the key operators for Steps 1-3;

5 – Set up working space and resources for the Operators' to work.

As long as the project is active, the presence of INFRA and its versions, stored on the Cloud, will be supported by the project partners CNR and CAE. We also are looking for people in Italy who could play the role of Operators, as described above, so that we are able to develop concrete proposals to activate the service with interested users in 2024.