



STRESS Resilient Smart Societies

STRESS Project – Mapperò Smart App based on KoBoToolbox



G. Cappellini , D. Voltolina - CNR IDPA

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Processi Ambientali



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STRESS Project

Strategies, Tools and new data for REsilient Smart Societies

- Design and implement a low-cost prototype of a Spatial Information Infrastructure (SII) able to support risk managers in decision making processes with new data and tools to improve hydrogeological susceptibility, hazard and impact assessment procedures
- Apply innovative ICT-based communication and dissemination strategies to increase citizens' risk awareness and strengthen communities' resilience



STRESS Project's aims

- Increase citizens' risk awareness by exhorting and training them collect in-situ observations
- Provide new data from remote sensing imagery and volunteered geographic information (VGI)
- Apply supervised Machine Learning techniques to cross-validate evidences and to update existing hydrogeological databases and support decision-making processes





Mapperò

Mobile application for VGI collection

- Form for hydrogeological evidences reporting
 - WHAT
 - WHERE
 - WHEN
- Do not require a registration



Mapperò

▼ STRESS VGI

▼ » User data collection

* Name

* Surname

* Role

Student

Teacher

Other

E-mail address



STRESS

Resilient
Smart
Societies

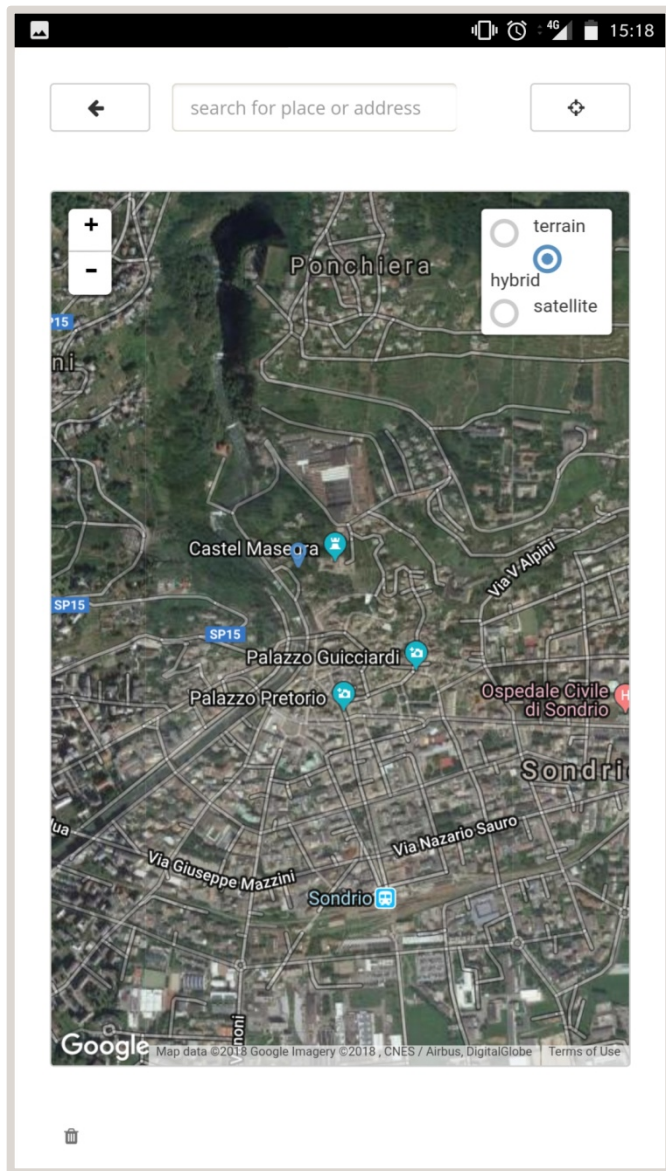
Loading

* Che tipologia di evento intendi segnalare?

Frana

Inondazione

Next



Mapperò

▼ **STRESS VGI**

▼ » **Raccolta informazioni temporali**

* **Quando hai osservato l'evento?**
Specifica giorno e ora della tua osservazione

yyyy-mm-dd

hh:mm ↻

* **In quale fase si trova l'evento?**

Atteso In corso Concluso

* **Puoi stabilire quando ha avuto inizio l'evento?**

Sì, con precisione

Sì, con approssimazione

No

Next

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Mapperò

▼ **STRESS VGI**

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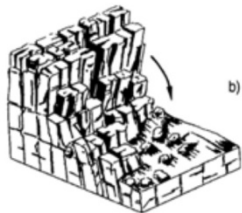
* Che tipo di frana hai osservato?

Seleziona una tipologia di frana

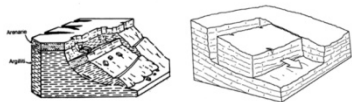
Crollo



Ribaltamento



Scivolamento



* Che tipo di materiale era in frana?

Seleziona una o più tipologie di materiale

Roccia compatta

Detrito (ghiaia, ciottoli, massi)

Terra

Non so

* Sapresti individuare una o più possibili cause di innesco della frana?

Seleziona uno o più possibili cause

Precipitazioni intense

Erosione fluviale o lacustre

Shock sismico

Interventi antropici

Altro

Non so

* Specifica la possibile causa di innesco

Crioclastismo


STRESS VGI

» Raccolta immagini evento ed eventuali note

1

Vuoi caricare una o più fotografie dell'evento?
Inserisci una sola fotografia per volta

IMG_20180314_145015-15_33_26.jpg



-

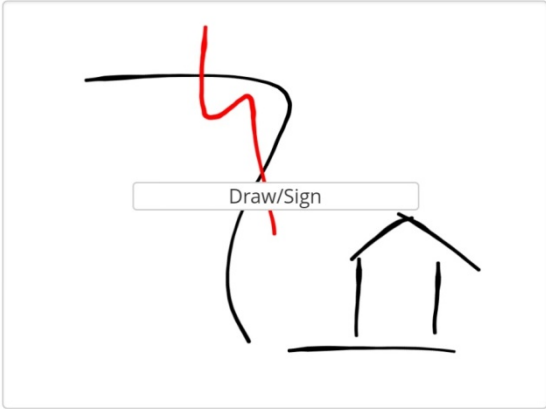
2

Vuoi caricare una o più fotografie dell'evento?
Inserisci una sola fotografia per volta

-

+

Vuoi caricare un disegno o uno schema dell'evento?



Draw/Sign

↻


Vuoi aggiungere una o più note?

Un masso di dimensioni metriche si è distaccato dalla parete rocciosa rimanendo intrappolato nella rete paramassi.

Next

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Data Collection Tools for Challenging Environments

- Building standardize forms and sharing question libraries
- Collecting data quickly, safely and reliably, online or offline
- Analyzing, summarizing and mapping collected data instantly
- Downloading forms and collected data

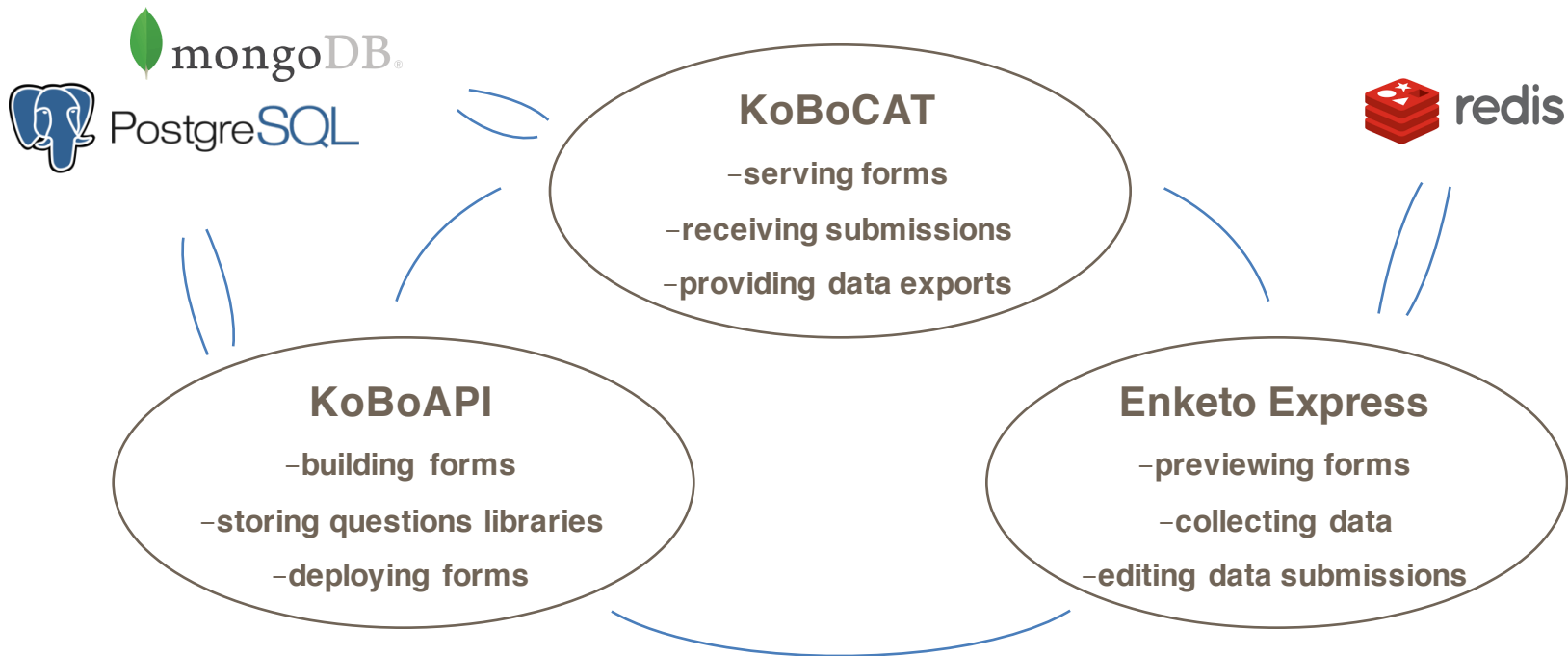
Available on GitHub



**HARVARD
HUMANITARIAN
INITIATIVE**



KoBoToolbox COMPONENTS





Based on XLSForm Standard

- Simplify forms authoring in Excel
- Convertible in XForm official W3C standard thanks to PyXForm library supported by ODK, Ona and KoBoToolbox
- Supported by JavaRosa Project





- XLSForm standard
<http://xlsform.org/>
- Hints for managing calculate questions from ODK
<https://opendatakit.org/help/form-design/binding/>
- Xform as supported by JavaRosa
<https://bitbucket.org/javarosa/javarosa/wiki/xform>
- Humanitarian Exchange Language (HXL) hashtag dictionary
http://hxlstandard.org/standard/1_0final/dictionary/



<http://www.kobotoolbox.org/>

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RESEARCHERS, AID WORKERS & EVERYONE ELSE

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STRESS Resilient Smart Societies

From KoBoToolbox to Android APK How to implement a KoBo based VGI App



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Deploy KoBo (Enketo) as an Hybrid Mobile App

← → ↻ <https://ee.kobotoolbox.org/> ... 🔒 ☆ ⏴ ⏵ ☰

» Raccolta informazioni spaziali

* Da quale posizione hai osservato l'evento?
GPS coordinates can only be collected when outside.

search for place or address 🔍 📍



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latitude (x,y °)


longitude (x,y °)

altitude (m)



GPS coordinates can only be collected when outside.

search for place or address 🔍 📍



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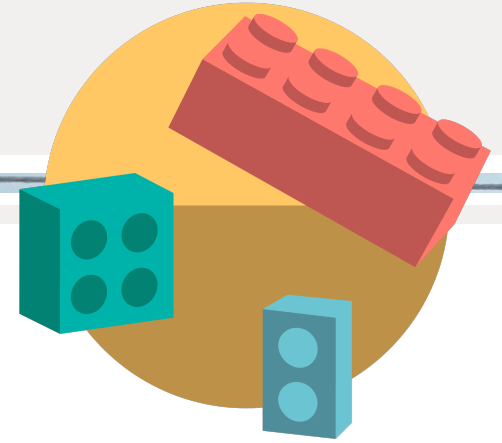
latitude (x,y °)

longitude (x,y °)

altitude (m)



Required tools

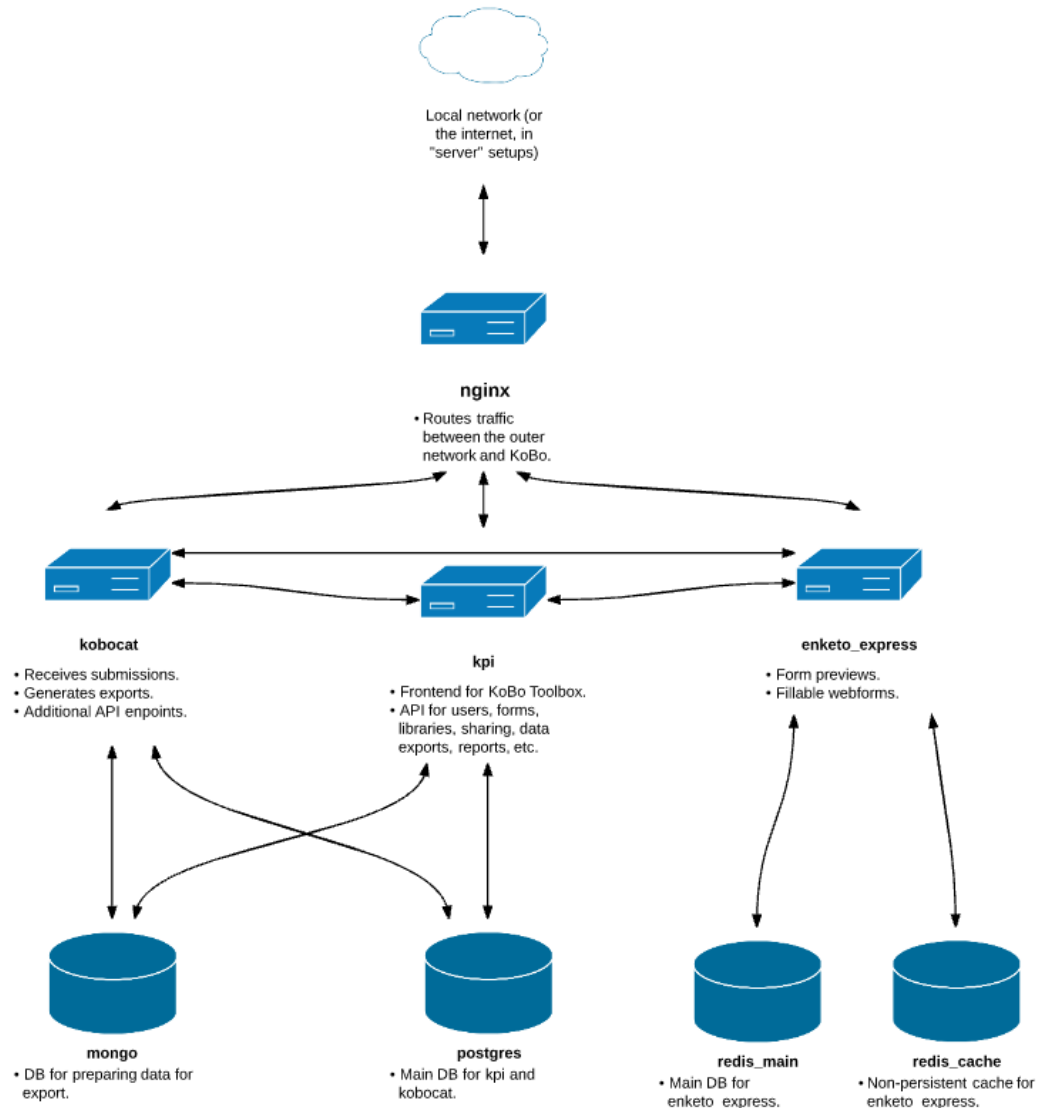


- **KoBoToolbox service instance**
 - Self hosted
 - <http://www.kobotoolbox.org/>
- **Node.js + Apache Cordova + InAppBrowser plugin**
- **Android SDK**
- **Android device ~ version > 4.2**



KoBoToolbox architecture

- Rabbit
- Postgres
- Mongo
- KoBoCat
- KPI
- Nginx
- Enketo Express
- Redis





KoBoToolbox – Self hosted

Reference page: <https://github.com/kobotoolbox/kobo-docker>

```
sudo apt install docker docker-ce docker-compose  
  
git clone https://github.com/kobotoolbox/kobo-docker  
cd kobo-docker || exit  
ln -s docker-compose.local.yml docker-compose.yml  
  
sudo docker-compose pull  
  
# fill envfile.local.txt  
  
sudo docker-compose up -d
```



KoBoToolbox on <http://www.kobotoolbox.org/>

Sign Up @ <http://www.kobotoolbox.org/>

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Checkpoints



- **Upload a XLSForm into KoBoToolbox**
- **Make Enketo form publicly available on a HTTPS endpoint**
- **Install Node.js, Apache Cordova, Java and Android SDK**
- **Setup a new Cordova project with InAppBrowser plugin**
- **Write InAppBrowser code in Cordova**
- **Compile for Android and run on smartphone**



Checkpoints






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Upload a XLSForm into KoBoToolbox

NEW

-  Deployed 6
-  Draft 0
-  Archived 0

NEW

-  Project
-  upload
-  Archived 0



Make Enketo form publicly available on a HTTPS endpoint

Preview

Draft version



Last Modified : Today at 5:32 PM - 59 questions

DEPLOY

Deploy

Draft version



Last Modified : Today at 5:32 PM - 59 questions

DEPLOY



Make Enketo form available on a public HTTP(S) endpoint

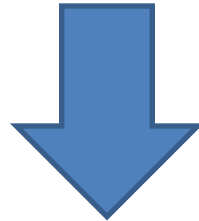
Collect data

Online-Offline (multiple submission) ▼

COPY

OPEN

This allows online and offline submissions and is the best option for collecting data in the field.



`http(s)://<HOST_NAME>/x/#<FORM_ID>`



Checkpoints



- Upload a XLSForm into KoBoToolbox
- Make Enketo form publicly available on a HTTPS endpoint
- **Install Node.js and Apache Cordova**
- **Setup a new Cordova project with InAppBrowser plugin**
- **Insert InAppBrowser code in Cordova project (1 line!)**
- **Compile for Android and run on smartphone**



Create a Cordova project

```
sudo apt install npm
sudo npm install -g cordova

cordova create androidapp it.cnr.idpa.workshopvgi WorkshopVGI
cd androidapp || exit
cordova platform add android
cordova plugin add cordova-plugin-inappbrowser
```



Set KoBo endpoint as InAppBrowser in www/js/index.js

```
var app = {  
  // Application Constructor  
  initialize: function() {  
    document.addEventListener('deviceready', this.onDeviceReady.bind(this), false);  
  },  
  
  // deviceready Event Handler  
  //  
  // Bind any cordova events here. Common events are:  
  // 'pause', 'resume', etc.  
  onDeviceReady: function() {  
    this.receivedEvent('deviceready');  
    browser = cordova.InAppBrowser.open('https://cnrserver.disat.unimib.it:18005/x/#YYYY', '_self', 'location=no,clearcache=no,clearsessioncache=no,zoom=no,hidden=no,toolbar=no');  
  },  
  
  // Update DOM on a Received Event  
  receivedEvent: function(id) {  
    var parentElement = document.getElementById(id);  
    var listeningElement = parentElement.querySelector('.listening');  
    var receivedElement = parentElement.querySelector('.received');  
  
    listeningElement.setAttribute('style', 'display:none;');  
    receivedElement.setAttribute('style', 'display:block;');  
  
    console.log('Received Event: ' + id);  
  }  
};  
  
app.initialize();
```

Reference: <https://cordova.apache.org/docs/en/latest/reference/cordova-plugin-inappbrowser/>

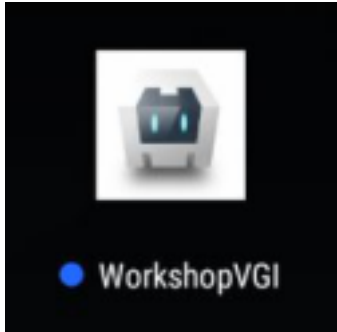


Run on Android



```
$ cordova run android
```

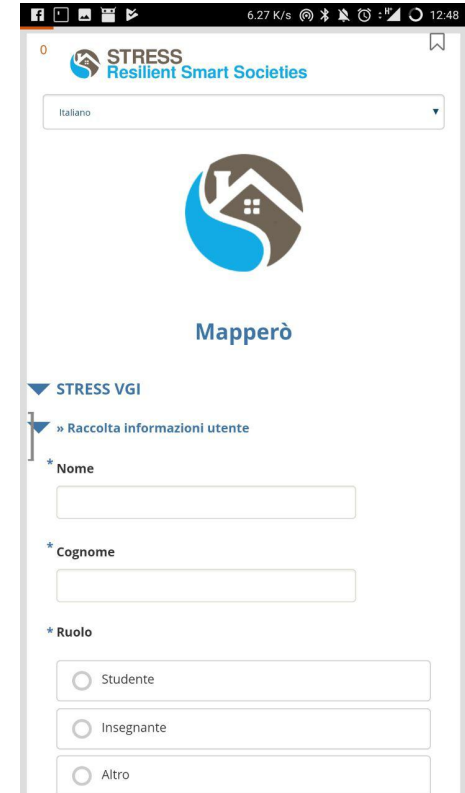
(Android SDK must be installed)



Cordova can deploy on many platforms

Reference:

<https://cordova.apache.org/docs/en/4.0.0/guide/platforms/>





Integration with external REST service

 Mapperò

SUMMARY

FORM

DATA

SETTINGS

Rest Services

Service
Name:

Service URL:

Add service



```
1  "notes": [
2
3
4  ],
5  "username": "username not found",
6  "stress_vgi/raccolta_info_tipologia_evento/evento_frana/possibili_cause_innesco": "shock_sismico antropico",
7  "stress_vgi/raccolta_info_utente/ruolo": "studente",
8  "bamboo_dataset_id": "",
9  "_tags": [
10
11  ],
12  "stress_vgi/raccolta_info_tipologia_evento/evento_frana/materiale_in_frana": "detrito terra",
13  "phonenumber": "phonenumber not found",
14  "stress_vgi/raccolta_info_spaziali/delimitazione_area": "45.517424 9.218408 0 1308;45.516843 9.222047 0 0;45.517857 9.220644 0 0;45.517424 9.218408 0 1308",
15  "stress_vgi/raccolta_info_difesa_danni/opere_difesa/tipo_difesa_versanti": "sostegno drenaggio",
16  "stress_vgi/raccolta_info_spaziali/localizzazione_evento": "45.518677 9.218013 0 0",
17  "meta/instanceID": "uuid:e4b95d82-62b9-4b59-b77d-662007f437b1",
18  "stress_vgi/raccolta_info_temporali/giorno_ora_osservazione": "2018-02-13T12:15:00.000+01:00",
19  "end": "2018-02-13T12:22:22.000+01:00",
20  "stress_vgi/tipo_evento_segналato": "frana",
21  "stress_vgi/raccolta_info_utente/indirizzo_e_mail": "test@test.test",
22  "stress_vgi/raccolta_info_temporali/fase_evento": "concluso",
23  "stress_vgi/raccolta_info_utente/nome": "test",
24  "start": "2018-02-13T12:20:47.000+01:00",
25  "geolocation": [
26    45.517424,
27    9.218408
28  ],
29  "_version_": "vj9rHYLU0MFyJU2kkqh7o6",
30  "stress_vgi/raccolta_info_difesa_danni/opere_difesa/danni_alle_opere_difesa": "totale",
31  "__version__": "vgMUYSQs3ENYdqYtPrN8mo",
32  "today": "2018-02-13",
33  "meta/deprecatedID": "uuid:a2f84d96-1d30-440b-9936-56d7ac80541c",
34  "simserial": "simserial not found",
35  "stress_vgi/raccolta_info_utente/cognome": "test",
36  "uuid": "e4b95d82-62b9-4b59-b77d-662007f437b1",
37  "_validation_status": {
38
39  },
40  "stress_vgi/raccolta_info_difesa_danni/elementi_danneggiati/tipo_elementi_danneggiati": "infrastrutture estrattivo",
41  "stress_vgi/raccolta_info_utente/recapito_telefonico": "333123456789",
42  "userform_id": "idpa_aU5guf6LKLgghAomGpiURt",
43  "submitted_by": null,
44  "stress_vgi/raccolta_info_temporali/giorno_ora_inizio_evento": "2018-02-12T10:15:00.000+01:00",
45  "status": "submitted_via_web",
46  "formhub/uuid": "5d5d2cedecd64b0ab5f0d425c67e476e",
47  "stress_vgi/raccolta_info_spaziali/da_quale_posizione": "45.517424 9.218408 0 1308",
48  "stress_vgi/raccolta_info_difesa_danni/opere_difesa/presenza_opere_difesa": "si",
49  "stress_vgi/raccolta_info_temporali/inizio_evento": "certezza",
50  "stress_vgi/raccolta_info_difesa_danni/elementi_danneggiati/presenza_danni_evidenti": "si",
51  "attachments": [
52    {
53      "mimetype": "image/jpeg",
54      "download_url": "/media/idpa/attachments/5d5d2cedecd64b0ab5f0d425c67e476e/e4b95d82-62b9-4b59-b77d-662007f437b1/frana2-12_21_59_K1XYuJ2.jpg",
55      "filename": "idpa/attachments/5d5d2cedecd64b0ab5f0d425c67e476e/e4b95d82-62b9-4b59-b77d-662007f437b1/frana2-12_21_59_K1XYuJ2.jpg",
56      "instance": 13,
57      "id": 5,
58      "xform": 1
59    }
60  ],
61  "stress_vgi/raccolta_info_tipologia_evento/evento_frana/tipo_frana": "ribaltamento",
62  "stress_vgi/raccolta_immagini_evento": [
63    {
64      "stress_vgi/raccolta_immagini_evento/fotografia_evento": "frana2-12_21_59.jpg"
65    }
66  ],
67  "deviceid": "cnrserver.disat.unimib.it:4McaRFR9xkapoId6",
68  "submission_time": "2018-02-13T11:22:22",
69  "xform_id_string": "aU5guf6LKLgghAomGpiURt",
70  "_id": 13,
71  "subscriberid": "subscriberid not found"
72 }
```



Final hints

- **HTTPS Endpoint is required for in-browser user location**
(more on <https://developers.google.com/web/updates/2016/04/geolocation-on-secure-contexts-only>)
- **InAppBrowser patch is needed to work with Application Cache (offline browsing)**
- **Form design is controlled by both Enketo (frame and paging) and Xform directives (form asset and contents)**



Thank you for your kind attention

CNR-IDPA LARGE

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