Free and open-source mobile and web data collection for low resource settings

openXdata comprises many organizations globally with deployments in Africa, South Asia and South America

www.openXdata.org
contact@openXdata.org

Video tutorials available at: doc.openXdata.org
Usable data for informed decision making

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Remi Andre Valvik (remi@valvik.org)
Usable data for informed decision making

- Ease of Use
- Security
- Costs
- Integration
- Scalability

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Topics of this presentation

- Functionalities
- Ease of use
- Change management
- Security
- Integration
- Costs
- Scalability
- Open source community
- Demonstrations
Functionalties

Design – Collect - Manage
Design

- Design complex forms in graphical interface
- Supported question types include e.g.: Text, Numbers, Date, Time, Single / Multi-select, Multimedia, Geo tagging
- Define skip logic & answer validation criteria
Collect – Mobile phones <30$

Structured SMS – manually coded forms – for any phone

A basic java-enabled cell phone (e.g. Nokia 1680 - $35) will support most of your data collection needs.

Use a higher end phone to gather geo-tagged & multimedia data (e.g. Nokia 2710 - $150)

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eCollect – Android/iPhone/Pads/Laptops

eCollect is a mini version openXdata web interface.  
• Stores data locally for offline functionality.  
• Users use regular browsers.  
• Android packag for native features like camera.
Collect – Android with ODK-collect / JR

Users can use ODK-collect due to a OpenROSA / JavaROSA standards API plugin.
Collect - Web

Web-based forms can be accessed through desktop computer, laptop, netbook, pads/tabs and smartphones with access to the internet and JavaScript support.
Manage

• Own your data - host on your own servers
• Define roles for different types of users (e.g. administrator, study manager, mobile data collector)
• Export data to CSV or direct to a relational database
• Manage data and forms using a standard web-browser
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Capture Data: Questions

Name

Phone number: 12345678

Gender

Where are openXdata deployed?
- [ ] Uganda
- [ ] Iceland
- [ ] India
- [ ] Nepal
- [ ] No clue

Is openXdata free and open source?

[ ] Submit  [ ] Cancel
Ease of use

Case reports from MoTeCH implementations
MoTeCH – summary from interviews

• Initial assumption to use structured SMS by health workers to create and update medical records using their own phones using "free" SMS.
  o The required messages were long and complex
  o It was much cheaper to give new phones and pay for mobile data than cover costs of "free" SMS.

• User comparison / validation workshop
  o SMS was surprisingly cumbersome, challenging and unfamiliar
  o openXdata was intuitive and required little training to start using
  o Midwives preferred the openXdata user interface on a low-end phone compared to ODK-collect on Android smart phone.

• Their summary conclusion was:
  o "on all fronts it ended up being better. It was cheaper, better ease of use, better quality of data that could be presented and we could collage much more data - enabling more functionality in the system."
MoTeCH – Primary useful functions

• Ability for a someone who is not a programmer to design a questionnaire – a very powerful questionnaire with complex skip logic
• Flexibility to create forms based applications for any type of domain.
• Change management – in custom applications – a change can have huge implications. How we can manage that in openXdata is incredible.
• Remote – used openXdata at the furthest locations on low-end phones in disconnected mode.
• Enabled individual level data at point of service
• Xforms and XML based
• Web-based dashboard and management
• Supports very large and complex forms on both web and mobile
• Automated availability of data in regular SQL database.
MoTeCH: Reasons for using openXdata

- It is open source and free and cost of maintenance is very low.
- Do not need latest phone models.
- Dashboard works in regular browsers
- Mobile works on low-end / low-cost phones
- Flexibility to adapt it to the requirements of clients
- Ability to deliver solutions fast due to not starting from scratch
- Immediate availability of data once uploaded from phone
- Data is validated during collection
- Reduced cost of data capture
- Digitized individual level data – automated reporting
- Mobile is easy – field workers have not have had challenges – the cell phones is ubiquitous
Change Management

Updating forms
Updating apps – backward compatibility
Versioning of Forms and Data
XML/Xforms to relational database snapshot

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Versioning of Forms and Data

- All updates to collected data are versioned as full XML copies.
- Data is not deleted, only voided (hidden).
- Form versions are more relaxed and created by the user on demand.
- A Form version with data cannot be altered (only minimal non-destructive changes).
- Users seamlessly get the published version of a form when they synch.
Long running projects will encounter the scenario where the mobile app or the server needs to be updated.

- This can be a major challenge if e.g. old clients and new server is not 100% compatible.

In openXdata we have solved this problem through a pluggable protocol solution, where a new server retains compatibility with all versions of the client.

- This allows for seamless upgrades between versions of both server and client.

The new REST API is a further development of this and allows for versioning at an even deeper level.
The basis for Form and Data versioning is a fixed structure using XML and Xforms.

- Data stored in this format is generally not easily available for reporting, querying and viewing.

OpenXdata includes an automatic “Exporter”, which based on Forms creates the required tables and when Data is submitted it interprets the XML and creates data in the respective tables defined by the Form.

- The exporter runs once for each time a form has been changed or updated.
- The exported data is a snapshot of the latest version of data – an analytical database.
Dynamics of changing mobile platforms

- Palm (C/C++)
- PocketPC / Windows Mobile (VB.net / C#)
- J2ME (Java) – Nokia / Sony Ericsson / Blackberry
- Linux (C/C++)
- iPhone/iPad (Objective C)
- Android (Java)
- WebOS
- HTML5 / JavaScript

- Requires flexible architecture to support multiple platforms, sizes and versions.
Security

Secure storage on clients
Secure data transfer
User access and permissions
Framework level permissions
General security measures

- Recommend SSL certificate for secure communication
- Spring framework security as basis for application security
- Customizable user Roles based on detailed permissions
- Users permissions based on their roles and their specific permissions on Study and Forms
Secure storage in openXdata mForms

- Every user has their own storage encrypted using their password.
- Multiple users can share a single device without being able to see/access each others data.
- If a device is lost or stolen, the data on it is inaccessible to third parties.
- If a user forgets the password, as server side recovery exists.
- The cryptographic strength can be adjusted according to requirements and available resources.
- Enables the use of lower end devices.
Integration

Features and case examples
Integration stories and experiences

- Clinical Study in Peru with ~24K participants (OpenMRS)
- Routine HIV reporting in South Africa ~10K users (DHIS2)
- DOTS for MDR-TB in Pakistan++ (OpenMRS XForms)
- Community HW - MoTeCH in Ghana (MoTeCH + OpenMRS)
- Mobile Clinical Trial: OMEVAC in Uganda (OpenClinica)
- Move-IT – Vital events registration (DHIS/RapidSMS++)
- M4Water – Water pump management and repairs (YAWL)
- Water Resource Mapping >1mill records in a few weeks (JasperReports)
- openXanalyzerR – BETA – online analytics (R-project)
- openXmapper – BETA – online mapping (OpenLayers++)
Integration approaches

- Reuse of components (e.g. MoTeCH)
- Extension through protocol plugin (e.g. ODK-collect)
- Exporter to third party system (DHIS2)
- Submission context (OpenClinica, YAWL, M4Water)
- Extension through Spring wiring (eCollect servlet)
- Direct access to analytical database (JasperReports, openXmapper, openXanalyzeR)
- REST interface with JSON, XML and POJO.
Costs

Training, Implementation, Design, Maintaining servers, Software updates, Hosting
Costs - Training

• Training for end users has been shown to be primarily dependent on the users familiarity with the handsets used.
  o OpenXdata therefore supports a wide range of clients to reduce the training requirements.
• Training for managers requires a bit more to cover the many features – but much is self explanatory
  o Video training material needs to be updated
• Basic installation, setup and updating of openXdata on Windows is as simple as running an installer. For linux there are a few but very clear instructions to follow.
• For larger deployments it is recommended to have some kind of it support or inhouse capacity on server management.
Costs - Infrastructure

- Dedicated IP
- Hosting location
- Network connectivity
- Hardware or virtual servers
- Mobile devices
- Power and cooling
- Backup (and possibly failover)

  - OpenXdata can run on very low resourced virtual machines costing below $100 per year
Costs - Maintenance

• OpenXdata has a proved stability
  o In general once setup, it runs properly.
• Updating to a new version of a server is merely replacing the web application package.
  o Database updates handled by liquibase
• There has been some issues with incompatibility with different browsers and their way of producing XML.
  o This is not commonly seen today as GWT has been improved.
Scalability

Implementations

Requirements
Technologies used

- Java
- Spring
- Hibernate
- GWT/GXT
- MySQL
- Apache Tomcat
- Xforms and XML

- Liquibase – Database change management
- Testing frameworks - JUnit / Spring Testing Framework
- Build Tool – Maven
- Dependency management - Nexus
- Mobile: J2ME
Scalability out of the box

• Spring framework provides the foundation
• Application servers running the openXdata web app exist in a wide range of scalable variants.
• OpenXdata can be setup with clustering using standard clustering solutions for the underlying database and application servers.
Minimal requirements

• Any operating system with newer version of Java and a web application server like Tomcat, Jetty, JBoss or similar and MySQL database server.

• For small deployments a basic machine (virtual or physical) with minimum:
  o 512 MB Ram
  o 8 GB disk (could be less)
  o 1 CPU (700mhz virtual CPU is sufficient)

• For larger deployments it will depend on usage and simultaneous users.
  o 2-8 GB RAM
  o 2-4 core CPUs
  o 60 GB disk

• For all deployments it is recommended to have a fixed IP address (though dynamic DNS could be used).
Open Source

Community
Processes
Infrastructure
Releases

www.openXdata.org
Collaborative development
Initially openXdata started off with only basic code collaboration infrastructure.

- High level of trust / autonomy – primary focus – make it work….
- Distributed teams in 6 countries and more locations.
- Fragile release and dependency management
- Numerous forks and parallel efforts
- This became unmanageable.

From 2010 we have formalized community and processes.

- Agile / XP and Apache community influenced
- Tickets and prioritized backlogs
- Coders have permissions based on proven merits
- Daily standup interactions on skype
- 2 week iterations with Maven release management.
- Public releases handled through maintenance releases.
Continous Integration

- **Maven** – Code build and dependency management tool
- **Subversion** – Code repository
- **Trac** – Ticket and development management
- **Jenkins** – Continuous integration server (build server)
- **Nexus** – Artifact repository (dependencies)
- **Cobertura** – Test coverage
- **FindBugs** – Code analysis
- **Checkstyle** – Code style checking
- **Concordion** – Acceptance tests
Apache / MySQL hybrid model

Projects / Sources

- P1
  • Reports T1
  • Reports T2

- P2
  • Patch T2
  • Reports T3

- P4
  • Reports T4
  • Patch T4
  • 30% Dev

- P5
  • Patch T3
  • 50% Dev

Backlog

• Group prioritized backlog of issues / tickets

Iterations / Releases

- v.1.7
- v.1.8
- v.1.9
- v.1.10
- v.1.11
- v.1.12
- v.1.12.1
- v.1.13
- v.1.18.1
- v.1.18.2
- v.12.2

P1: 100%
P2: 100%
P4: 100%
P5: 100%
Demonstration

Design – Collect – Manage
Small room today: 14:00 – 15:00
Online videos and training material
openXdata comprises many organizations globally with deployments in Africa, South Asia and South America.
Create a ticket: Defect/Bug  -  Feature  -  Enhancement  -  Requirement  -  Story  -  Task
Automated builds:  Jenkins  -  Server Nightly  -  Server on Commit  -  mForms  -  Forms (web)
Metrics:  JavaDoc  -  Cobertura  -  Acceptance Tests  -  Checkstyle  -  FindBugs
Current Milestone:  See roadmap  -  Tickets ready for testing  -  Code to be reviewed

This is the openXdata developers wiki, for User documentation, visit www.openxdata.org

For introductory information, community, support, contacts, documentation (non-developer), non-developer installation and more please go to www.openxdata.org

Installation

- Simplified Developer setup for openXdata
- Detailed Developer setup for openXdata

Developer resources

- ProcessChanges and Process Improvement
- OpenXdata Architectural Overview
- Using git-svn with openxdata
- Version number conventions
- End to end debugging (mobile-to-server-to-mobile)
- How to report bugs, feature requests etc
- Relevant technologies
- Best Practices, Methodologies and Developer skills
- Subversion Repository Code of Conduct
- Developer Guides
- Continuous integration (the build server)
- Community processes
### Milestone: server-1.13

- **Status:** 2 weeks late (04/11/12)
- **Progress:** 100%
- **Tickets:**
  - Closed tickets: 2
  - In test tickets: 2
  - Open tickets: 0
  - Total tickets: 4

### Milestone: mforms-1.7.3

- **Status:** 8 hours late (04/26/12)
- **Progress:** 0%
- **Tickets:**
  - Closed tickets: 0
  - In test tickets: 0
  - Open tickets: 1
  - Total tickets: 1

J2ME-based data collection application, maintenance release.

### Milestone: mforms-2.2

- **Status:** 8 hours late (04/26/12)
- **Progress:** 80%
- **Tickets:**
  - Closed tickets: 4
  - In test tickets: 4
  - Open tickets: 2
  - Total tickets: 10

J2ME-based data collection application.

### Milestone: oxdforms-1.8

- **Status:** 8 hours late (04/26/12)

### Milestone: server-1.8.5

- **Status:** 8 hours late (04/26/12)
### openXdata prioritized backlog

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<td>#741</td>
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04/25/12: Yesterday

23:46 Ticket #768 (Unable to upload data via mobile client, with server 1.3.4 and mforms 2.2) closed by birdsarah
wontfix: +1 for not supporting forward compatibility - sorry oystein

17:45 Ticket #660 (If user with Role_Mobile_User is able to log into the dashboard, they will ...) updated by dinebennett
status changed
Please ignore my previous comment, you were right to include a new role. ...

17:42 OXD-660.3.patch attached to Ticket #660 by dinebennett

16:37 Ticket #768 (Unable to upload data via mobile client, with server 1.3.4 and mforms 2.2) updated by dagmar
What is being describe here is what I would call forwards compatibility. ...

15:52 Ticket #729 (Unanswered repeat questions don't fire validation rules.) updated by dagmar
status changed

15:51 Ticket #696 (Mobile client doesn't lock up questions when they are locked) updated by jenkinstrac
Referenced in build ...

15:51 Ticket #696 (Mobile client doesn't lock up questions when they are locked) closed by dinebennett
fixed: This was quite a simple fix, I am happy to skip QA and mark it as fixed.

15:50 Ticket #696 (Mobile client doesn't lock up questions when they are locked) updated by dinebennett
status changed
Applied in r6045.
Ticket #658 (needs_review defect)

It is not possible to delete a Study/Form/Version with voided data

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</table>

Description (last modified by dagmar) (diff)

If a Form Version has voided (deleted) data, then it is not possible to delete that study, form or version.

Steps to reproduce:
1. Create a Form Version
2. Capture data
3. Open View Responses window
4. Delete (all) data
5. Select Form Version
6. Press Delete button
7. Select option to delete Form Version

Expected result:
Ticket #658: OXD-658.3.patch

File OXD-658.3.patch, 35.4 KB (added by dinebennett, 41 hours ago)

model/src/main/java/org/openxdata/server/admin/model/FormDef.java

```java
public List<FormDefVersion> getVersions() {
    return versions;
}

public List<Integer> getFvIds() {
    List<Integer> fdvIds = new ArrayList<Integer>();
    for (int i=0; i< getVersions().size(); i++) {
        fdvIds.add(getVersions().get(i).getId());
    }
    return fdvIds;
}

/**
 * Returns a version of the Form with the name
 */
```

model/src/main/java/org/openxdata/server/admin/model/StudyDef.java

```java
public List<FormDef> getForms() {
    return forms;
}
```
<table>
<thead>
<tr>
<th>#</th>
<th>S</th>
<th>W</th>
<th>Name</th>
<th>Last Success</th>
<th>Last Failure</th>
<th>Last Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td>mForms Protocol</td>
<td>18 hr (#157)</td>
<td>8 days 0 hr (#149)</td>
<td>14 sec</td>
</tr>
<tr>
<td></td>
<td><img src="https://example.com" alt="Red cloud" /></td>
<td><img src="https://example.com" alt="Red cloud" /></td>
<td>openclinica-conversion-tools</td>
<td>1 day 18 hr (#396)</td>
<td>19 hr (#397)</td>
<td>1 min 32 sec</td>
</tr>
<tr>
<td></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td>OpenXdata</td>
<td>20 hr (#888)</td>
<td>3 mo 0 days (#817)</td>
<td>3 min 1 sec</td>
</tr>
<tr>
<td></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td>OpenXdata-1.2.X</td>
<td>8 mo 5 days (#51)</td>
<td>9 mo 11 days (#45)</td>
<td>3 min 48 sec</td>
</tr>
<tr>
<td></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td>OpenXdata-1.3.X</td>
<td>5 days 17 hr (#159)</td>
<td>1 mo 11 days (#154)</td>
<td>4 min 3 sec</td>
</tr>
<tr>
<td></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td>OpenXdata-1.8.X</td>
<td>6 days 21 hr (#30)</td>
<td>N/A</td>
<td>2 min 57 sec</td>
</tr>
<tr>
<td></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td>opendata-forms</td>
<td>7 days 23 hr (#60)</td>
<td>N/A</td>
<td>29 sec</td>
</tr>
<tr>
<td></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td>opendata-forms-1.0.X</td>
<td>5 mo 29 days (#9)</td>
<td>N/A</td>
<td>30 sec</td>
</tr>
<tr>
<td></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td>opendata-forms-1.3.X</td>
<td>1 mo 11 days (#14)</td>
<td>N/A</td>
<td>27 sec</td>
</tr>
<tr>
<td></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td>opendata-mforms</td>
<td>18 hr (#169)</td>
<td>1 mo 22 days (#146)</td>
<td>53 sec</td>
</tr>
<tr>
<td></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td>opendata-mforms-1.3</td>
<td>7 mo 17 days (#1)</td>
<td>N/A</td>
<td>18 sec</td>
</tr>
<tr>
<td></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td>opendata-mforms-1.7.X</td>
<td>27 days (#11)</td>
<td>N/A</td>
<td>25 sec</td>
</tr>
<tr>
<td></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td><img src="https://example.com" alt="Green sun" /></td>
<td>OpenXdata-nightly</td>
<td>7 hr 0 min (#647)</td>
<td>12 days (#635)</td>
<td>6 min 34 sec</td>
</tr>
</tbody>
</table>
Project OpenXdata

Test Result Trend

Upstream Projects
- openxdata-forms

Downstream Projects
- openxdata-server-acceptance-test
- openxdata-server-checkstyle
- openxdata-server-cobertura
- openxdata-server-findbugs
- openxdata-server-javadoc

Permalinks
- Last build (#888), 18 hr ago
- Last stable build (#888), 18 hr ago
- Last successful build (#888), 18 hr ago
- Last failed build (#817), 3 mo 0 days ago
- Last unstable build (#842), 1 mo 26 days ago
- Last unsuccessful build (#842), 1 mo 26 days ago
CSV export Acceptance test

All tests are captured by admin on the 15/09/2010.

The exporter should handle normal xforms with a int and a string as input.

Given a form that has two fields, one field is called firstname and has type string. The other field is called age and is a integer field. When we export the data after submitting these data:

<table>
<thead>
<tr>
<th>Submission where fields are separated with #</th>
</tr>
</thead>
<tbody>
<tr>
<td>David#8</td>
</tr>
<tr>
<td>Peter#16</td>
</tr>
</tbody>
</table>

Then the CSV exporter should produce this output:

```
ID, CAPTURER, CREATION DATE, FIRSTNAME, AGE
1, admin, 15/09/2010, David, 8
2, admin, 15/09/2010, Peter, 16
```

The exporter should handle normal a xform with a GPS location as input.

Given this form with a name and a locationfield.

```
<xforms xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <model>
```


# Code Coverage

Cobertura Coverage Report

## Trend

<table>
<thead>
<tr>
<th>%</th>
<th>Classes</th>
<th>Conditionals</th>
<th>Files</th>
<th>Lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>103/135</td>
<td>865/2641</td>
<td>94/121</td>
<td>2762/1</td>
</tr>
</tbody>
</table>

## Project Coverage summary

<table>
<thead>
<tr>
<th>Name</th>
<th>Classes</th>
<th>Conditionals</th>
<th>Files</th>
<th>Lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobertura Coverage Report</td>
<td>76%</td>
<td>33%</td>
<td>78%</td>
<td>44%</td>
</tr>
</tbody>
</table>

## Coverage Breakdown by Package

<table>
<thead>
<tr>
<th>Name</th>
<th>Classes</th>
<th>Conditionals</th>
<th>Files</th>
<th>Lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>org.fcitmuk.ephanydyan</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>org.openxdata.communication.bluetooth</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>org.openxdata.server</td>
<td>60%</td>
<td>30%</td>
<td>60%</td>
<td>3%</td>
</tr>
<tr>
<td>Directory</td>
<td>ID</td>
<td>Time</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>-----</td>
<td>-------</td>
<td>-----------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>6003</td>
<td>9 days</td>
<td>changed the capture_date expected data for monthly and yearly data</td>
<td></td>
</tr>
<tr>
<td>Forms</td>
<td>6020</td>
<td>8 days</td>
<td>mapkon: [maven-release-plugin] prepare for next development iteration</td>
<td></td>
</tr>
<tr>
<td>J2ME</td>
<td>6045</td>
<td>16 hours</td>
<td>dagmar: [#696] fixes issue with locked questions on the mobile. Submitted by: ...</td>
<td></td>
</tr>
<tr>
<td>Server</td>
<td>6044</td>
<td>19 hours</td>
<td>dagmar: [#701] changed protocol implementation so we can support non-oxd clients ...</td>
<td></td>
</tr>
<tr>
<td>branches</td>
<td>6041</td>
<td>7 days</td>
<td>dagmar: [#727] fix issue where next button is not enabled in the New Study/Form ...</td>
<td></td>
</tr>
<tr>
<td>emit-1.0</td>
<td>2578</td>
<td>21 months</td>
<td><a href="mailto:dagmar@cell-life.org.za">dagmar@cell-life.org.za</a>: fixed character encoding problem in emmit 1.0 branch</td>
<td></td>
</tr>
<tr>
<td>openXdata-1.3.X</td>
<td>5936</td>
<td>5 weeks</td>
<td>batkinson: Formatting sources with openxdata-eclipse-codestyle.xml</td>
<td></td>
</tr>
<tr>
<td>openXdata-1.8.X</td>
<td>6041</td>
<td>7 days</td>
<td>dagmar: [#727] fix issue where next button is not enabled in the New Study/Form ...</td>
<td></td>
</tr>
<tr>
<td>openXdata-wm-5</td>
<td>676</td>
<td>2 years</td>
<td><a href="mailto:ctumwebaze@gmail.com">ctumwebaze@gmail.com</a>:</td>
<td></td>
</tr>
<tr>
<td>oxd-sniv</td>
<td>819</td>
<td>2 years</td>
<td><a href="mailto:ctumwebaze@gmail.com">ctumwebaze@gmail.com</a>:</td>
<td></td>
</tr>
<tr>
<td>oxd-wf-prototype</td>
<td>3728</td>
<td>15 months</td>
<td><a href="mailto:gmuthondou@gmail.com">gmuthondou@gmail.com</a>: added immunization dependance onto server project pom</td>
<td></td>
</tr>
<tr>
<td>release_1_1</td>
<td>2550</td>
<td>21 months</td>
<td><a href="mailto:dagmar@cell-life.org.za">dagmar@cell-life.org.za</a>: removed reference to META-INF directory, which does not exist</td>
<td></td>
</tr>
<tr>
<td>release_1_2_x</td>
<td>5036</td>
<td>8 months</td>
<td><a href="mailto:brent.atkinson@gmail.com">brent.atkinson@gmail.com</a>: fixing build, resolving plugins from oxd nexus</td>
<td></td>
</tr>
<tr>
<td>wf-intergration</td>
<td>5355</td>
<td>6 months</td>
<td>ronaldk: Ignore workitems that were already canceled.</td>
<td></td>
</tr>
<tr>
<td>tags</td>
<td>6024</td>
<td>8 days</td>
<td>mapkon: [maven-release-plugin] copy for tag oxd-1.13</td>
<td></td>
</tr>
<tr>
<td>trunk</td>
<td>6044</td>
<td>19 hours</td>
<td>dagmar: [#701] changed protocol implementation so we can support non-oxd clients ...</td>
<td></td>
</tr>
<tr>
<td>model</td>
<td>6025</td>
<td>8 days</td>
<td>mapkon: [maven-release-plugin] prepare for next development iteration</td>
<td></td>
</tr>
<tr>
<td>protocol-api</td>
<td>6043</td>
<td>19 hours</td>
<td>dagmar: [#701] added protocol support to the API for non-oxd clients (e.g. odk or ...</td>
<td></td>
</tr>
<tr>
<td>protocol-providers</td>
<td>6042</td>
<td>6 days</td>
<td>mapkon: Update the version of mforms-server to track with the latest snapshot.</td>
<td></td>
</tr>
<tr>
<td>rpc-interface</td>
<td>6025</td>
<td>8 days</td>
<td>mapkon: [maven-release-plugin] prepare for next development iteration</td>
<td></td>
</tr>
<tr>
<td>server</td>
<td>6044</td>
<td>19 hours</td>
<td>dagmar: [#701] changed protocol implementation so we can support non-oxd clients ...</td>
<td></td>
</tr>
<tr>
<td>webapp</td>
<td>6044</td>
<td>19 hours</td>
<td>dagmar: [#701] changed protocol implementation so we can support non-oxd clients ...</td>
<td></td>
</tr>
<tr>
<td>.gitignore</td>
<td></td>
<td></td>
<td>mapkon: Add eclipse files to .gitignore to reduce noise.</td>
<td></td>
</tr>
<tr>
<td>Branch</td>
<td>Latest Update</td>
<td>Days Since Last Update</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>---------------</td>
<td>------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>J2ME</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Server</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>branches</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tags</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>before-ant-removal</td>
<td></td>
<td></td>
<td>Tagging the revision before the removal of the Ant build.</td>
<td></td>
</tr>
<tr>
<td>mforms-proto-1.4</td>
<td></td>
<td></td>
<td><a href="mailto:brent.atkinson@gmail.com">brent.atkinson@gmail.com</a>: maven-release-plugin copy for tag mforms-proto-1.4</td>
<td></td>
</tr>
<tr>
<td>mforms-proto-1.5</td>
<td></td>
<td></td>
<td>batkinson: maven-release-plugin copy for tag mforms-proto-1.5</td>
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<tr>
<td>mforms-proto-1.6</td>
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<td></td>
<td>batkinson: maven-release-plugin copy for tag mforms-proto-1.6</td>
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<tr>
<td>mforms-proto-1.7</td>
<td></td>
<td></td>
<td>skelly: maven-release-plugin copy for tag mforms-proto-1.7</td>
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<td>mforms-proto-1.8</td>
<td></td>
<td></td>
<td>batkinson: maven-release-plugin copy for tag mforms-proto-1.8</td>
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<tr>
<td>mforms-proto-2.0</td>
<td></td>
<td></td>
<td>batkinson: maven-release-plugin copy for tag mforms-proto-2.0</td>
<td></td>
</tr>
<tr>
<td>openxdata-1.2</td>
<td></td>
<td></td>
<td><a href="mailto:brent.atkinson@gmail.com">brent.atkinson@gmail.com</a>: Creating a more usable tag for 1.2 release.</td>
<td></td>
</tr>
<tr>
<td>openxdata-1.2.1</td>
<td></td>
<td></td>
<td><a href="mailto:brent.atkinson@gmail.com">brent.atkinson@gmail.com</a>: maven-release-plugin copy for tag openxdata-1.2.1</td>
<td></td>
</tr>
<tr>
<td>openxdata-1.2.2</td>
<td></td>
<td></td>
<td><a href="mailto:brent.atkinson@gmail.com">brent.atkinson@gmail.com</a>: Retro-fixing tagged release, tsk tsk.</td>
<td></td>
</tr>
<tr>
<td>oxd-1.3</td>
<td></td>
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<td>oxd-1.3.1</td>
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<td>oxd-1.3.2</td>
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<tr>
<td>oxd-1.6</td>
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<td></td>
</tr>
</tbody>
</table>
Free and open-source mobile and web data collection for low resource settings

openXdata comprises many organizations globally with deployments in Africa, South Asia and South America.

www.openXdata.org
contact@openXdata.org

Video tutorials available at: doc.openXdata.org