



**Mopius**

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Cross Platform NFC  
HTML5 Apps with Apache Cordova

# Andreas Jakl

» Startup founder & app developer

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» History

- Nokia: Technology Wizard
- FH Hagenberg, Mobile Computing: Assistant Professor
- Siemens / BenQ Mobile: Augmented Reality-Apps



Runtimes, tools and libraries

# OVERVIEW

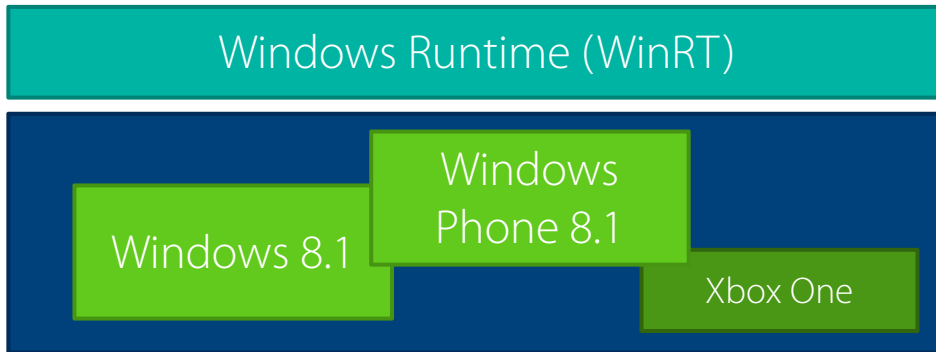
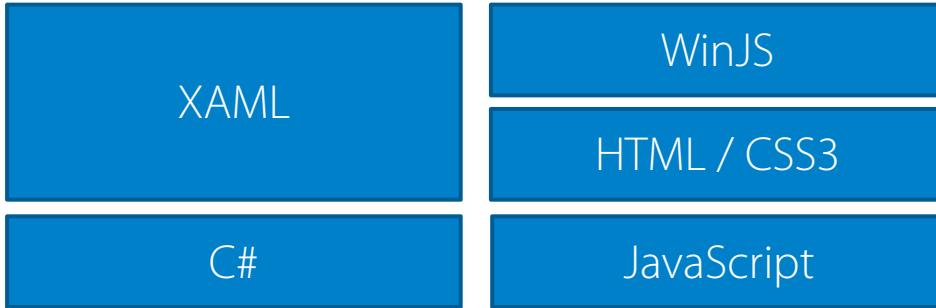


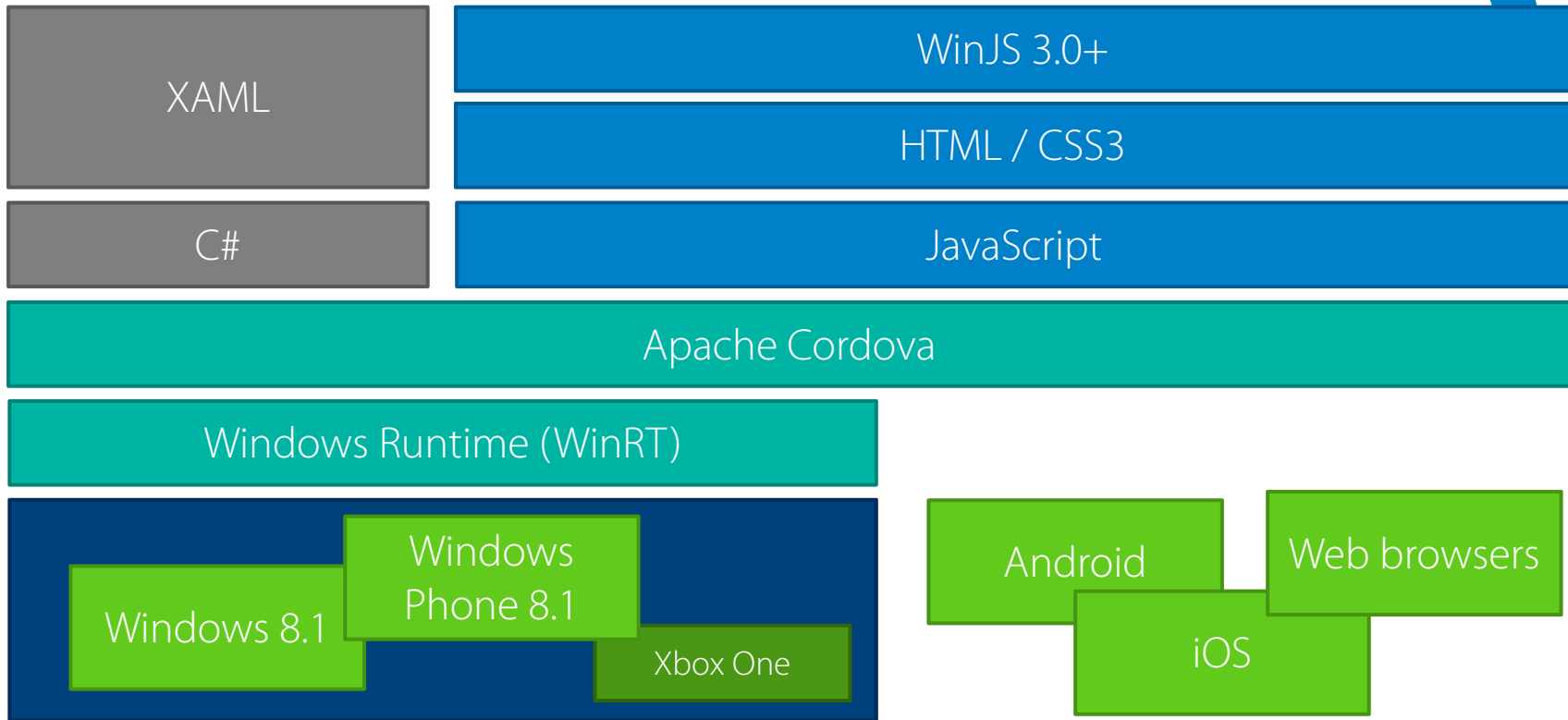
# HTML5 UI Toolkits

- » AngularJS
- » BackboneJS
- » jQuery Mobile
- » Sencha Touch
- » Ember.js
- » Dojo Mobile
- » WinJS
- » ... and many, many more!

HTML Form in Chrome, no styling / layouts

Same HTML form in WinJS, default dark theme without layouts





# Apache Cordova

- » Use native phone APIs from HTML / JavaScript
  - Hybrid apps – packaged for distribution
  - App runs locally on device: web browser component in native app
  - No native code required
- » **PhoneGap** = distribution of Cordova
  - Cordova = engine
  - Additional paid services: PhoneGap Build, Enterprise



# Multi-Device Hybrid Apps

- » Visual Studio Extension (preview)
  - <http://bit.ly/vsHybrid>
- » Code completion, debugging
- » Installs required toolkits (Android SDK, etc)
- » Known issues:  
<http://www.visualstudio.com/explorer/cordova-known-issues-vs>



```
yPosition += (element.offsetTop - element.scrollLeft);  
element = element.  
return { x: xPosition,  
  }  
}
```

- addEventListener
- appendChild
- ATTRIBUTE\_NODE
- attributes
- CDATA\_SECTION\_NODE
- childElementCount

```
script.js  
function getClickPosition(e) {  
  var parentPosition = getPosition(e.currentTarget);  
  var xPosition = parentPosition.x;  
  var yPosition = parentPosition.y;  
}  
function getPosition(element) {  
  var position = {}  
}
```





# Deploying to Targets



Android

On device  
debugging:  
Android 4.4 +


Ripple  
*(Chrome extension  
for Android  
emulation)*

iOS

Windows  
Phone

No debugging  
(emulator & device)

Windows



```
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved.

C:\Users\Andreas>adb devices
* daemon not running. starting it now on port 5037 *
* daemon started successfully *
List of devices attached
4df1a4a45a374f97    device
```

Going Multi-Platform

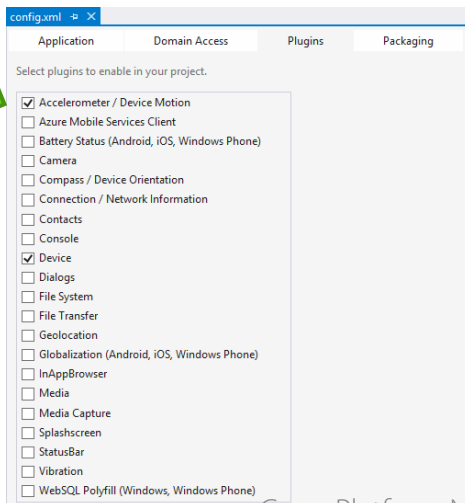
# CORDOVA



# Core Plug-Ins

- » Interface to native components
- » Good cross-platform support
- » Integrated in VS

– config.xml



	amazon- fireos	android	blackberry10	Firefox OS	ios	Ubuntu	wp8 (Windows Phone 8)	windows (8.0, 8.1, Phone 8.1)	tizen
Accelerometer*	✓	✓	✓	✓	✓	✓	✓	✓	✓
BatteryStatus*	✓	✓	✓	✓	✓	X	✓	X	✓
Camera*	✓	✓	✓	✓	✓	✓	✓	✓	✓
Capture*	✓	✓	✓	X	✓	✓	✓	✓	X
Compass*	✓	✓	✓	X	✓ (3GS+)	✓	✓	✓	✓
Connection*	✓	✓	✓	X	✓	✓	✓	✓	✓
Contacts*	✓	✓	✓	✓	✓	✓	✓	partially	X
Device*	✓	✓	✓	✓	✓	✓	✓	✓	✓
Events*	✓	✓	✓	X	✓	✓	✓	✓	✓
File*	✓	✓	✓	X	✓	✓	✓	✓	X
File Transfer*	✓	✓	✓ * Do not support onprogress nor abort	X	✓	X	✓ * Do not support onprogress nor abort	✓ * Do not support onprogress nor abort	X
Geolocation*	✓	✓	✓	✓	✓	✓	✓	✓	✓
Globalization*	✓	✓	✓	X	✓	✓	✓	X	X
InAppBrowser*	✓	✓	✓	X	✓	✓	✓	uses iframe	X
Media*	✓	✓	✓	X	✓	✓	✓	✓	✓
Notification*	✓	✓	✓	X	✓	✓	✓	✓	✓
Splashscreen*	✓	✓	✓	X	✓	✓	✓	✓	X
Storage	✓	✓	✓	X	✓	✓	✓ localStorage & indexedDB	✓ localStorage & indexedDB	✓
Vibration*	✓	✓	✓	✓	✓	X	✓	X	X

# 3<sup>rd</sup> Party Plug-Ins

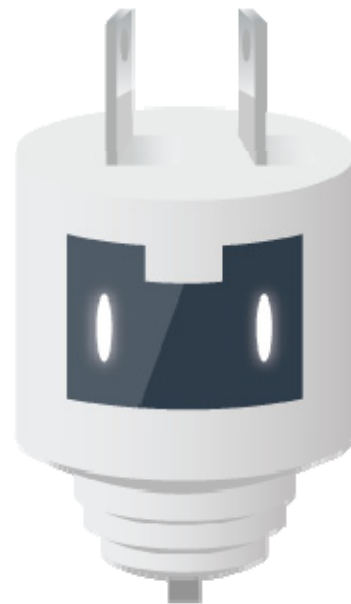
## » Sources

- Cordova.io, 400+ plugins: [plugins.cordova.io](https://plugins.cordova.io)
- Telerik verified plug-ins: [plugins.telerik.com](https://plugins.telerik.com)

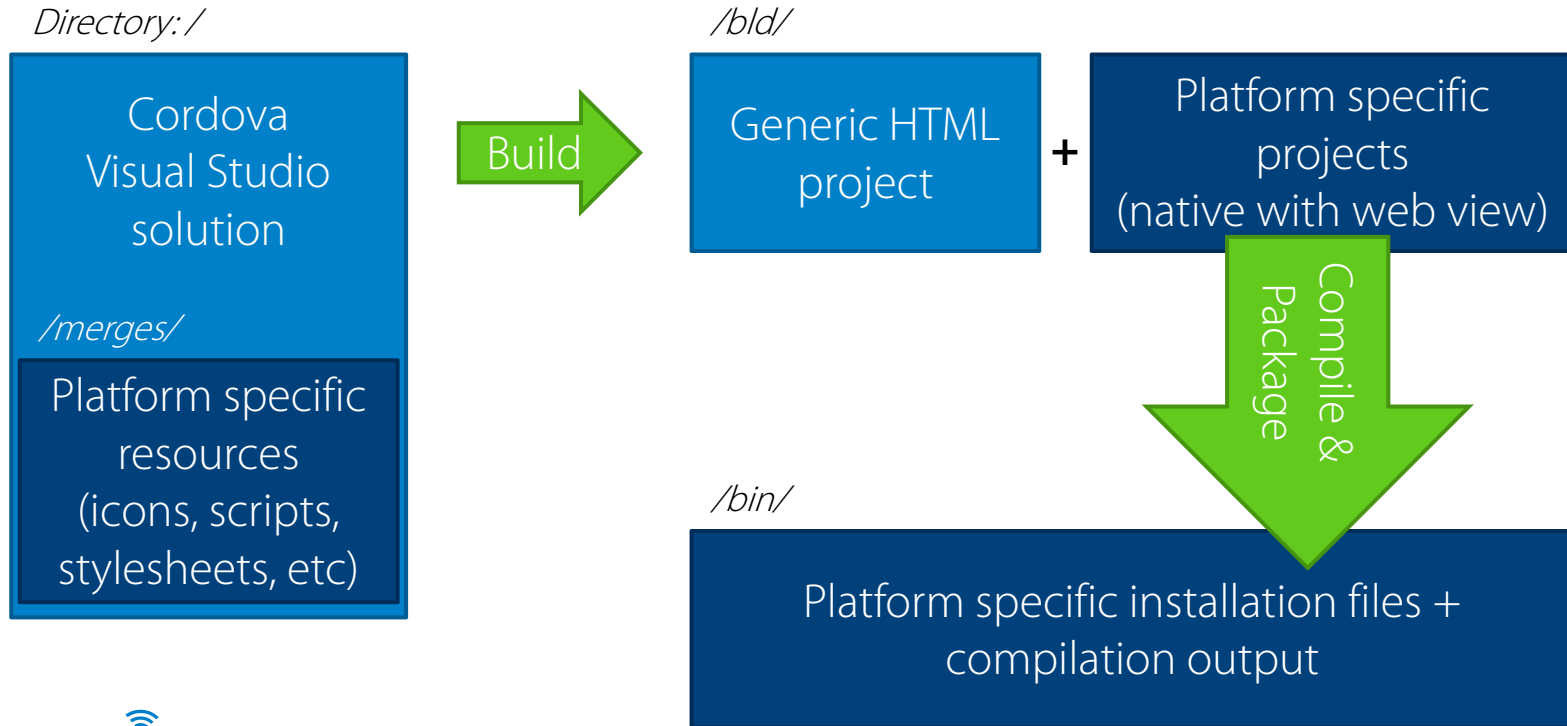
## » Integration

- “View code” of config.xml
- Manually add plugin reference:

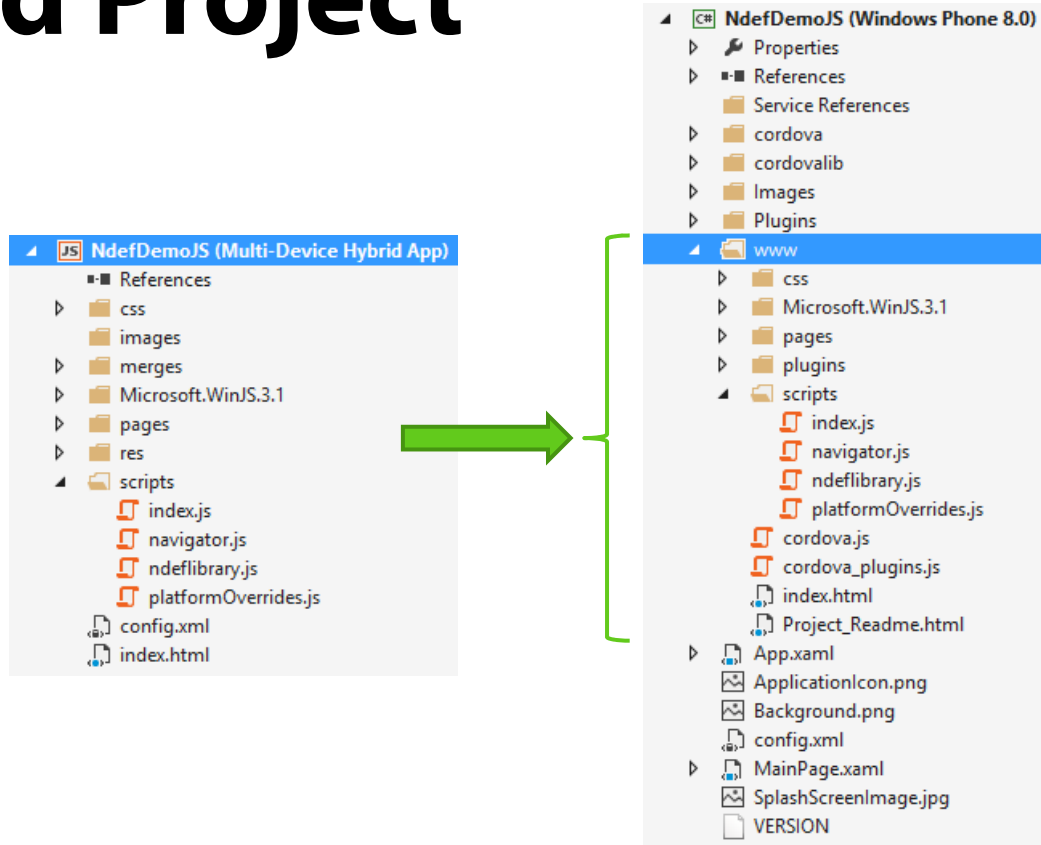
```
<vs:feature>pluginname@version</vs:feature>
```



# Hybrid App Build Process



# Hybrid Project

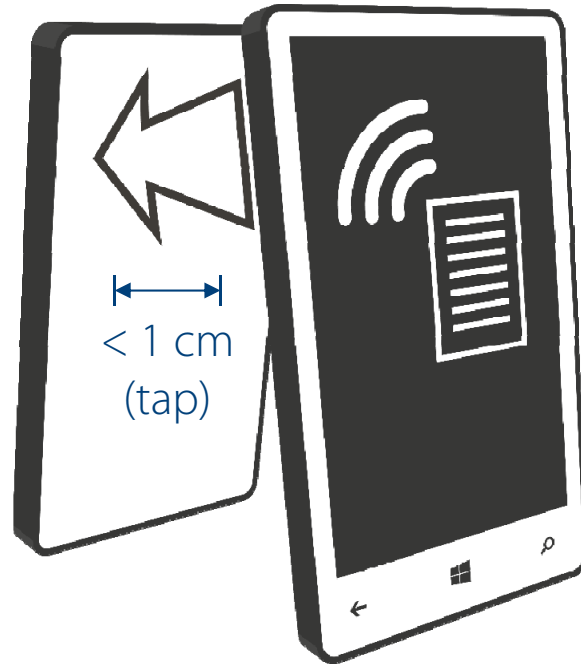


Near Field Communication

# NFC

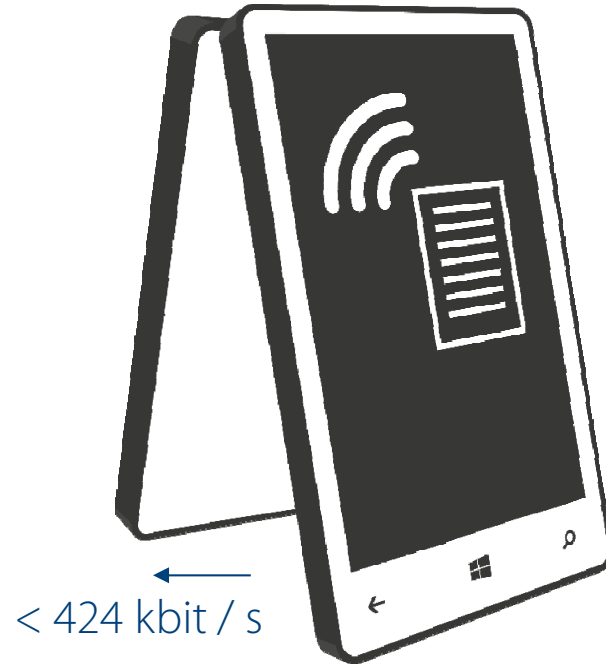


# Near Field Communication?





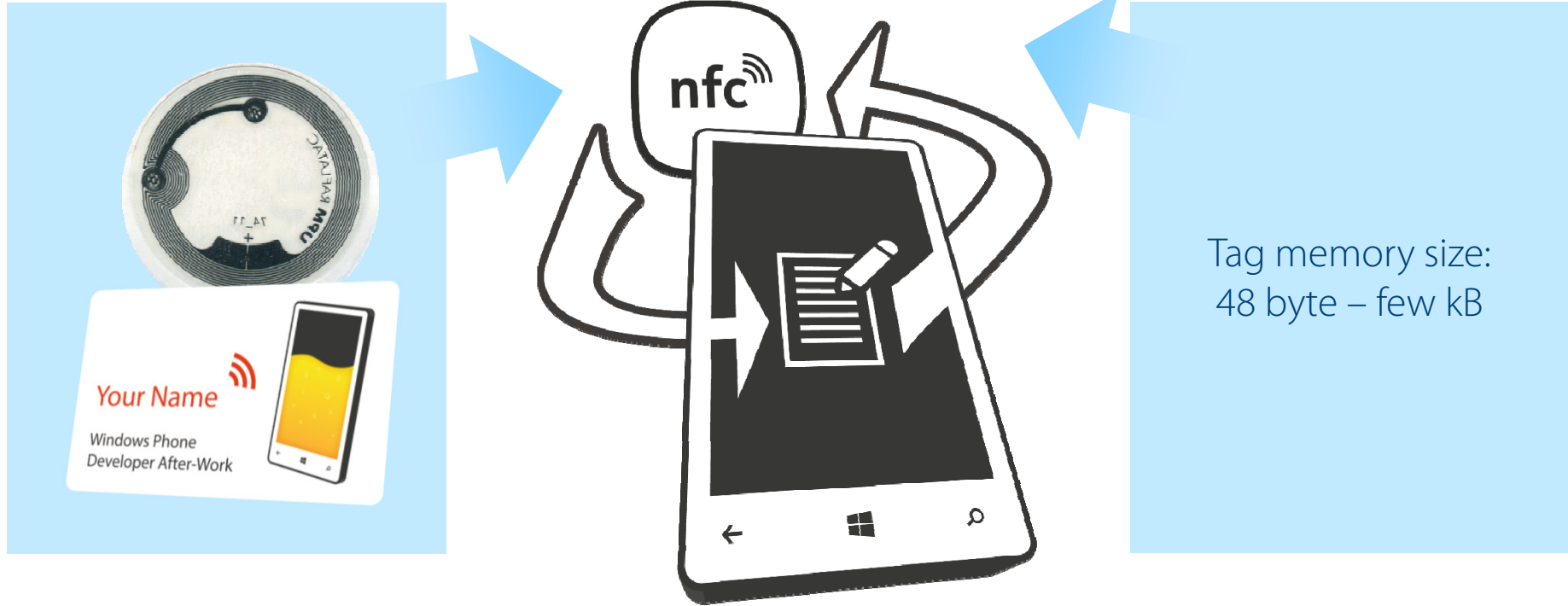
# Near Field Communication?



# Near Field Communication?



# NFC Tags



Bringing it all together ...

# NFC & CORDOVA & WINJS



# W3C NFC API



## » JavaScript NFC API

– [www.w3.org/TR/nfc/](http://www.w3.org/TR/nfc/)

## » Status: First Public Working Draft; NFC & basic NDEF

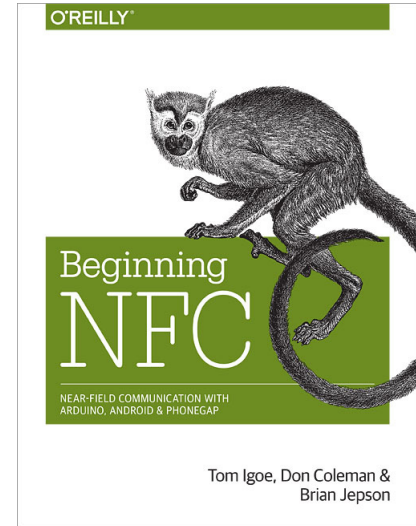
– Not very active group ☹

*State: October 2014*

Specification	Internal draft	Public Working draft	Stable draft (Last Call)	Implementors feedback (CR)	Standard (Rec)	Test Suite	Notes
Active work							
NFC API	11 Apr 2014	14 Jan 2014	Q2 2014	Q4 2014			

# Cordova NFC Plugin

- » Open source
- » Developed by Chariot Solutions
  - [plugins.cordova.io/#/package/com.chariotsolutions.nfc.plugin](https://plugins.cordova.io/#/package/com.chariotsolutions.nfc.plugin)
- » Platforms
  - Android
  - WP8
  - BlackBerry 10, (7)



# Adding Cordova NFC Plugin



- » Add NFC plugin reference to config.xml

```
<vs:feature>com.chariotsolutions.nfc.plugin@0.5.1</vs:feature>
```

- » Test reading NFC tags

```
nfc.addNdefListener(  
  this.nfcHandler,  
  function () { console.log("Listening for NDEF tags."); },  
  function (error) { alert("Adding the listener failed."); }  
);
```

```
nfcHandler: function (nfcEvent) {  
  var tag = nfcEvent.tag;  
  var ndefMessageBytes = tag.ndefMessage;  
  var payload = nfc.bytesToString(ndefMessageBytes[0].payload);  
  alert(payload);  
}
```

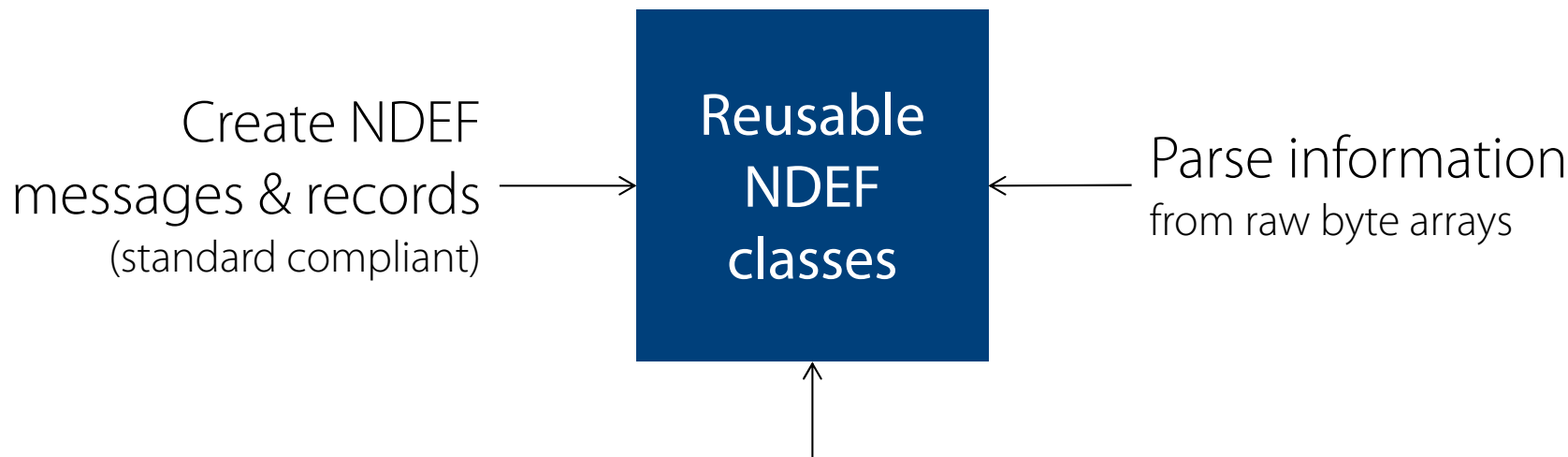
# NFC & NDEF Overview



NDEF = NFC Data Exchange Format



# Open Source NDEF Library



Fully documented  
Open Source LGPL license

*library development  
supported by:*



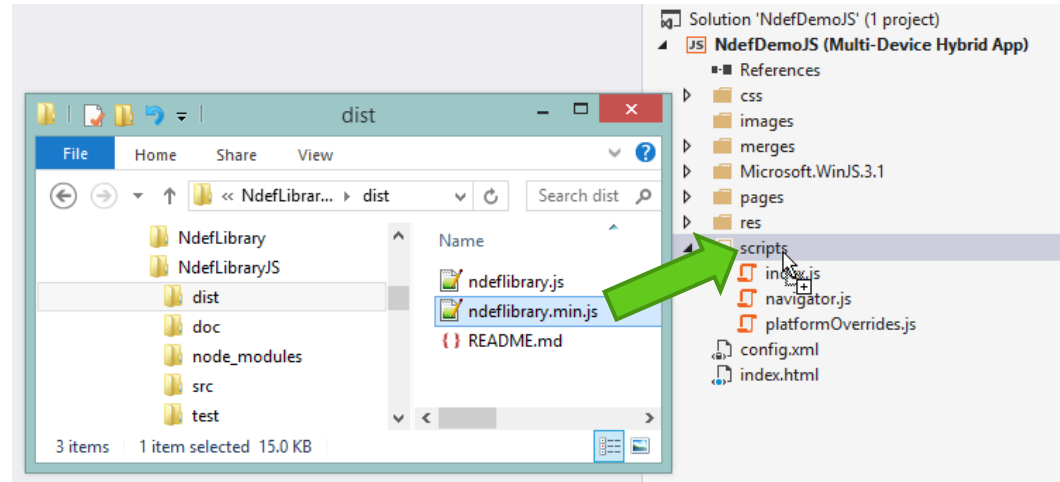
[ndef.mopius.com](http://ndef.mopius.com)

Cross Platform NFC – Andreas Jakl, 2014



# Adding the NDEF Library

- » Download & extract library  
NdefLibraryJS\_1.0.0.zip
- » Drag & drop to project  
/dist/ndeflibrary(.min.).js



# Creating NDEF Messages



## » NDEF Record

### – URI record

```
var ndefRecord = new NdefLibrary.NdefUriRecord();  
ndefRecord.setUri("http://www.mopius.com/");
```

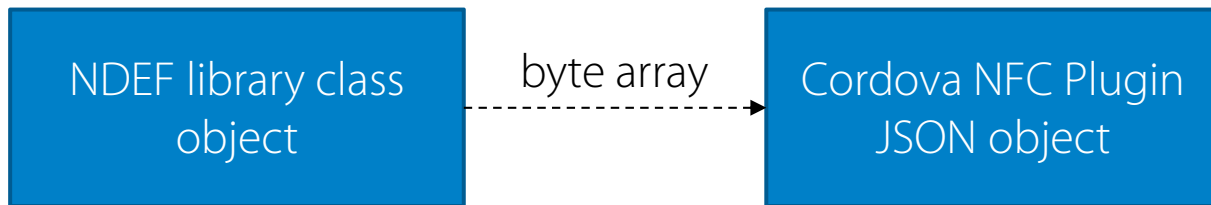
### – Social record (Twitter)

```
var ndefRecord = new NdefLibrary.NdefSocialRecord();  
ndefRecord.setSocialType(NdefLibrary.NdefSocialRecord.NfcSocialType.Twitter);  
ndefRecord.setSocialUserName("mopius");
```

## » NDEF Message

```
var ndefMessage = new window.NdefLibrary.NdefMessage(ndefRecord);
```

# Format Conversion



```
// Convert message to raw NDEF byte array
var ndefMsgBytes = ndefMessage.toByteArray();
// Parse raw byte array to Cordova NFC Plugin format (JSON)
var ndefMessagePlugin = window.ndef.decodeMessage(ndefMsgBytes);
```

# Writing NFC Tags



- » Cordova NFC Plugin: Write tag ...
  - **Android:** in NFC tag discovered call-back = while user is tapping tag
  - **Windows Phone:** outside call-back = instruct phone to write tag as soon as user taps tag

```
nfc.write(  
  ndefMessagePlugin,  
  function (msg) { console.log("Publish Success" + msg); },  
  function (msg) { console.log("Publish Error" + msg); }  
);
```

# Sharing to Devices

📶 Can be started & stopped (with **unshare**)



```
nfc.share(  
  ndefMessagePlugin,  
  function (msg) { console.log("Share Success" + msg); },  
  function (msg) { console.log("Share Error" + msg); }  
);
```

# Full Demo App



[mopius.github.io/ndef-nfc](http://mopius.github.io/ndef-nfc)

# SUMMARY







**WinJS:** HTML5 UI toolkit.

Coming from Windows, expanding to cross-platform.  
UI Controls & improved async / callbacks.

**Multi-Device Hybrid Apps:** Visual Studio Extension.  
Create cross-platform HTML5 apps, based on Cordova.



**Apache Cordova:** toolchain to create hybrid apps.  
Plugins to access native functionality from JavaScript.  
**PhoneGap:** commercial distribution of Cordova.



**NFC:** short-range wireless communication.  
Transmit small data packages between devices or store data on tags.  
**Platforms:** Android, Windows Phone, BlackBerry, iPhone (partly)  
**Support:** W3C JavaScript API: draft; Cordova: 3<sup>rd</sup> party plugin



**NDEF:** content standard.  
Record(s) contained in Message.

**NDEF Library:** open source for JavaScript & C#.  
Create & parse NDEF messages.  
[ndef.mopius.com](http://ndef.mopius.com)





Thank You.

Andreas Jakl

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