**Internationalization & Unicode Conference** **38**
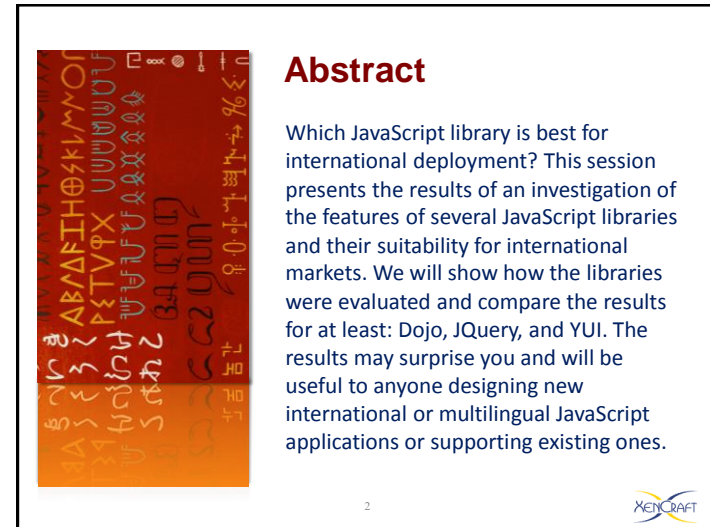NOVEMBER 3-5, 2014 • SANTA CLARA, CA USA

**Comparing JavaScript Libraries**

Craig Cummings, Tex Texin
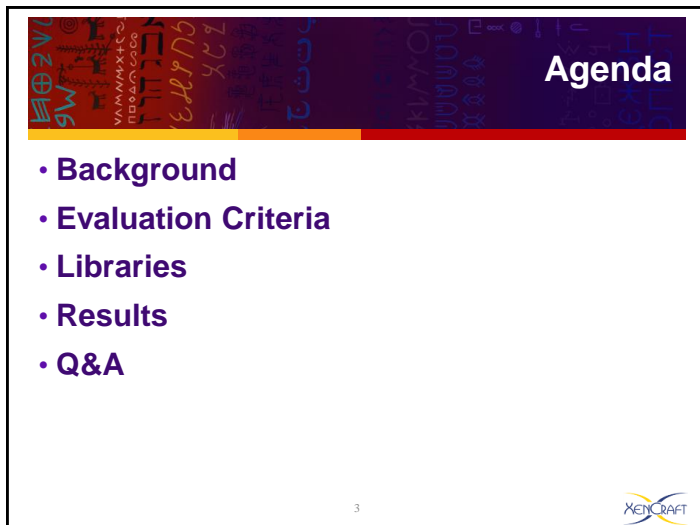November 4, 2014

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## Abstract

Which JavaScript library is best for international deployment? This session presents the results of an investigation of the features of several JavaScript libraries and their suitability for international markets. We will show how the libraries were evaluated and compare the results for at least: Dojo, JQuery, and YUI. The results may surprise you and will be useful to anyone designing new international or multilingual JavaScript applications or supporting existing ones.

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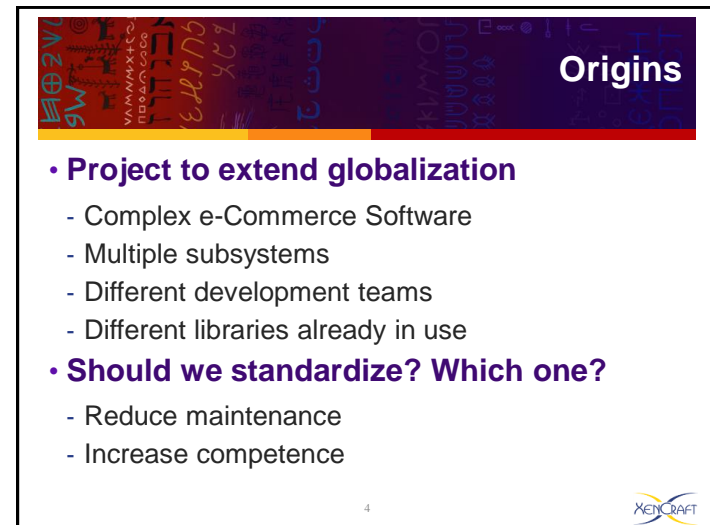
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## Agenda

- **Background**
- **Evaluation Criteria**
- **Libraries**
- **Results**
- **Q&A**

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## Origins

- **Project to extend globalization**
  - Complex e-Commerce Software
  - Multiple subsystems
  - Different development teams
  - Different libraries already in use
- **Should we standardize? Which one?**
  - Reduce maintenance
  - Increase competence

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## Evaluation Criteria

- **Support for target and future markets**
- **Number of internationalization features**
- **Quality of internationalization features**
- **Maintained?**
- **Widely used?**
- **Ease of migration from existing libraries**
- **Browser compatibility**

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## Candidate Libraries

| | |
|---|---|
| AccDC | MooTools |
| Ample SDK | PhoneJS |
| CupQ | Prototype |
| DHTMLX | Pyjamas |
| Dojo | qooxdoo |
| Echo3 | Rialto Toolkit |
| Enyo | Rico |
| Ext JS | SmartClient & SmartGWT |
| Google Web Toolkit | Wakanda |
| i18next | Web Atoms |
| jQuery | Webix |
| Midori | YUI |
| MochiKit | ZK |

## The ECMA I18n Standard

- **Why not rely on the new standard?**
  - It didn't exist circa 2011
  - Unclear browser support
  - Older browser support requirements

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## Internationalization Feature Requirements

- **Encoding Support**
  - Unicode
  - Supplementary Chars
  - Bidi algorithm, shaping
  - Character Properties
  - Charset detection
  - Conversion
  - IDN/IRI
  - Normalization
  - Collation

- **Text Support**
  - Case, Accent Mapping
  - Boundary detection
  - Transliteration

- **Message Formatting**
  - Resource/properties files
  - Plurals, Gender, et al

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## Internationalization Feature Requirements

- **Regular Expressions**

- **Compression**

- **Locales**
  - Names (BCP 47)
  - Negotiation
  - Fallback
  - Detection

- **Data formats**
  - Date, time, calendar
  - Time zone
  - Number, Currency
  - Postal Address
  - Name, Honorifics

- **Measurement systems**

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## Desirable Features

- Cross-browser compatibility
  - Desktop, Mobile, Node.js, Older versions
- Based on CLDR Locale Data
- Based on ICU
- Ease of data update and customization
  - Time zone data (Olson/IANA)
  - CLDR locale corrections and additions
- Part of a larger (useful) JS platform
- Well-performing (CPU, download size, disk, memory)

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## Scoping

- **Need to limit investigation**
- **Writing tests and reviewing each feature for each library would take a large effort**
- **Reduced list of libraries**
  - Already in use or strongly recommended
  - YUI, jQuery+globalize.js, Dojo, Closure, QooxDoo
- **Identified features/functions actually used**

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## Minimal Feature Requirements (Ideally in one library)

- **Encodings**
  - Detection, Supplementary characters, Conversion
- **Locales: European and Asian Markets**
- **Data Formats**
  - Dates, times, numbers, currency
  - Localized Gregorian calendar
- **Message formatting, Externalized text**
- **IDN, IRI**

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## Updated Goals

- **Adequate i18n for foreseeable future**
- **Meets minimal i18n requirements**
- **Meets browser requirements**
- **Acceptable to development teams**
- **Part of a larger library**
- **Easy to update data**
- **Easy to migrate to**

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## Example Challenge: Dates

- **142 different date formats in use**
  - Unclear history or requirements for each format
  - Unclear how to internationalize some formats
  - Unclear whether to internationalize some formats

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## Library Comparison Data

## Quick Comparison

|  | YUI | globalize.js | Dojo |
|---|---|---|---|
| Locales | 81 | 225/353 | 25/35 |
| Number Format | Fair (self) | Good | Excellent |
| Currency Format | Fair (self) | Good | Good |
| Date Format | Good (strftime) | Good | Excellent |
| Time Format | Good (strftime) | Good | Excellent |
| Calendar Format | Fair (self) | Excellent | Good |

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## Code Evaluation (js.i18nqa.com)

**ECMA-402 Tests**

- Intl.DateFormat vs ICU DateFormat.html
- Intl.Date Format vs ICU SimpleDateFormat
- Intl.DateFormat Parameter Combinations
- Intl.Date Format vs Java
- Intl.DateFormat vs ICU NumberFormat (645 ICU locales)
- Intl.NumberFormat vs ICU NumberFormat (645 ICU locales)
- Numbering Systems

**YUI Tests**

- YUI Date Format

**Dojo Tests**

- Date Format (Sample)
- Date Format (Dojo locales)
- Number Format (Dojo locales)
- Number Format (645 ICU locales)

**jQuery Tests**

- Date Format (32 CLDR locales)
- Number Format (32 CLDR locales)

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## YUI

- **Advantages**
  - Robust additional I18n support
    - BCP-47 locales and in-depth locale support
    - JSON/YRB Resources
    - Word break

- **Disadvantages**
  - Self-driven number and currency formatting
  - strftime date formatting

- **2014 Update**
  - Code shows strftime flexible enough to match 12 of 16 standard ICU date formats
  - The 4 do not match only for time zone spellout
  - Number formatting just as problematic
  - New calendars near impossible to add

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## YUI Development End

- "On August 29, 2014, it was announced that active development of YUI by Yahoo! would end, citing the evolution of the JavaScript standards, steadily decreasing interest in JavaScript libraries by developers, and the proliferation of server-side solutions. Future development will be limited to maintenance releases addressing issues which are absolutely critical to Yahoo properties."

- http://yahooeng.tumblr.com/post/96098168666/important-announcement-regarding-yui

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## Dojo

- **Advantages**
  - CLDR formats
    - Number, currency, date and time formatting

- **Disadvantages**
  - Not-as-rich locale support
  - BCP-47 locale, currency, and other I18n support not as well documented

- **2014 Update**
  - Unit testing reveals this harder to get running than YUI, but easier than Globalize.
  - Code shows strftime flexible enough to match 4 of 16 standard ICU date formats. Mismatches due to minor separator problems
  - More locales available than advertised, but problematic in actual use.

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## jQuery/Globalize.js

**Advantages**
- Very rich set of I18n support
- International calendars

**Disadvantages**
- Date information mismatches with CLDR/ICU
- jQuery DatePicker's first day of week, day name problems
- BCP-47 locale support not well documented

**2014 Update**
- Being rewritten; alpha state. Can't fully review.
- More difficult to set up
- Now with CLDR
- Nearly as comprehensive coverage for dates and numbers as ECMA-402.

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## ECMA-402

**Advantages**
- Excellent implementations for locales, number and date formats, and collation.
- Supplementary character support in separate specification out this fall (ECMA-262)
- Built-in support with all major browsers save Safari.

**Disadvantages**
- Message support, boundary detection, and more earmarked for stalled second edition.
- Differing results with different browsers
- Mobile support currently very limited

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## ECMA vs ICU Comparison

Passing Unit Tests for EMCA Support

| I18n Support | IE 11 | FF 33 | Chrome 38 | Opera 25 |
|---|---|---|---|---|
| Number Format (of 645) | 487 | 638 | 461 | 486 |
| Date Format (of 10320) | 0 | 4841 | 1939 | 2067 |

Browser Independent
     jQuery globalize number format 585/645
     Dojo number format ~487/645

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## Conclusion

- **Even popular, recommended JS libraries lack good i18n coverage in "basic" areas**
  - A standard is needed
- **Extensive evaluation is nice to have, scoping to near-term needs is practical**
  - Risks repeating and replacing library in the future

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## YUI Resources

- **YUI I18n Doc**
  - http://yuilibrary.com/yui/docs/intl/
  - http://yuiblog.com/sandbox/yui/3.2.0pr1/examples/intl/index.html
- **YUI Numbers/Currencies**
  - http://yuilibrary.com/yui/docs/datatype/datatype-numberformat.html
  - http://yuiblog.com/sandbox/yui/3.2.0pr1/examples/datatype/datatype_numberformat.html
- **YUI Dates/Times**
  - http://pubs.opengroup.org/onlinepubs/007908799/xsh/strftime.html
  - http://yuilibrary.com/yui/docs/datatype/datatype-dateformat-lang.html
  - http://yuiblog.com/sandbox/yui/3.2.0pr1/examples/datatype/datatype_numberformat.html
  - http://yuiblog.com/sandbox/yui/3.2.0pr1/examples/datatype/datatype_dateformat_lang.html

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## Dojo Resources

- **Dojo doc**
  - http://dojotoolkit.org/documentation/tutorials/1.9/i18n/
  - http://dojotoolkit.org/reference-guide/1.9/quickstart/internationalization/index.html#quickstart-internationalization-index
- **Dojo demos**
  - http://dojotoolkit.org/reference-guide/1.9/dojo/number.html#dojo-number
  - http://dojotoolkit.org/reference-guide/1.9/dojo/date.html#dojo-date
  - http://dojotoolkit.org/reference-guide/1.9/dijit/Calendar.html

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## JQuery/globalize.js Resources

- **Jquery**
  - http://jqueryui.com/datepicker/#localization
- **globalize.js**
  - https://github.com/jquery/globalize
  - https://github.com/jquery/globalize#numbers
  - https://github.com/jquery/globalize#currency
  - https://github.com/jquery/globalize#dates

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## ECMA Resources

- **ECMA Specs**
  - 1st Edition
    - http://www.ecma-international.org/publications/standards/Ecma-402.htm
  - Tests
    - http://test262.ecmascript.org/testcases_intl402.html#

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**Questions?**

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**Craig R. Cummings**
**Principal Software Engineer – I18n, Informatica**

Craig has been working in the field of software globalization for over twenty years. Before his role at Informatica, Craig was at Zynga making games in a variety of languages including Arabic. Before that, at Yahoo! Inc., he helped drive corporate technical strategy for internationalization with a particular focus on Middle Eastern markets. Prior to that, Craig was with Oracle's Applications globalization team where he worked closely with Sun's internationalization team to shape some of the pluggable locale, resource bundle, font, and supplementary character support in Java.

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**Tex Texin**
**Globalization Architect,   XenCraft**

Tex Texin is an industry thought leader specializing in business and software globalization services. His expertise includes global product strategy, Unicode and internationalization architecture, and cost-effective implementation and testing. Over the past two decades, Tex has created numerous global products, led internationalization development teams, and guided companies in taking business to new regional markets.

Tex is a contributor to several internationalization standards for software and on the Web. He is on the steering committees of open source products and the program committees for Unicode and other conferences.

Tex is a popular speaker at conferences around the world and provides on-site training on Unicode, internationalization, and globalization worldwide.

Tex maintains two Web sites for internationalization, the popular, instructional www.I18nGuy.com site and the site for his business www.XenCraft.com.

Tex is founder and Chief Globalization Architect for XenCraft. XenCraft provides global business consulting and software design, implementation, test  and training services on globalization product strategy and software internationalization architecture.

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