This document requires or recommends certain practices for developing programs in the JavaScript language.

Key Words: JavaScript, Code, Standard, Guideline

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We publish this document as is, and without any guarantee. The purpose of publication is for information only, and to promote consistent programming practice in the JavaScript community.
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1. Introduction

1.1 Objective
This document requires or recommends certain practices for developing programs in the JavaScript language. The objective of this coding standard is to have a positive effect on:

- Avoidance of errors/bugs, especially the hard-to-find ones.
- Maintainability, by promoting some proven design principles.
- Maintainability, by requiring or recommending a certain unity of style.
- Performance, by dissuading wasteful practices.

1.2 Scope
This standard pertains to the use of the JavaScript language. Certain items that deserve attention have been identified, but have not been included in this document because treatment in separate documents appears more appropriate.

Not included items are:
- JavaScript class inheritance
- Rules or recommendations on how to layout brackets, braces, and code in general.

1.3 Scope of Validity
This document is intended for developers of the DESIGO INSIGHT Web Plus project.

1.4 Document References

<table>
<thead>
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<th>Doc.Number</th>
<th>Author</th>
<th>Title</th>
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<td>PD917-3.38</td>
<td>Jean-Claude Philippin, 3271</td>
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2. General rules

2.1 Overview

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<tr>
<td>Rec. 2-104:</td>
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2.2 Rules and Recommendations

2.2.1 Rule 2-101: Don’t use Alert(), Confirm() and Prompt() in final code

Don’t use the functions alert(), confirm() or prompt() in the final code. They block the JavaScript thread and therefore the updates in the web application.

They can still be very useful and it’s OK to use them during the implementation phase.

2.2.2 Rule 2-102: Add Prototype functions to intrinsic Classes only in utility.js

Prototype functions must be defined in utility.js

Example: in utility.js

```javascript
String.prototype.trim = function(){ ... }
```

2.2.3 Rule 2-103: Don’t use viewer specific global functions and variables

Don’t use global variables and functions to avoid name conflicts. Name conflicts are not recognised by the JavaScript compiler. Encapsulate viewer specific global functions and variables in an object with the same name as the viewer prefix:

- `pv`: plant viewer
- `ov`: object viewer
- `ts`: time scheduler
- `tv`: trend viewer
- `av`: alarm viewer
- `lv`: log viewer

The names pv, ov, etc. are an exception to Rule 3-105.

Example: for the Web Plant Viewer

```javascript
// container for all Web Plant Viewer specific variables, objects and functions
var pv = new Object;

// viewer specific global variable
pv.bInitialized = false;

// viewer specific global function
pv.myMethod = function(strText)
{
    if (pv.bInitialized)
    ...
}
```

2.2.4 Rec. 2-104: Use Object instead of Array for “Hash Table”

Use Object() if the array is just a hash table with strings or numbers as key.

Use an Array() only if you use Array properties like length or Array methods like push(), slice() etc.

Example: The system id is the key in the hash table `pv.aoTags`

```javascript
pv.aoTags = new Object;
```
// create a new Tag and add it to the hash table
var oTag = new Tag("13.4.543.122");
pv.aoTags[oTag.strSystemId] = oTag;

// trace all Tags in the hash table
for (var strKey in pv.aoTags)
    TraceWindow.traceMsg(strKey + ": " + pv.aoTags[strKey]);
3. Naming conventions

3.1 Overview

<table>
<thead>
<tr>
<th>Rule or Recommendation</th>
</tr>
</thead>
<tbody>
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<tr>
<td>Rule 3-102: Use Pascal and Camel casing for naming identifiers.</td>
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<tr>
<td>Rule 3-103: Use a prefix, similar to the Hungarian notation</td>
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<tr>
<td>Rule 3-104: Do not prefix member fields.</td>
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<td>Rule 3-105: Prefix global objects or variables.</td>
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<td>Rec. 3-106: Use abbreviations with care.</td>
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<tr>
<td>Rec. 3-111: Use a noun or a noun phrase to name a class or struct.</td>
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<tr>
<td>Rule 3-201: Use E and e suffix to an enumeration type.</td>
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<tr>
<td>Rule 3-202: Use singular names for enumeration types.</td>
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<tr>
<td>Rec. 3-204: Do not use letters that can be mistaken for digits, and vice versa.</td>
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<tr>
<td>Rule 3-302: Add Callback to callback functions.</td>
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<tr>
<td>Rule 3-502: Use small letters for naming source files.</td>
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3.2 Rules and Recommendations

3.2.1 Rec. 3-101: Use US-English for naming identifiers

3.2.2 Rule 3-102: Use Pascal, Camel and Capital casing for naming identifiers
- In Pascal casing the first letter of each word in an identifier is capitalized. For example, BackColor.
- In Camel casing only the first letter of the second, third, etc. word in a name is capitalized; for example, backColor.
- Two-letter abbreviations have both letters capitalized, e.g. getIEVersion()
- Constant variables with capitals and underscores

The table below provides the casing for the most common types.

<table>
<thead>
<tr>
<th>IDENTIFIER</th>
<th>CASE</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td>Pascal</td>
<td>function Utility() ()</td>
</tr>
<tr>
<td>Function</td>
<td>Camel</td>
<td>Utility.getIEVersion = function()</td>
</tr>
<tr>
<td>local variables</td>
<td>Pascal</td>
<td>var oArrayIndex = 0;</td>
</tr>
<tr>
<td>constant variables</td>
<td>Capital</td>
<td>pv.MAX_ROWS = 9;</td>
</tr>
</tbody>
</table>

3.2.3 Rule 3-103: Use a prefix, similar to the Hungarian notation
- Multiple prefixes can be added, e.g. g_ astrStatus
- Conflict with C#: If a JavaScript name has to be the same as a C# name, use the C# name. This can happen in web servicemethods.

<table>
<thead>
<tr>
<th>JavaScript Object Type</th>
<th>Prefix</th>
</tr>
</thead>
<tbody>
<tr>
<td>ActiveXObject</td>
<td>o</td>
</tr>
<tr>
<td>Array</td>
<td>a</td>
</tr>
<tr>
<td>Boolean</td>
<td>b</td>
</tr>
<tr>
<td>HTML / DOM Object</td>
<td>Prefix</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>Applet</td>
<td>ap</td>
</tr>
<tr>
<td>Button</td>
<td>bn</td>
</tr>
<tr>
<td>Checkbox</td>
<td>cb</td>
</tr>
<tr>
<td>Combo (Select)</td>
<td>cbo</td>
</tr>
<tr>
<td>Directory</td>
<td>dir</td>
</tr>
<tr>
<td>Document</td>
<td>doc</td>
</tr>
<tr>
<td>File</td>
<td>fl</td>
</tr>
<tr>
<td>FileUpload</td>
<td>fup</td>
</tr>
<tr>
<td>Form</td>
<td>frm</td>
</tr>
<tr>
<td>Frames</td>
<td>fr</td>
</tr>
<tr>
<td>Hidden</td>
<td>hd</td>
</tr>
<tr>
<td>Image</td>
<td>img</td>
</tr>
<tr>
<td>Link</td>
<td>lnk</td>
</tr>
<tr>
<td>Node</td>
<td>n</td>
</tr>
<tr>
<td>Radiobutton</td>
<td>rb</td>
</tr>
<tr>
<td>Radiobutton group</td>
<td>rbg</td>
</tr>
<tr>
<td>Span</td>
<td>span</td>
</tr>
<tr>
<td>Textarea</td>
<td>ta</td>
</tr>
<tr>
<td>TextField</td>
<td>tf</td>
</tr>
<tr>
<td>Timer (from setTimeout)</td>
<td>tm</td>
</tr>
<tr>
<td>Window und Dialog</td>
<td>win</td>
</tr>
<tr>
<td>Svg node</td>
<td>svg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HTML / DOM Object</th>
<th>Prefix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global object or variable</td>
<td>g_</td>
</tr>
</tbody>
</table>

Example:
```javascript
var bEnable = true;
var svgTime = svgDocument.getElementById("time");
var g_astrStatus = new Array();
```

### 3.2.4 Rule 3-104: Do not prefix member fields
Do not prefix class members (e.g. m_).

### 3.2.5 Rule 3-105: Prefix global objects or variables
Prefix global objects or variables with g_

Example: g_oToolbar

**Exception:**
Rule 2-103, application prefix objects pv, ov, etc.
3.2.6 Rec. 3-106: Use abbreviations with care

Do not contract words in identifiers, but do use well-known abbreviations. For example, do not use GetWin instead of GetWindow, but do use a well-known abbreviation such as UI instead of UserInterface.

3.2.7 Rule 3-107: Do not use an underscore in identifiers

Exceptions:
- Rule 3-102, To separate words in capital letters of constant variables.
- Rule 3-108, for the global function document_onLoad(), document_onUnload() and document_onResize()

3.2.8 Rule 3-108: Use the object prefix with an underscore for global event handlers

The event handler functions document_onLoad(), document_onUnload() and document_onResize() are called by the framework. The function names must not be changed.

3.2.9 Rec. 3-111: Use a noun or a noun phrase to name a class

Also, if the class involved is a derived class, it is a good practice to use a compound name. For example, if you have a class named Button, deriving from this class may result in a class named BeveledButton.

3.2.10 Rule 3-201: Use E and e suffix to an enumeration type

Example:

```javascript
ToolBarImageButton.EState = new Object();
ToolBarImageButton.EState.eNormal = 0;
ToolBarImageButton.EState.eHover = 1;
```

3.2.11 Rule 3-202: Use singular names of enumeration types

For example, do not name an enumeration type Protocol but name it Protocol instead. See example above.

3.2.12 Rule 3-203: Use a plural name for enumerations representing bitfields

Use a plural name for such enumeration types. The following code snippet is a good example of an enumeration that allows combining multiple options.

```javascript
Utility.EFormats = new Object();
Utility.EFormats.eZero = 0x01 // Format has leading zeros
Utility.EFormats.eLeft = 0x02 // Format is left justified
Utility.EFormats.eUnit = 0x04 // Format has eng units
Utility.EFormats.eExp = 0x10 // Format is real Exp notation
```

3.2.13 Rec. 3-204: Do not use letters that can be mistaken for digits, and vice versa

To create obfuscated code, use very short, meaningless names formed from the letters O, o, l, I and the digits 0 and 1. Anyone reading code like

```javascript
bool b001 = (lo == 10 ? I1 == 11 : 101 != 101);
```

will marvel at your creativity.

3.2.14 Rule 3-302: Add Callback to callback functions

Functions that are used to pass a reference to a callback function must be suffixed with Callback. For example:

```javascript
... pv.callWebService(pv.queryTagCallback, "QueryTag", strTagName);
... pv.queryTagCallback = function(oResult)
```
3.2.15 **Rule 3-401: Suffix exception classes with Exception**

For example:

```javascript
function InsightException( iErrorCode, strMessage )
{
    this.iErrorCode = iErrorCode;
    this.strMessage = strMessage;
}
```

3.2.16 **Rule 3-502: Use small letters for naming source files**

JavaScript files will be transferred to the client. Do not use the capital and underscore characters for file names. Use dashes '-' to separate words.

Example: date-picker.js
4. Comments and embedded documentation

4.1 Overview

<table>
<thead>
<tr>
<th>Rule or Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rule 4-101: Each file shall contain a header block.</td>
</tr>
<tr>
<td>Rule 4-102: Use // for comments.</td>
</tr>
<tr>
<td>Rule 4-103: All comments have to be written in US English.</td>
</tr>
<tr>
<td>Rule 4-104: Use XML tags for documenting types and members.</td>
</tr>
</tbody>
</table>

4.2 Rules and Recommendations

4.2.1 Rule 4-101: Each file shall contain a header block

```javascript
// Copyright ©2004 by Siemens Building Technologies, Building Automation
//-----------------------------------------------------------------------------
// Filename                : infobar.js
//-----------------------------------------------------------------------------
// Project                 : DESIGO INSIGHT Web Plus
// Language                : ECMAScript V3
// Author                  : Laurent Bugnion, 3457
// Date of creation        : 09.03.2004
//-----------------------------------------------------------------------------
// Contains the javascript code used for the Infobar custom control.
// Use Infobar.setText( ... ) to set the text displayed in the right-most
/// panel. The text displayed will be preserved over round-trips.
//
// Revisions: |
//
//-----------------------------------------------------------------------------
```

4.2.2 Rule 4-102: Use // for comments

If the characters // are consistently used for writing comments, then the combination /* */ can be used to make comments out of entire section of code during development and debugging phases, because JavaScript does not allow comments to be nested using /* */.

4.2.3 Rule 4-103: All comments have to be written in US English

*Exceptions:*

ToDo notes which are removed when the reason is solved.

4.2.4 Rule 4-104: Use XML tags for documenting types and members

All functions, global variables, classes and class members shall be documented using XML tags according to Rule 4-104 [1].

Extension to [1]: The default values of function arguments and the data type of the arguments and return value can be specified in the `<param>` tag as an extension to the C# Guideline. The data type of the arguments is optional since the argument has a prefix with the type.

Example:

```xml
/// <summary>Formats a data point value into a string</summary>
/// <param name="iWidth">The total width of the string</param>
/// <param name="iDigits">The number of decimal places</param>
```
/// <param name="iFlags">The flags, how to format the value</param>
/// <list>
/// Utility.EFormats.eZero, Format has leading zeros
/// Utility.EFormats.eLeft, Format is left justified
/// Utility.EFormats.eUnit, Format has eng units
/// Utility.EFormats.eExp, Format is real Exp notation</list>
/// <param name="strUnits">The engineering units</param>
/// <returns type="string">The result string</returns>
/// <remarks>Don't use directly the Utility function</remarks>
/// <example>(4.567).toFormatString(6,2,"deg") returns "004.57 deg"
Utility.toFormatString = function(iWidth, iDigits, iFlags, strUnits)
{
    ...
}

If the data type can vary, use "o" as prefix and specify all data types, which are allowed.
Example:
/// <param name="oValue" type="number,string">A number or a string</param>
pv.myFunction = function(oValue)
5. **Object lifecycle**

5.1 **Overview**

<table>
<thead>
<tr>
<th>Rule or Recommendation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rec. 5-101:</td>
<td>Declare and initialize variables close to where they are used.</td>
</tr>
<tr>
<td>Rec. 5-102:</td>
<td>If possible, initialize variables at the point of declaration.</td>
</tr>
<tr>
<td>Rule 5-103:</td>
<td>Declare each variable in a separate declaration statement.</td>
</tr>
</tbody>
</table>

5.2 **Rules and Recommendations**

5.2.1 **Rec. 5-101 Declare and initialize variables close to where they are used.**

A variable ought to be declared within the smallest possible scope to improve the readability of the code and so that variables are not unnecessarily allocated. When a variable that is declared at the beginning of a function is used somewhere in the code, it is not easy to directly see the type of the variable. In addition, there is a risk that such a variable is inadvertently hidden if a local variable, having the same name, is declared in an internal block.

5.2.2 **Rec. 5-102: If possible, initialize variables at the point of declaration**

```javascript
var bInitialized = checkCondition() ();
var iCount = bInitialized ? 1 : 0;
```

5.2.3 **Rule 5-103: Declare each variable in a separate declaration statement.**

```javascript
var iMin = 100, iMax = 200; // wrong, bad style
var iMin = 100;           // ok
var iMax = 200;           // ok
```
6. Control flow

The same rules and recommendations of the C# programming guideline apply also for JavaScript. Refer to chapter 6 of [1].
7. Coding Style

7.1 Overview

<table>
<thead>
<tr>
<th>RULE OR RECOMMENDATION</th>
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<tbody>
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</tr>
<tr>
<td>Rule 11-202: Write unary, increment, decrement, function call, subscript, and access operators together with their operands.</td>
</tr>
<tr>
<td>Rule 11-203: Each new block is indented by two spaces.</td>
</tr>
<tr>
<td>Rule 11-204: Do not create source lines longer than 80 characters.</td>
</tr>
</tbody>
</table>

7.1.1 Rule 11-101: Do not mix coding styles within a group of closely related classes or within a module.

This coding standard gives you some room in choosing a certain style. Do keep the style consistent within a certain scope. That scope is not rigidly defined here, but is at least as big as a source file.

7.1.2 Rule 11-202: Write unary, increment, decrement, function call, subscript, and access operators together with their operands.

This concerns the following operators:

- **Unary**: & * + - ~ !
- **Increment and decrement**: -- ++
- **Function call and subscript**: () []
- **Access**: .

It is not allowed to add spaces in between these operators and their operands. It is not allowed to separate a unary operator from its operand with a newline.

Note: this rule does **not** apply to the **binary** versions of the & * + - operators.

**Example:**

```
a = -- b;        // wrong
a = -- c;        // right
```

```
a = -b - c;      // right
a = (b1 + b2) +
(c1 - c2) +
d - e - f;      // also fine: make it as readable as possible
```

7.1.3 Rule 11-203: Each new block is indented by two spaces.

Spaces or tabs may be used. If tabs are used the tab size must be set to two spaces.

7.1.4 Rule 11-204: Do not create source lines longer than 120 characters.