

# Zpravodaj Československého sdružení uživatelů TeXu

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Extensible Stylesheet Language Requirements, Version 2.0, Working Draft  
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## Abstrakt

Tento článek obsahuje požadavky, které si klade pracovní skupina XSL, která spadá pod aktivity W3C XML. Jedná se o poslední pracovní verzi, zveřejněnou 26. března 2008. Redakce se domnívá, že řada prezentovaných a nastíněných situací jsou nádherné typografické problémy, které pohladí nejednoho  $\text{T}_{\text{E}}\text{X}$ istu a stojí za trvalé uložení na papíře jako médium nezávislé na internetu.

Formátovací jazyk XSL-FO 1.0 je doporučením konsorcia W3C od roku 2001. Od té doby vzniklo několik jeho nezávislých implementací, a to jak komerčních, tak i open-source. V roce 2006 pak byl jazyk drobně vylepšen a byla vydána jeho verze 1.1. XSL-FO je dnes zcela běžně používaná technologie a možná byste byli překvapeni, kolik dokumentů, které vám projdou rukama, bylo vysázeno s využitím XSL-FO.

Pokud vás zajímá podrobnější princip toho, jak se XSL-FO používá, můžete ve své knihovničce zapátrat po čísle 1 z roku 2003, kde na toto téma vyšel článek. Připomeňme na tomto místě alespoň základní princip XSL-FO. Dokument je popsán jako strom formátovacích objektů (makety stránek, odstavce, obrázky, záhlaví, tabulky, buňky tabulek, poznámky pod čarou, ...) a pomocí vlastností jsou pak určeny charakteristiky těchto objektů jako rozměry, velikost písma, řádkování atd. Formátovač tak na vstupu dostane v podstatě seznam objektů a omezení a snaží se z toho vytvořit co nejlepší naformátovaný výsledek. Konkrétní algoritmy pro řádkový a stránkový zlom, dělení slov atd. jsou však věci každé implementace XSL-FO. Není tak zaručen 100% shodný výstup různých formátovačů, ale je zde naopak prostor pro konkurenci. To je odlišné od přístupu  $\text{T}_{\text{E}}\text{X}$ u, kde algoritmy jsou jednoznačně dány a popsány v  $\text{T}_{\text{E}}\text{X}$ booku.

XSL-FO a jeho implementace mohou být vnímány jako konkurence  $\text{T}_{\text{E}}\text{X}$ u, protože stejně jako  $\text{T}_{\text{E}}\text{X}$  se používají pro automatizovanou, dávkovou sazbu. Nicméně je to i další možnost, jak využít vyzrálé formátovací jádro  $\text{T}_{\text{E}}\text{X}$ u. Některé implementace XSL-FO totiž pro samotné formátování využívají právě  $\text{T}_{\text{E}}\text{X}$  – například experimentální  $\text{PassiveT}_{\text{E}}\text{X}$  nebo formátovač používaný v komerčních produktech Arbortext (nyní PTC).

Následující článek shrnuje požadavky na novou verzi jazyka XSL-FO 2.0, zveřejněný na <http://www.w3.org/TR/xslfo20-req/>. Jedná se o přehled věcí, které se v dokumentech používají, ale není je možné snadno realizovat v současné verzi XSL-FO. Máte-li ve vašich dokumentech požadavky, které v návrhu chybí nebo pracujete na vývoji vaší vlastní implementace XSL-FO, pracovní skupina W3C pro XSL-FO bude ráda, když se k ní připojíte. Stačí v angličtině kontaktovat jejího předsedu Liama Quina na adrese [liam@w3.org](mailto:liam@w3.org).

Naší milou povinností je poděkovat Jiřímu Koskovi za upozornění na poster Tony Grahama z konference XMLPrague 2009 a sepsání úvodu k tomuto článku. Pan Graham byl vstřícný a redakci poskytl k sazbě původní obrázky ve formátu SVG. Touto cestou oběma pánům děkujeme.

**Klíčová slova:** W3C, XML, XSL 2.0, XSL-FO.

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# 1. Introduction

The W3C is in the process of developing the second major version of XSL-FO, the formatting specification component of XSL. XSL-FO is widely deployed in industry and academia where multiple output forms (typically print and on-line) are needed from single source XML. It is used in many diverse applications and countries on a large number of implementations to create technical documentation, reports and contracts, terms and conditions, invoices and other forms processing, such as driver's licenses, postal forms, etc. XSL-FO is also widely used for heavy multilingual work because of the internationalization aspects provided in 1.0 to accommodate multiple and mixed writing modes (writing directions such as left-to-right, top-to-bottom, right-to-left, etc.) of the world's languages.

The primary goals of the W3C XSL Working Group in developing XSL 2.0 are to provide more sophisticated formatting and layout, enhanced internationalization to provide special formatting objects for Japanese and other Asian and non-Western languages and scripts and to improve integration with other technologies such as SVG [8] and MathML [10].

A number of XSL 1.0 [1] implementations already support dynamic inclusion of vector graphics using W3C SVG. The XSL and SVG WGs want to define a tighter interface between XSL-FO and SVG to provide enhanced functionality. Experiments with the use of SVG paths to create non-rectangular text regions, or "run-arounds", have helped to motivate further work on deeper integration of SVG graphics inside XSL-FO documents, and to work with the SVG WG on specifying the meaning of XSL-FO markup inside SVG graphics. A similar level of integration with MathML is contemplated.

## 1.1. Feedback

Additional comments and feedback on individual requirements should be provided using the W3C public Bugzilla system, <http://www.bugzilla.org/>. If access to the Bugzilla system is not feasible, you may send your comments to [xsl-editors@w3.org](mailto:xsl-editors@w3.org). Each Bugzilla entry and email message should contain only one error report. It will be very helpful if you include the string [FO2.0Req] in the subject line of your report, whether made in Bugzilla or in email. Archives of the comments and responses are available at <http://lists.w3.org/Archives/Public/xsl-editors/>.

## 1.2. Writing modes

We use terms like top, bottom, vertical and horizontal in this document to be easy to understand. We know that when we write the specification, we have to talk in terms of before, after, start, end, block-progression-direction, inline-progression-direction etc, the same as XSL 1.0 [1] and XSL 1.1 [2] did.

### 1.3. Participation

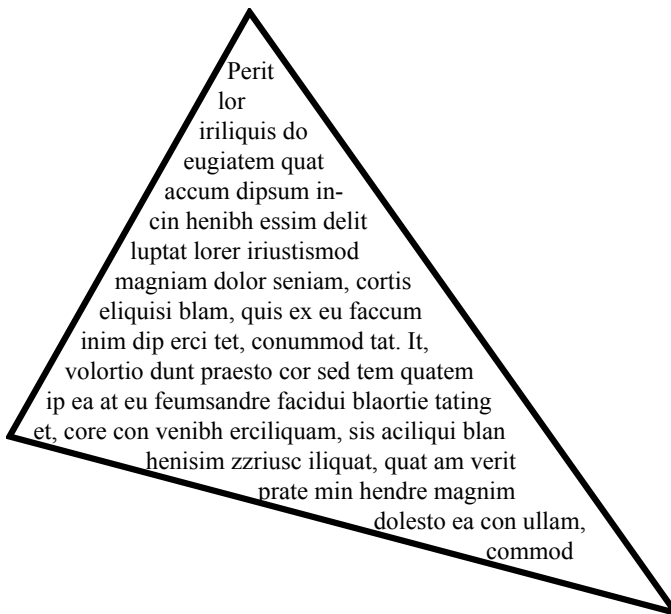
If you would like to participate in developing XSL-FO 2.0, please contact the FO subgroup chair, Liam Quin, [liam@w3.org](mailto:liam@w3.org).

## 2. Pagination and Layout

### 2.1. General Region

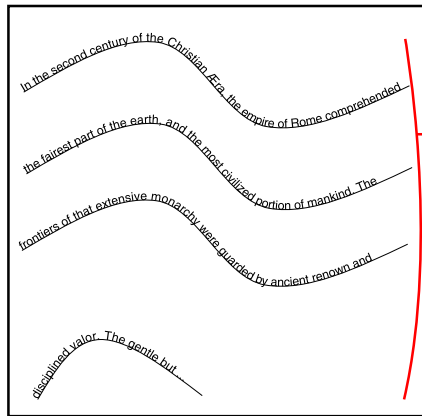
#### 2.1.1. Non-rectangular areas

Add support for non-rectangular areas wherever appropriate. This is for areas where the content needs to be flowed inside an non-rectangular shape.



#### 2.1.2. Add text to path

Run text on a path including flowing from one path to another. This goes further than simply including SVG, as we're also supporting the line breaking rules that XSL-FO provides. Text should be able to flow from one line to the next line of the multiline paths but it needs to be explicitly specified what each line of the path is, as we do not intend to stack paths automatically. The intent is to apply the normal line building properties to text on a path.



Automatic stacking of these lines when more content is present is not within scope. This means all of these lines need to be explicitly present in the path on the specified location and are not generated and stacked by the formatter.

### 2.1.3. Runarounds

Add support for runarounds or intrusions (text flowing around illustrations, regions and other objects). This is related to effects obtained by overlapping areas of either rectangular or non-rectangular shape in any suitable combination, but it doesn't really require non-rectangular areas.

Allow one object to intrude into another:

**Support intrusions into all 4 sides.**

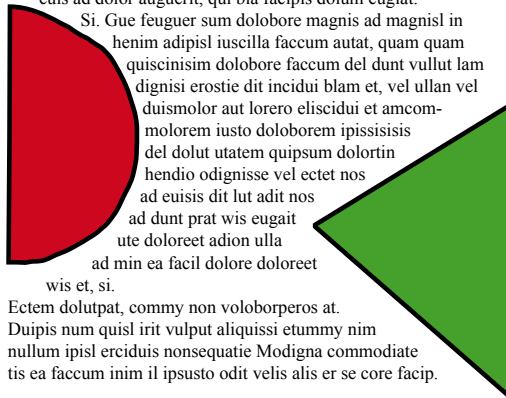
**Support multiple intrusions.**

Elit etue tie miniamet wis duis diam nulput lortismod eu faccum in  
euis ad dolor auguerit, qui bla facipis dolum eugiat.

Si. Gue feuguer sum dolobore magnis ad magnisl in  
henim adipisl iuscilla faccum autat, quam quam  
quiscinisim dolobore faccum del dunt vullut lam  
dignisi erotie dit incidui blam et, vel ullan vel  
duismolor aut lorero eliscidui et amcom-  
molestrem iusto doloborem ipissisis  
del dolut utatem quipsum dolortin  
hendio odignisse vel ectet nos  
ad euisit dit lut adit nos  
ad dunt prat wis eugait  
ute doloreet adion ulla  
ad min ea facil dolore doloreet

wis et, si.

Ectem dolutpat, commy non voloborperos at.  
Duipis num quisl irit vulput aliqussit etummy nim  
nullum ipsl erciduis nonsequatie Modigna commo-  
diatetis ea faccum inim il ipsusto odit velis alis er se core facip.



**Support specifying pull-quotes without the need to repeat the content of the pull-quote.**

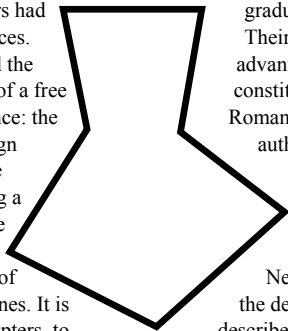
This is related to *2.2.9 Generalized markers* on page 104.

In the second century of the Christian Æra, the empire of Rome comprehended the fairest part of the earth, and the most civilized portion of mankind. The frontiers of that extensive monarchy were guarded by ancient renown and disciplined valor. The gentle but powerful influence of laws and manners had gradually cemented the union of the provinces. Their peaceful inhabitants enjoyed and abused the advantages of wealth and luxury. The image of a free constitution was preserved with decent reverence: the Roman senate appeared to possess the sovereign authority, and devolved on the emperors all the executive powers of government. During a happy period of more than fourscore years, the public administration was conducted by the virtue and

The image of a free constitution was preserved with decent reverence

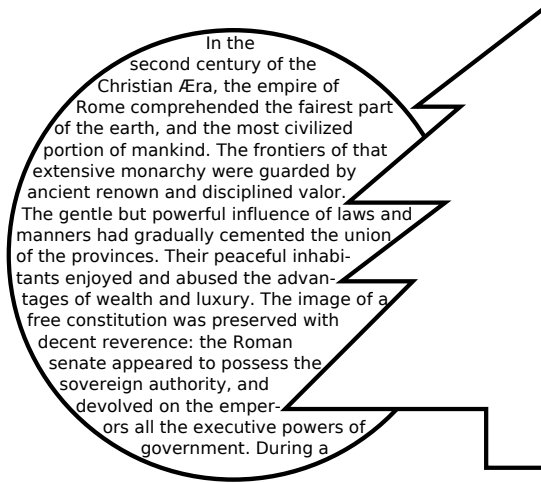
**Support cut-outs.**

In the second century of the Christian Æra, the empire of Rome comprehended the fairest part of the earth, and the most civilized portion of mankind. The frontiers of that extensive monarchy were guarded by ancient renown and disciplined valor. The gentle but powerful influence of laws and manners had gradually cemented the union of the provinces. Their peaceful inhabitants enjoyed and abused the advantages of wealth and luxury. The image of a free constitution was preserved with decent reverence: the Roman senate appeared to possess the sovereign authority, and devolved on the emperors all the executive powers of government. During a happy period of more than fourscore years, the public administration was conducted by the virtue and abilities of Nerva, Trajan, Hadrian, and the two Antonines. It is the design of this, and of the two succeeding chapters, to describe the prosperous condition of their empire; and after wards, from the death of Marcus Antoninus, to deduce the most important circumstances of its decline and



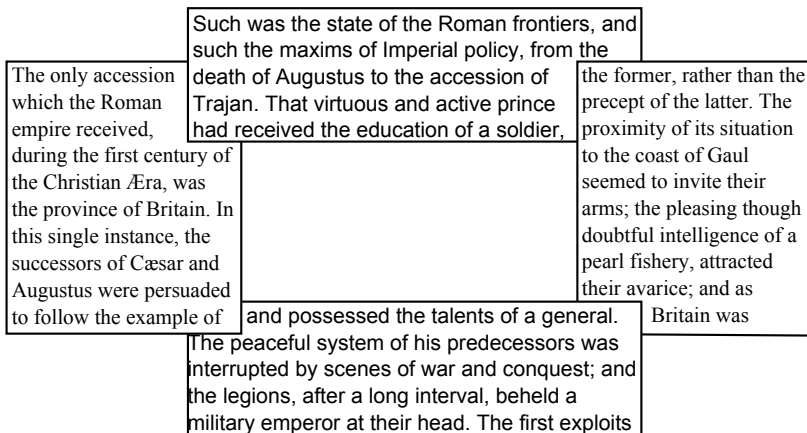
**The objects may be of arbitrary shape.**

Both the intruder as well as the object intruded upon.



Allow users to specify the relations between the objects that are impacted by the intrusion:

1. Specify where the objects should be positioned. The objects may be relatively or absolutely specified.
2. Specify separation/gap between intruders & other regions.
3. The intruder's size may be pre-defined or specified dynamically. It may be a region or a flowing object. An example of a dynamically sized object is a pullquote where the size of the pullquote depends on the amount of text, or a graphic where the size of is dependent on the external graphic.
4. Specify a priority between objects.





- Specify a keep/anchor between the text and the intruder. This is related to *2.2.22 Relationship of two objects* on page 108.

### 2.1.4. Copyfitting

Add support for copyfitting, for example to shrink or grow content (change properties of text, line-spacing, ...) to make it constrain to a certain area. This is going to be managed by a defined set of properties, and in the stylesheet it will be possible to define the preference and priority for which properties should be changed. That list of properties that can be used for copyfitting is going to be defined.

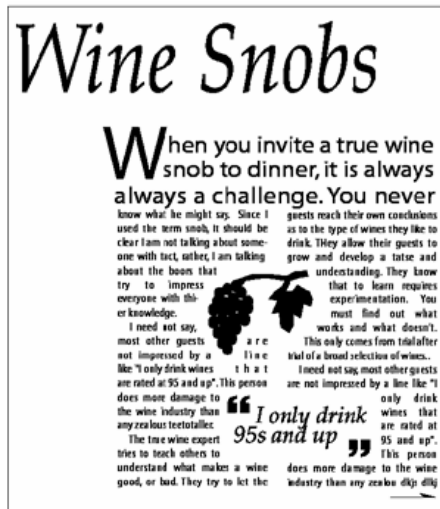
Additionally, multiple instances of alternative content can be provided to determine best fit.

This includes copyfitting across a given number of pages, regions, columns etc, for example to constrain the number of pages to 5 pages.

Add the ability to keep consistency in the document, e.g. when a specific area is copyfitted with 10 pt fonts, all other similar text should be the same.

### 2.1.5. Properties at non-tag boundaries

Add support for specifying the properties on the specified number of lines or certain parts in areas, e.g. the first 5 cm of the area should be in bold.



### 2.1.6. First line indent on first line of page, region or column

Allow users to specify that first line indent should be different on the first line of a page, region or column. This is a specific case of *2.1.5 Properties at non-tag boundaries* and is also related to *5.3 Alignment around breaks* on page 112.

The first line is not indented when a paragraph starts a new page or a new column

The principal conquests of the Romans were achieved under the republic; and the emperors, for the most part, were satisfied with preserving those dominions which had been acquired by the policy of the senate, the active emulations of the consuls, and the martial enthusiasm of the people.

The seven first centuries were filled with a rapid succession of triumphs; but it was reserved for Augustus to relinquish the ambitious design of subduing the whole earth, and to introduce a spirit of moderation into the public councils.

Inclined to peace by his temper and situation, it was easy for him to discover that Rome, in her present exalted situation, had much less to hope than to fear from the chance of arms;

The experience of Augustus added weight to these salutary reflections, and effectually convinced him that, by the prudent vigor of his counsels, it would be easy to secure every concession which the safety or the dignity of Rome might require from the most formidable barbarians.

Instead of exposing his person and his legions to the arrows of the Parthians, he obtained, by an honorable treaty, the restitution of the standards and prisoners which had been taken in the defeat of Crassus.

### 2.1.7. Initial Caps

Add support for raised initial capitals and *n*-line dropped capitals. This includes support for the first *n* characters. See also *2.1.5 Properties at non-tag boundaries* on page 86.

## 2.2. Pages

### 2.2.1. Footnotes

#### Column wide.

Allow users to specify whether footnotes are column wide or page wide.

#### Multiple columns.

Add support for multiple columns in the footnote region, where the number of columns may be different from the number of columns in the page.

#### Table footnotes.

Add support for table footnotes. These are footnote bodies that get rendered within the table (as opposed to at the bottom of the page) when the footnote reference appears on the table fragment on that page.

**Coalescing footnotes.** Add support for coalescing footnotes. This means that the same footnote should only be shown once when it appears multiple times on the same page.

### **Restart numbering.**

Add support for restarting numbering footnotes for each page.

**Maximum size.** Allow users to specify the maximum size of the footnote area in relation to the body and for footnotes to continue on the next page.

**Other properties.** Allow users to specify other properties of the footnotes, such as margins, spacing etc.

**Properties from area tree.** Add support for specifying properties such as the fontsize of footnotes to be taken from the area tree, instead of from the formatting object tree. This is related to  $\frac{1}{4}$  *Inheritance* on page 110.

### **2.2.2. Floats**

Improve support for floats. Currently we can only float to the top.

**Page wide and column wide floats.** We should differentiate page wide, column wide or  $n$ -column wide floats.

**Floats alignment.** We have to be able to align floats to the top and bottom.

**Stack floats.** Be able to stack floats as well as to specify whether the order needs to be preserved, or whether the page wide floats come first, followed by the ones that span two columns, followed by the ones that span one column.

**Distance of floats.** We need be able to add floats from the previous page, specify how far they can float, whether they can float towards the front of the document, they may flow only within the same spread, etc. . .

### **2.2.3. Marginalia**

Add support for marginalia.

#### **Keep marginalia together with other objects.**

Keep marginalia together with other objects, such as blocks or inlines. We should specify the alignment of the marginalia, as this is typically a smaller font size. For example align the baselines, align the top of the two lines, etc. Support a variety of positions of marginalia, e.g. position them at the left on a left-hand page and at the right on a right-hand page.

*Note:* In some cases, marginalia are seen as an alternative to footnotes, so some footnote properties should also apply to marginalia, for example numbering and restarting numbering.

The following graphic on page 90 shows an examples of marginalia. The next picture on page 91 shows collision of 2 marginalia.

The graphic on page 92 shows marginalia on the two sides of the flow.

The graphic on page 93 shows an example of the relative alignment of the marginalia and the text. At the top of the page, the first lines of the marginalia

and the text are aligned at the before-edge. When in the middle of the page, the first line of the marginalia and the corresponding line of the text are visually aligned on a particular baseline (in the case of mixed text).

### Large marginalia

If marginalia become larger than the space on the page, they should force the text and/or the related marginalia to move to the following page. Also permit breaking of marginalia.

The graphic on page 94 is showing the situation where some breaking is preferable.

The graphic on page 95 shows one solution, by breaking the flow so that the entire marginalia is brought to the next page, together with the text it belongs to. The graphic on page 96 shows another solution, by breaking the marginalia.

### 2.2.4. Vertical Positioning

**Feathering.** Add support for feathering, to vertically adjust lines. Feathering is vertical justification with very small amounts.

**Correlating vertical position.** Add support for correlating vertical position so that lines of text on two adjacent pages, columns or regions are visually next to each other. Also support alignment of the two sides of the same sheet, so that the lines of text on the back side and front side of the sheet are aligned. This is a common requirement when the sheets of paper are very thin.

The Wedding-Guest he beat his breast,	_____	With slo
Yet he cannot choose but hear;	_____	As who
And thus spake on that ancient man,	_____	Still trea
The bright-eyed Mariner.	_____	And for
<i>The ship driven by a storm</i>	_____	The ship
<i>toward the South Pole</i>	_____	And sou
“And now the storm-blast came, and he	_____	Because
Was tyrannous and strong:	_____	But now
He struck with his o’ertaking wings,	_____	And it g
And chased us south along.	_____	And ice

### Vertical alignment within a page or column.

Add support for vertical alignment, such as centering the content of the columns or aligning to the bottom within pages, regions or columns.

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Nunc vitae felis. Nullam ut sem at ipsum sagittis malesuada. Cras bibendum, nisl vel interdum commodo, ligula tortor semper erat, hendrerit elementum ipsum nisi et tortor. Aenean dictum facilisis felis. Nullam est erat, varius quis, tempor eu, volutpat viverra, nulla. Pellentesque ultrices. Sed sodales. Etiam velit nibh, pellentesque vitae, condimentum in, tempor dapibus, dui. Praesent enim felis, aliquam nec, fermentum vel, bibendum ac, tortor. Ut non diam ut nisl adipiscing lacinia.

*marginalia referring to a block-level object*

Cras rhoncus sapien non dolor. Sed feugiat condimentum nibh. Praesent ornare auctor massa.

*marginalia referring to an inline-level object*

Curabitur bibendum urna at massa. Donec iaculis ipsum at arcu. Donec at eros. Donec risus arcu, euismod at, eleifend at, aliquet quis, odio. Vestibulum fermentum tellus vitae leo egestas facilisis. Fusce pretium ultrices turpis. Nunc malesuada sagittis enim. Phasellus tempus. Donec ac ante. Integer vestibulum, magna id eleifend porta, turpis sem sodales orci, vitae pellentesque metus massa nec ante. Ut molestie. Sed velit. Integer venenatis, enim in imperdiet sagittis, neque libero feugiat sem, tempus vehicula massa magna nec pede. Ut elit nisi, cursus vel, luctus vitae, elementum at, lacus. Nunc a libero.

Nam consequat. Morbi vehicula hendrerit quam. Sed fermentum arcu lobortis diam. Pellentesque sagittis leo id dui. Proin sit amet magna. Suspendisse bibendum facilisis mi. Donec pulvinar. Donec nisi. Cras libero. Praesent nisl dui, tincidunt a, aliquet sed, sodales sed, lacus. Nam consectetur pede dapibus diam. Donec ut tellus eget nunc scelerisque porttitor. Sed ultrices adipiscing augue. Nulla imperdiet imperdiet nulla. Pellentesque eros. In sodales venenatis tellus. Quisque sollicitudin est in enim. Suspendisse laoreet.

Mauris congue, nibh a porta convallis, sapien arcu luctus risus, non rutrum ipsum sapien sed massa. Vivamus risus. Etiam auctor consectetur orci. Vestibulum quis arcu. Nullam euismod sapien in

Phasellus convallis egestas erat.  
Mauris nonummy eleifend diam.  
Nam id est. Proin vitae ligula a  
tellus posuere mollis. Morbi  
tempus ante id.  
Proin eu lacus. Fusce at mauris  
ac purus vulputate tempus. Cras  
tellus. Integer dapibus  
malesuada magna. Duis nibh  
felis.

Nulla id ipsum ut turpis facilisis  
suscipit. Maecenas ac orci non  
iacus pellentesque viverra.  
Integer id lorem. Nullam sed  
velit ut turpis dignissim porta.  
Duis viverra justo in lorem.  
Praesent consequat auctor.

Ut nisi velit, sodales vestibulum,  
pulvinar sit amet, volutpat quis,  
felis. Curabitur a enim. Ut vitae  
quam at arcu blandit  
consectetuer. Praesent at urna.

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inner-positioned  
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end-positioned  
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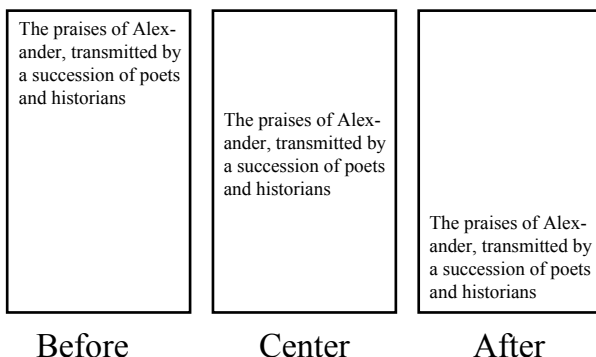
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**Vertical alignment specific for the last column.** Allow users to do alignment for all columns, and alignment specific to the last column.

**Vertical justification across pages and columns.** Add support for adjusting properties to do vertical justification within a page, a region or a column, as well as across regions. Allow users to specify a priority where you want the spaces to end up.

### 2.2.5. Tables and lists

**Decimal alignment.** To improve decimal alignment, extend the character alignment in table cells to permit a specification of the horizontal position of the alignment point within the column.

**Table header/footer on boundaries.** Be able to specify different instances of what the table header or footer should be depending on the different boundaries (page, column and region). This also would allow specifying that certain headers must be omitted at certain boundaries.

**Split tables.** Allow users to specify that tables can be split horizontally. It should be possible to have a column repeated when the table is split horizontally, by specifying a row header. There should be a way to keep the split parts visually next to each other depending on binding edge.

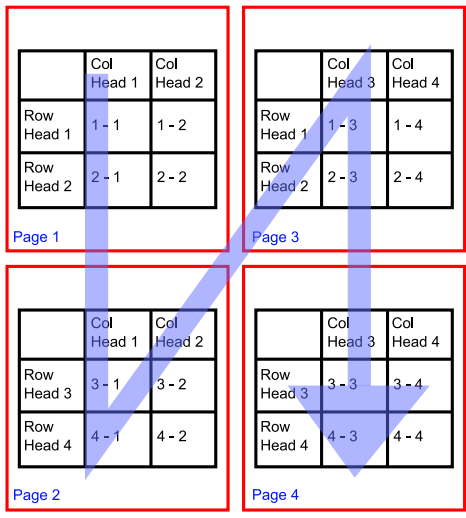
In case a table is split over multiple pages and both the rows and columns don't fit a page, allow users to specify which table part comes out in which order (rows first or columns first).

This graphic shows a table before it is split. Neither all of the rows, nor all of the columns fit on one page, so the table needs to be split.

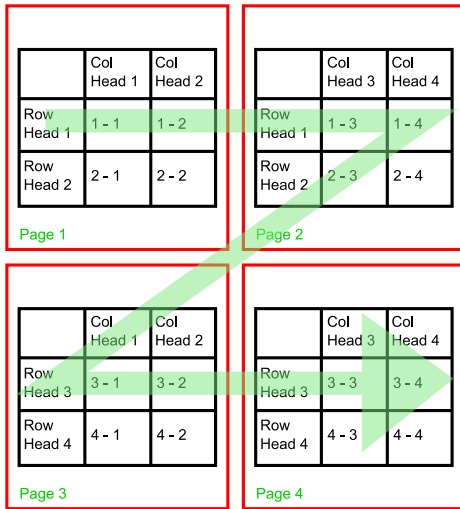
	Col Head 1	Col Head 2	Col Head 3	Col Head 4
Row Head 1	1 - 1	1 - 2	1 - 3	1 - 4
Row Head 2	2 - 1	2 - 2	2 - 3	2 - 4
Row Head 3	3 - 1	3 - 2	3 - 3	3 - 4
Row Head 4	4 - 1	4 - 2	4 - 3	4 - 4

The red dashed lines indicate the breaks that occur when paginating the table. The entire column 3 and the entire row 3 do not fit.

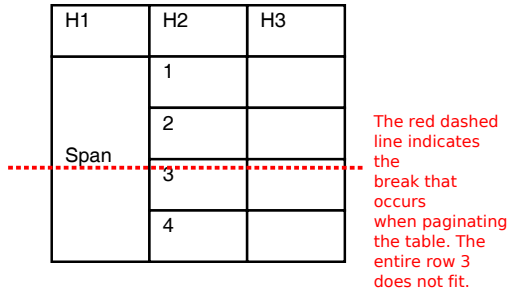
The following graphics show 4 pages that contain the split table. The order in which the pages will come out depends on the users' preference, and the two alternatives are marked with green (columns first) and blue (rows first) numbers.



The blue page numbering scheme shows the page order when splitting tables in rows first.



The green page numbering scheme shows the page order when splitting tables in columns first.

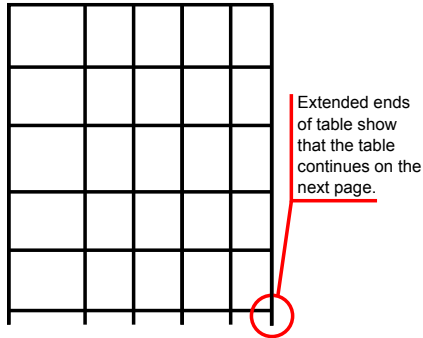


H1	H2	H3
Span	1	
	2	

H1	H2	H3
Span	3	
	4	

**Repeat contents of split spanned cell.** Allow users to specify that when a spanned cell in a table is split, the entire cell contents should be repeated on each table instance. This applies to splitting as well as spanning in the block-progression-direction as well as the inline-progression-direction.

**Cell borders extending beyond the table.** Allow the column lines to extend down or right the table to visually indicate that the table continues. When this happens, any vertical border should be extended beyond the bottom border for the last row or right column.



**Adjacent borders.** When one formatting object is immediately preceding another in block-progression-dimension, be able to specify what to do with their adjacent borders.

**Borders on break.** Allow having different borders when a break occurs so that a formatting object is split, e.g. a cell that splits, have a thinner border for the split.

**Spanning cell over all row and columns.** The current specification of XSL says that number-rows-spanned and number-columns-spanned should be a positive integer. Other specifications, such as HTML 4.01 [4], allow 0 as a value, which means that all rows or columns of the current table section are spanned over. This behavior may be added to XSL 2.0, either by allowing 0 as a value, or some other solution.

### 2.2.6. Side-by-side

Introduce a way to position objects next to each other. Side-by-side includes complex positioning and breaking rules (in some cases similar to the constraints necessary for marginalia).

I often passed the Village  
When going home from school -  
And wondered what they did there -  
And why it was so still -

Spesso attraversavo il Villaggio  
Quando tornavo a casa dalla scuola -  
E mi domandavo cosa facessero là -  
E perché fosse tanto silenzioso -

I did not know the year then,  
In which my call would come -  
Earlier, by the Dial,  
Than the rest have gone.

Non potevo sapere l'anno allora,  
In cui la chiamata sarebbe giunta -  
Più presto, per la Meridiana,  
Degli altri che sono andati.

It's stiller than the sundown.  
It's cooler than the dawn -  
The Daisies dare to come here -  
And birds can flutter down -

È più calmo del tramonto.  
È più fresco dell'alba -  
Le Margherite osano venire qui -  
E gli uccelli possono posarsi -

So when you are tired -  
Or - perplexed - or cold -  
Trust the loving promise  
Underneath the mould,  
Cry "it's I," "take Dollie,"  
And I will enfold!

Così quando sei stanca -  
O - perplessa - o fredda -  
Confida nell'amorosa promessa  
Sotto la terra,  
Grida: "sono io", "prendi Dollie",  
E io ti abbraccerò!

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## 2.2.7. Numbering

**Additional numbering.** Add support for line number, column number and region number. For example number only every fifth line, etc.

The following are requirements for line numbers, but they apply to columns numbers and region numbers as well:

- Line numbering side (start/end/...).
- Line numbering separation – distance of number from the text.
- Line numbering format (1, 2, 3...; 001, 002, 003...; A, B, C...).
- Line numbering text properties (font-family, font-size, ...).
- Starting line number – 1 by default, but can be changed by user.
- Continuation – should numbering continue from previous object, or should be restarted.
- Line numbering restart – where numbering restarts (document, page-sequence, object, page, column).
- Line number only each  $n$ -th number.
- Line number separator.
- Line number alignment.

**Cross-references to other numbers.** Allow users to make cross-references to anything that can be numbered, such as the numbers introduced in *2.2.7 Additional numbering* on page 103.

**Calculations with page numbers.** It should be possible to do calculations with page numbers. For example to determine the number of pages in a section.

**Multiple sets of page numbers.** Have multiple series of page numbers in the whole document that can be output on selected pages (even outputting multiple page numbers on the same page). As an example, take the case where a document contains both a letter and a contract. In that case, you want to be able to have a page number starting from 1 for the entire document, that is also output on all pages, as well as a page number starting from 1 for just the contract that is only output on the pages of the contract.

**Control increments of page numbers.** Specify that page numbers should not increment on certain pages.

For example, the case where back side containing the ‘conditions of sale’ shouldn’t be numbered and thus the page number shouldn’t be incremented. A document containing 4 pages, page 1 with page number ‘1’, page 2 being the back side of page 1 containing conditions of sale and not numbered, page 3 with page number ‘2’, page 4 being the back side of page 3 containing conditions of sale and not numbered again. What is actually being accomplished is simulating printing a 2 page document (with page numbers 1 and 2) on 2 sheets of preprinted paper, each containing the conditions of sale on the back side.

### 2.2.8. Cross-references

#### **Textual cross-references.**

We want the formatter to detect where the cross-referenced object is located (e.g. where on the page, or on which page such as the previous page). We want to allow the insertion of variable text for cross-references depending on both the page number on which the cross-reference appears and the target page, for example ‘see previous page’ or ‘see opposite page’.

#### **Cross-reference to a specific region on a page.**

Support cross-references that refer to a specific region on a page (e.g. near the top, bottom, above on this page etc.).

#### **Cross-reference ranges and coalescing.**

Allow in cross-referencing page number (and line number, column number etc) ranges that include coalescing, joining etc.

### 2.2.9. Markers

**List all markers.** Extend retrieve-marker and retrieve-table-marker to enable listing all markers on the page (e.g. to list all index terms on the page or show a list of destinations in a list of hotels). Provide in a way to ‘carry-over’ the markers from previous (not following) pages. This should be done in all cases, not just in the case the current page contains no markers.

**Organize all markers.** When retrieving all markers of a page, add the ability to organize them. This includes removing duplicates, sorting markers and indicating how to format them (e.g. each marker on a separate line or separated with commas).

**Coalescing markers.** Add support for coalescing markers, for example if you have at the top of the page ‘A – B’. Where A and B are retrieved markers. If A and B are the same, the text should just be ‘A’.

**Generalized markers.** Add the ability to retrieve markers from any region into any region (and not just from the flow to the static regions).

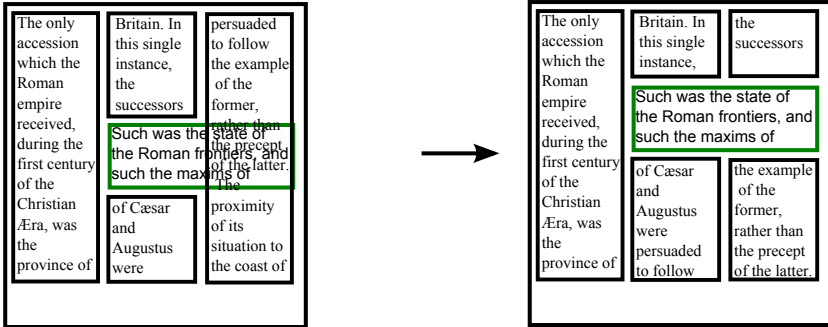
### 2.2.10. Text before or after a break

Markings at particular page, column, table (horizontal and vertical) or region breaks. For example add text ‘continued on next page’ or ‘continued from previous page’. The text may be just fixed text, or retrieved from the page or a cross-reference.

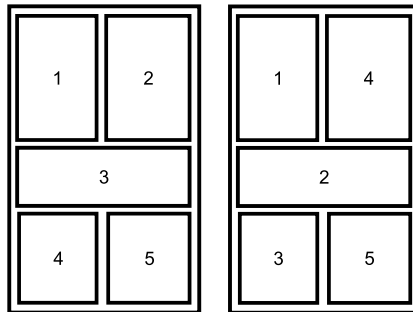
### 2.2.11. Columns

**Column balancing.** Add support for column balancing.

**Column spanning.** Add support for spanning over less than the total number of columns. The following graphic presents normal spanning in the upper part and backwards spanning in the lower part.



**Strong vs. weak spanning.** Give control over how the text flows when spanning columns over the entire page. In the following images, the numbers note the reading order of the specific location within the page.



Strong

Weak

Numbers indicate reading order

**Spanning columns in nested formatting objects.** Allow the span property to have effect when specified on formatting objects that are not direct children of an `fo:flow`.

**Multiple columns of different widths.** Allow specifying multiple columns of different widths.

**Multi-column layout in all regions and block-containers.** Allow specifying multiple columns in all regions and also in block-containers, not just the region-body.

### 2.2.12. Layout master set

**Interleaving layout-master-set.** Be able to define layout-master-sets not only at the top of the FO tree, but also interleaving page-sequences, to allow users to define and change masters, such as simple-page-master and page-sequence master, on the fly instead of having to specify all the masters in the beginning of the FO tree. When traversing the FO tree in pre-order traversal, the master must be defined before it may be referenced by a master-reference property.

**Repeatable sub-sequence-specifier.** Have sets of pages repeatable within the same page-sequence.

**Change master every  $n$  pages.** Allow specifying that every  $n$ -th page, a different master should be used. This is a specific case of *Repeatable sub-sequence-specifier*. For example, use master A for page 1, 2, 3, 4, then master B for page 5, then master A again for 6, 7, 8, 9 then master B for page 10, etc. . .

**Background content.** Add background content, such as images but also any other content, to a page master or region master.

### 2.2.13. Variable-sized regions

Dynamically size the region-start, -end, -before and -after so that it sizes according to the content of the region. This may well be not applied to the current simple-page-master. This is a simple case of *2.2.14 Adjustable Region Sizes* for the case where the page has a typical ‘border layout’.

### 2.2.14. Adjustable Region Sizes

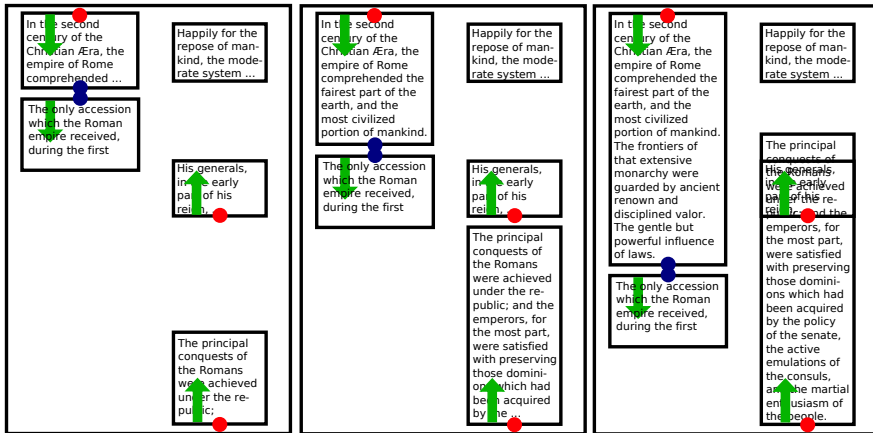
Support specifying which edge remains in its original position and which edge moves when the region grows (or multiple edges may move). This applies to all of the dimensions. Related to this is the notion of an anchored edge that can be anchored with respect to the page or with respect to another area. Some overlapping may occur with other regions that aren’t part of the specified constraints. The anchors are related to *2.2.22 Relationship of two objects* on page 108.

### 2.2.15. Binding edge

Add support for specifying the binding edge. This is related to duplex/simplex of *8.3 Print specific properties* on page 115.

### 2.2.16. Multi-directional page collation order

Add support for multi directional page collation order in a single document. For example a single book where the front part starts in one language and the



Page with some text

Page with medium amount of text

Page with a lot of text (overlapping is intentional)

Legend:

- A green arrow indicates the direction in which a region grows and/or moves
- A red dot indicates an anchor on a specific position on the page
- A blue sign indicates an anchor on another region

backside starts from another language. Another example is that of Japanese magazines that combine vertical layout from the back and horizontal layout from the front.

### 2.2.17. Spreads

Be able to treat two facing pages (a two page spread) as a single unit. For example to allow images to cross the page boundaries.

### 2.2.18. Bleeds

Add support for bleeds. For example, bleeds allow an image to go beyond the page boundaries so that when you print, bind and cut the paper you don't have any white space showing. It has got to be in the context of the output media, so this is related strongly to *8.3 Print specific properties* on page 115.

### **2.2.19. Synchronize text of flows**

Synchronize the text of flows that have a relationship to each other, and specify how near or how far they can go from each other. The relationship between the text of the two flows may also be expressed using some form of anchors. This is related to *2.2.22 Relationship of two objects* on page 108.

For example, this is needed to keep two translated paragraphs next to each other in a two column document where one column is in one language and another column in another language.

### **2.2.20. Total block-progression-dimension**

Allow users to specify the sum of the block-progression-dimensions of the generated areas instead or in addition to specifying the block-progression-dimension of each generated instance.

### **2.2.21. Different page geometry based on flows' content**

Support different page geometries based on the flows that have been exhausted and those that have still content to be placed. For example, when having two regions A and B, both laid out next to each other on a single page, once flow A is exhausted, make B use the entire available space on the page.

### **2.2.22. Relationship of two objects**

Add support for expressing the relationship of two objects, and the distance that they can go apart. This is a requirement that is necessary for other requirements that use the concept of anchors.

## **2.3. Feedback from pagination stage**

Give the ability to use information from the pagination step of one formatting episode in determining layout of the following formatting episode. This ability also allows making changes to the pages, reordering pages, merging multiple flows and do many other post processing tasks. One example of using XSL-FO for this is by representing the result of the first formatting episode each formatted page in a separate page-sequence, so that when this XSL-FO instance is fed into an XSL-FO formatter again, the same amount of pages would be generated as there are page sequences in the XSL-FO instance.

As a specific example, take the process that involves sending out a letter followed by a contract for a large number of customers. This involves an envelope machine that will take the individual sheets of paper and put them in an envelope. This process has the additional constraint that an envelope can only hold  $n$  pages,

so when the letter + contract contain more than  $n$  pages, and extra sheet of paper must be produced that contains the address again, so that this contract can be sent in multiple envelopes. This envelope machine is typically driven by OMR marks, which are lines or markings on the paper that indicate which is the first/last page of the envelope. These markings typically also include a checksum that contains the sheetnumber so that the envelope machine can detect when it took two sheets at the same time. Adding these markings to the output involves logic that needs to know how many pages are generated.

## **2.4. Document collection**

The working group will investigate relationships between multiple input documents and multiple output documents.

The term ‘document collection’ refers to a document that is actually composed of multiple documents. Once this concept of ‘document collection’ is defined, we can add features that need the relationships between multiple documents such as a master index or hyperlink management.

### **2.4.1. Master index**

Give users the ability to create a master index across multiple documents that contains all of the index terms for the multiple sub-documents with references to the individual locations inside the sub-documents.

### **2.4.2. Hyperlink management**

Allow managing hyperlinks across multiple documents of a document collection.

## **3. Expressions**

### **3.1. Including information from formatting time**

Modify the expression language to allow expressions that include information that’s only available at formatting time.

Some examples of this are the size of a block, the height of a line, etc.

### **3.2. Pagination information**

Be able to compute expressions that are based on information that is only available after the pagination stage. For example, this allows to calculate the subtotal of the current page (as opposed to a running total that is already supported in XSL 1.1 with table markers). Once this expression can be calculated, you can use *3.3 Output result of expression* to output its result.



### **3.3. Output result of expression**

Allow users to output the result of expressions on area tree, traits, markers or text content. For example to calculate the subtotal of a certain page (as opposed to a running total that is already supported in XSL 1.1 with table markers).

### **3.4. User defined units of measurement**

Allow defining units of measurement in XSL-FO in terms of a known unit. This can currently already be done in XSLT or by using XML entities, but we want to add new syntax to express this in XSL-FO functionality.

### **3.5. Getting values of properties**

Add support for getting the formatting properties associated to the area as opposed to the content.

For example, specify that the (formatted) width of a formatting object is equal to the (formatted) width of another formatting object.

## **4. Inheritance**

### **4.1. Inheritance down area tree**

Inheritance of properties down the area tree (as opposed to the formatting object tree in previous versions of XSL).

One example of this is inheritance with footnotes that should inherit the properties of the footnote are as opposed to the properties of the area in the body that contains the referenced text.

Another example is the case where there are two regions on a page that contain the flowed text (text is flowed for to Region A, then to region B). Region A has a black background and region B has a white background. The text color should be white in region A and black in region B.

### **4.2. Inheritance at reference area boundaries**

Add the ability to specify whether inheritance is in effect at reference area boundaries, or you take the initial value instead.

For example you don't want an indent on a table to be propagated by usual inheritance into the content of the table-cells.

## 5. Composition

### 5.1. Fonts

#### 5.1.1. Improved font support

This may include SVG font capabilities, such as referring to an external font pointed to with a URI, or being able to define fonts like SVG fonts. For more information on SVG fonts, see Chapter 20 of SVG 1.1 [8].

#### 5.1.2. Unicode ranges

Use a different font-family (already supported by SVG) and different font-size (not yet supported by SVG) for characters depending on the Unicode range.

#### 5.1.3. Font dependent on script or language

Make font-size and font-family dependent on the script or language.

#### 5.1.4. Font specific features

Add additional properties to give access to font specific features, e.g. in initial swash caps, oldstyle figures, and/or other features such as those available in OpenType.

#### 5.1.5. Kerning

Allow users to specify constraints to control kerning.

#### 5.1.6. Ligatures

Allow users to specify constraints to control ligatures, like forcing the use of ligatures, or avoiding the use of ligatures even though they are available. This requirement includes the large number of parameters that may be necessary to control ligatures for those languages where the ligatures are font dependent, such as Arabic.

#### 5.1.7. XSL-FO inside other languages

Allow using fragments of XSL-FO inside other languages. One example is using inline or block level objects into an SVG object.

### 5.2. Force line justification

Allow users to force line justification when the line length is within a certain range. For example, normally the last line of a paragraph would not be justified, but if the last line is longer than a certain threshold, justify it anyway.

### 5.3. Alignment around breaks

Currently XSL has justification parameters for ‘all text but the last line’ and the ‘last line’. Add properties to specify what the alignment should be for the ‘last line before a break’ and the ‘first line after a break’.

### 5.4. Hanging punctuation

Add support for hanging punctuation, both for western as non-western languages.

“He hath cast out the  
bats and the croco-  
diles from the altars  
of the profane.”

### 5.5. Tabs and tab stops

Add support for tabs and tab stops that people are used to from word processors. The main requirement for this seems to be compatibility with other formats, mainly word processor formats.

### 5.6. Word and letter spacing

#### 5.6.1. Word and letter spacing exclusions

Allow excluding specific characters or Unicode classes (for example numerals) from word and letter spacing.

#### 5.6.2. Punctuation spacing

Add support to control spacing before (XSL-FO start direction) and after (XSL-FO end direction) punctuation. For example in French inserting a quarter space before a colon.

#### 5.6.3. Specify priority between word and letter spacing

Allow users to specify the priority between word and letter spacing.

### 5.7. Hyphenation and line breaking

The following set of requirements is related to hyphenation. All hyphenation settings need to be language-dependent so that you can set different values for the various languages you use in a given document.

### **5.7.1. Number of syllables**

Allow specifying the number of syllables in addition to the number of characters to control hyphenation.

*Note:* We are concerned how to divide things reliably in syllables. This requirement comes from the Print Workshop in Heidelberg.

### **5.7.2. Syllable widows**

Add syllable level widow and orphan controls. We can only do this if we implement *5.7.1 Number of syllables*.

### **5.7.3. Hyphenation exceptions**

Allow specifying language-specific hyphenation exceptions. This could for example be done by providing a pointer (e.g. <uri-specification>) to a list of language-specific hyphenation exceptions.

### **5.7.4. Line breaks without hyphen character**

Allow the specification of a set of characters after which the composition process may introduce a line break without inserting a hyphen character. For example for ‘/’ characters in URLs.

### **5.7.5. Word widows**

Add word level widow and orphan control. For example, don’t allow single word, 3 words, etc. on a single line or at the start of page.

*Note:* We are concerned how to divide things reliably in words, for example in Chinese/Japanese/Korean or Thai.

### **5.7.6. Minimum length of last line**

Be able to specify the minimum length of the last line.

## **6. Further improved non-Western language support**

Improve support for non-Western languages, such as Mongolian, Indic languages, Thai, Japanese, Chinese, etc. The working group invites language experts to identify language specific features that are currently not yet supported by XSL.

Specifically, the Japanese Layout Taskforce [5], is creating a document about requirements for general Japanese layout realized with technologies like CSS, SVG

and XSL-FO. The document is currently in draft stage and is being developed further by the Japanese participants in the task force.

This document will be an input to the XSL working group as a source of requirements.

## **7. Images**

### **7.1. Cropping images**

Cropping images, including bleed and non-rectangular cropping. See *2.2.18 Bleeds* on page 107 and *10.1 Masks* on page 116.

### **7.2. Rotate images in 90 degree increments**

Allow rotating images in 90 degree increments.

### **7.3. Rotate images over arbitrary angles**

Allow rotating images over arbitrary angles.

### **7.4. Callouts**

Add support for callouts. Callouts are labels in a picture, overlaying text on top of a graphic (which typically needs to be translatable). Allow users to make live links from the image or map to the text and vice versa.

### **7.5. Multi-page images**

Add support for access to individual images in multi-page image formats such as TIFF, PDF or SVG 1.2.

## **8. Improvements for specific output formats or devices**

### **8.1. Annotations that appear in output**

Add support for adding annotations that appear in the output, e.g. comments or text highlighting in PDF.

### **8.2. Base URL**

Add support for setting the base URL for output formats that support this, such as PDF or HTML.

### 8.3. Print specific properties

Specifying print specific properties such as the following.

- Input/output trays.
- Duplex/simplex.
- Dpi depending on output format.
- Grayscale or patterns or colors.
- Glossy paper (has influence on formatting as well).
- Crop marks.
- Registration marks.
- Bleeds (also described at *2.2.18 Bleeds* on page 107).

This will probably be done with a Job Control specification such as JDF [6].

### 8.4. Marks for paper folding machines

Allow adding marks for paper folding machines.

## 9. Rendering

### 9.1. Animations with graphics

Add support for animations contained within the graphics.

*Note:* This could be related to *10 Collaboration with SVG* on page 116.

### 9.2. Other types of animations

Add support for other types of animation. For example an ant crawling around the borders of a table, a business chart with drilldown/zoom functionality, go to next page every 3 seconds.

*Note:* This could be related to *10 Collaboration with SVG* on page 116.

### 9.3. Z-index

Improve absolute position, layering and positioning by extending the z-index property so that it can cross formatting object boundaries. Also support z-index on regions (also required for more complex page layout).

### 9.4. Border styles

You should be able to specify these border styles for individual borders or individual corners. Patterns may be segmented, so that we have different borders for the corners etc.

Add support for extensible border patterns, e.g. with numbers and thicknesses of lines, dashes.

Tiled graphics and images as borders, for example, for borders typically surrounding a stock certificate.

### **9.5. Rounded corners**

Add support for rounded corners, e.g. for places where borders join, but also for the background with rounded corners instead of 90 degree angles.

### **9.6. Color support**

Improved color support including things that SVG Print does. For example add device-specific CMYK color. Add support for the color names that are supported in SVG. Fills/Shading/Vignettes.

#### **9.6.1. Transparency**

Allow specifying transparency and opacity/alpha values.

## **10. Collaboration with SVG**

For XSL-FO 2.0 we want to have a close collaboration between the XSL and SVG working groups. Wherever possible we will try to use SVG functionality rather than reinventing our own. Working with SVG is part of the solution to other requirements outlined in this document.

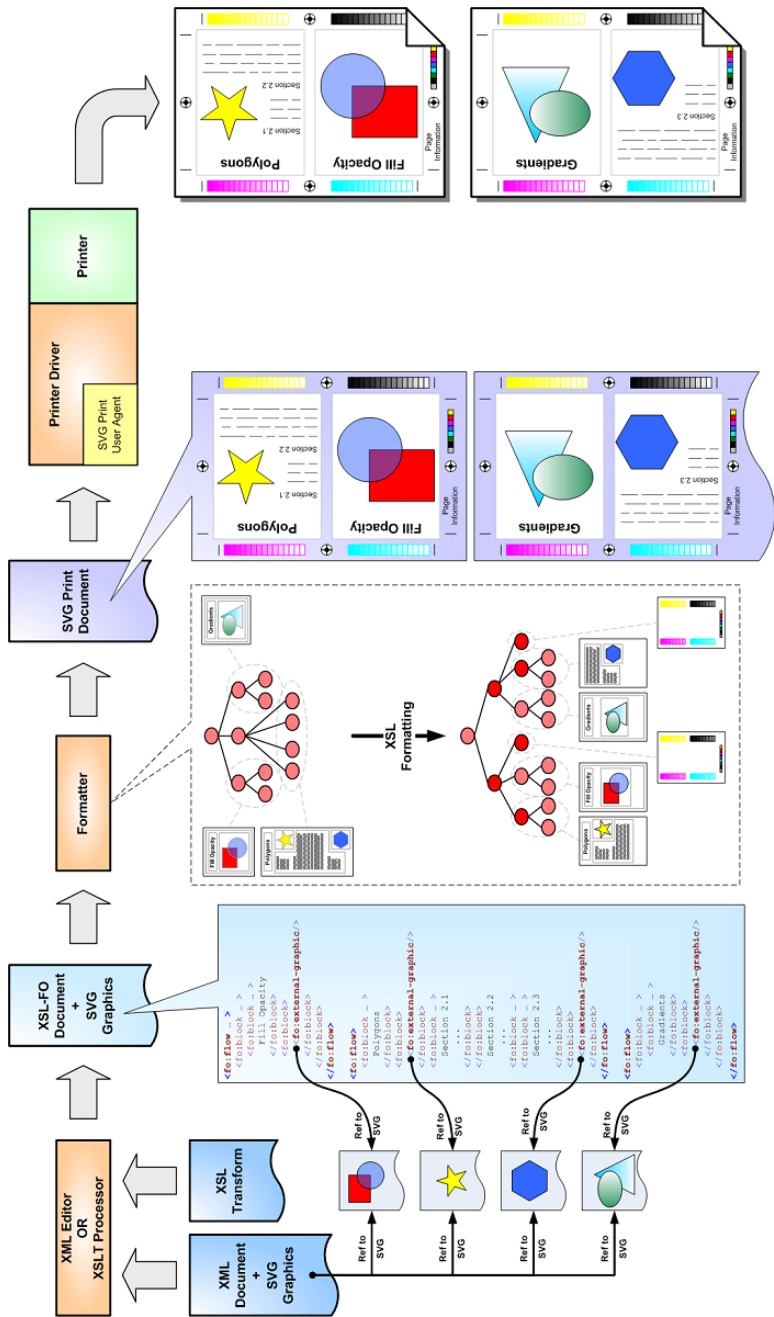
By implementing XSL-FO and SVG, some of the extra conformance criteria that apply are inheritance at language boundaries, SVG transformations of XSL-FO result renditions, nesting languages.

One example of how SVG and XSL-FO can be used is shown in this picture, coming from the *SVG Print 1.2 Primer* dated 21 December 2007 [9].

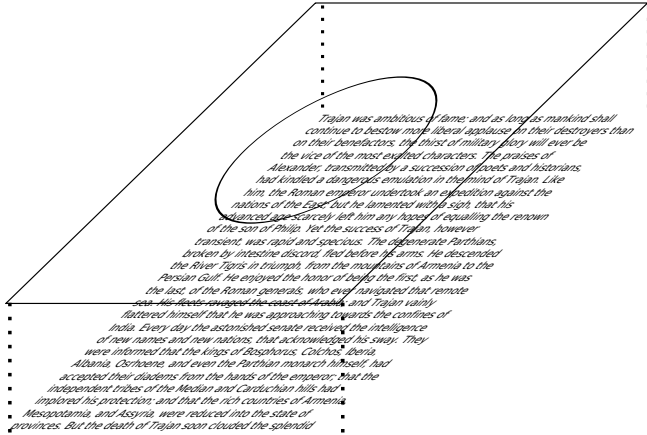
### **10.1. Masks**

Add support for applying a mask (or clip shape) to an object.

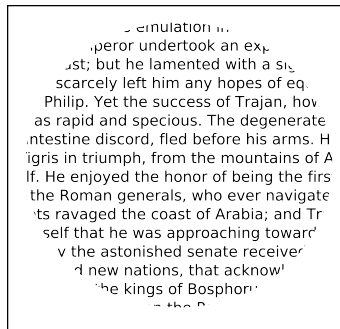
The first picture explains the concept of a mask, where a certain piece of text is masked.







The following picture explains the result of the mask.



## 10.2. Rotations

Support rotations on any type of object (not just images) over arbitrary angles.

## 10.3. Transformations

Allow applying SVG type transformations to XSL areas.

## 11. Other

### 11.1. Foreign objects

Improve the embedding of foreign objects inside XSL-FO to allow a tighter coupling. Examples of these are SVG [7], MathML [10], XForms [3], etc.

## 11.2. Metadata on objects

Specify how metadata can be attached to individual objects.

## 11.3. Generalized metadata

Specify metadata that may influence the output, like PDF keywords, producer, etc., or be used for other purposes.

## 11.4. `xml:base`

Add support for `xml:base`. We need to understand where we want to use `xml:base` in the various steps of the XSL Formatting Process.

*Note:* `xml:base` helps when you actually don't have a serialized file on disk.

## 11.5. Schema for XSL-FO

Provide a schema for XSL-FO.

## 11.6. Compatibility

Existing XSL-FO documents should still be supported unchanged by XSL 2.0 processors.

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## **Summary: Extensible Stylesheet Language Requirements, Version 2.0, Working Draft 26 March 2008**

The XSL 1.1 specification defines the features and syntax for the Extensible Stylesheet Language (XSL), a language for expressing stylesheets. This paper enumerates the collected requirements for a 2.0 version of XSL. There are two parts to XSL: XSL Transformations (XSLT) for transformation of documents and XSL Formatting Objects (XSL-FO) for formatting of documents. This is the requirements document for XSL-FO and not for XSLT.

**Keywords:** W3C, XML, XSL 2.0, XSL-FO, Features and Syntax.

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