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Professional outputs with ODS LATEX

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ABSTRACT

ODS tagset and ODS markup have been embedded from SAS 8 to SAS 9. It is a very good opportunity to link SAS reports and LaTeX. We can now generate graphics easily in a postscript format. Through basic SAS code, it is possible to include it automatically in our LaTeX Documents or presentations.

INTRODUCTION

ODS tagset was experimental in SAS Version 8. Now in SAS 9.1, new functionalities were implemented making this tool easier to use. SAS 9 also provides ODS GRAPHICS and new publishing destinations, like ODS LATEX. Even if this is experimental also in this version, it gives the new possibility to have statistical graphics displayed quite automatically. We will present an overview of these possibilities to produce added-value reports.

WHAT IS LATEX

LaTeX is a professional text treatment tool; it's a markup language that can be compiled into PDF, PostScript or DeVice Independent (DVI) formats, allowing creating written documents (reports, articles, books, letters) of high quality. All that you need is the free LaTeX processing system that can be downloaded from the Web.

Indeed, after spending little time learning the LaTeX code, you will get very nice reports - in terms of layout.

The main principle is to open LaTeX text editor, and to enter all tagsets and text information about the document you want to produce. It needs little more investment than usual Word or PowerPoint, but you will get a better final rendering than with classical text treatment tools. Of course, the code you will produce once will be reusable as a basis to create new documents.

Additionally, the mathematical mode will allow you to write mathematical equations or formulas in a simple way, with an excellent layout on your final document.

WHY USE LATEX

LaTeX it's not very used in the pharmaceutical industry, despite its advantages compared to Word or PowerPoint.

Using a markup language such as LaTeX provides some rather unique advantages over other approaches, especially for large, detailed reports. The main advantages of LaTeX are for example:

- the typesetting of mathematical formulae is supported in a convenient way,
- even complex structures such as footnotes, references, table of contents and bibliographies can be generated easily,
- users only need to learn a few easy-to-understand commands which specify the logical structure of a document. They don't need to tinker with the actual layout of the document,
- it's possible to include many effects and animations in presentations.

Moreover, LaTeX is faster on big documents because you write down only the content and software wastes no time thinking about layout. The separate type setting steps are only done at the end, which saves you time.

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SAS & LATEX

ODS GRAPHICS

SAS introduced the Output Delivery System (ODS) in version 7 which provides a way of redirecting and customizing tabular SAS output. SAS has extended the capabilities of ODS in version 9.1 to include graphics for some of its statistical procedures. Using ODS graphics, a procedure automatically creates the graphs that are most commonly needed for a particular analysis and eliminates the need to save numerical results in an output data set, manipulate them with a DATA step program, and display them with a graphics procedure.

With ODS graphics it's easy to:

- create statistical graphics in various formats including Rich Text Format (RTF), PostScript (PS), or HTML (HTM) formatted files for inclusion in other programs like Word, Internet explorer or LaTeX
- select and exclude components of the statistical graphics output
- use styles and templates to customize the appearance of statistical graphics

ODS MARKUP

Regarding LaTeX destination, we can use four LaTeX tagsets within SAS9: LaTeX, ColorLaTeX, SimpleLaTeX, and TablesOnlyLaTeX. Both the LaTeX and ColorLaTeX destinations have complex style sheets and macros that allow them to create outputs that look very much like the output from the HTML or RTF destinations. The SimpleLaTeX destination creates LaTeX with a simple style definition so that it can be more easily incorporated into a LaTeX document that already exists. These three tagsets generate LaTeX that can be directly compiled into PDF or PostScript.

If you are writing papers, reports or slides in LaTeX, then there is another tagset that you can use, called TablesOnlyLaTeX. This tagset allows you to create LaTeX snippets to include in another LaTeX document.

In the following example, we will focus on this last tagset: TablesOnlyLaTeX. This will generate the LaTeX code concerning a graph, but will ignore all other LaTeX information like system titles and footnotes, etc.

The major advantage is that we can replace any specific command by this code in our initial LaTeX document, to get a graphic inserted automatically.

EXAMPLE

You are writing a report in LaTeX and you want to include a graph in this report but this graph is not produced because you're waiting for data. You can include a 'flag' that you will use to insert automatically the graph when it will be available, like in the following code:

```
\bigskip
\subsection{Test for Part I.1}
\paragraph{This is a new Paragraph\\\\}
\bigskip
\indent
This is a test.\\
... just write specific code for automatic insertion, like below:\\
    INSERT MY GRAPH\\
\bigskip
--> Then Graph will be inserted at this place.
\bigskip
```

Once compiled in PDF:

1 TEST FOR TITLE I

1 Test for Title I

1.1 Test for Part I.1

This is a new Paragraph

This is a test.
... just write specific code for automatic insertion, like below :

INSERT MY GRAPH

-> Then Graph will be inserted at this place.

Data are now available and you want to incorporate the graph in your report.
With ODS Graphics & ODS LaTeX, you can produce graphics in PostScript mode:

```
/* Step 1: Generate a Graph in PostScript, with ODS LATEX */
ods tagsets.tablesonlylatex
    file="C:/Temp/my_graph.tex" (notop nobot)
    newfile=table;

ods select DiagnosticsPanel;
ods graphics on / imagename="C:/Temp/GraphName" reset;

    proc reg data=sashelp.class;
        model Weight = Height Age;
    run;quit;

ods graphics off;

ods tagsets.tablesonlylatex close;
```

Now you can ask SAS to replace automatically the 'flag' in your LaTeX code by the code which will insert the graph:

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```
filename tex "C:/Temp";
%let file=my_tex_file; /* your initial TEX file */

/* Step 2: Load the tex file containing the graph into a SAS dataset */

data work.my_graph ;
  infile tex(my_graph.tex) length=linelong ;
  input @;
  input line $varying500. linelong ;
run ;

/* Step 3: Load your initial TEX file.
   Replace 'INSERT_MY_GRAPH' by the real LATEX code
   Provide a new file with the final code */

data work.saspgm ;
  infile tex(&file..tex) length=linelong ;
  input @;
  input line $varying500. linelong ;
  file tex(&file._new.tex) ;
  if index (line, 'INSERT MY GRAPH') gt 0 then do;
    set work.my_graph ;
    put line;
  end;
  else do;
    put line $varying500. linelong ;
  end;
run ;
```

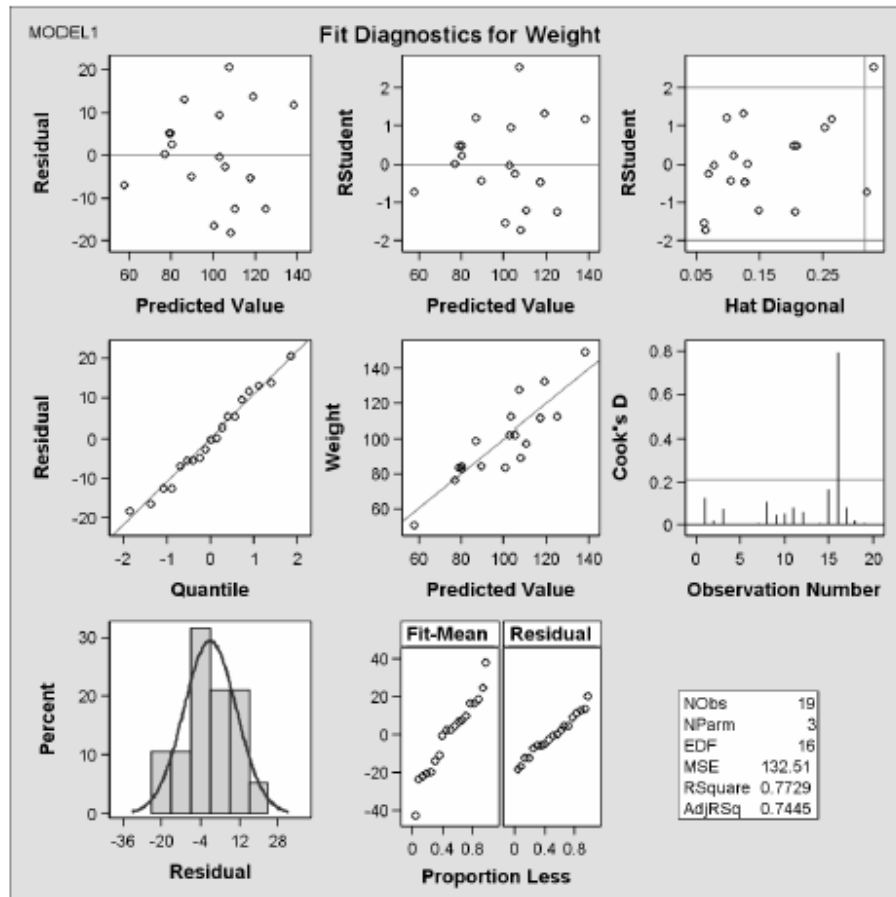
Then you just need to compile the new TeX file in PDF to get the final result:

1.1 Test for Part I.1

This is a new Paragraph

This is a test.

... just write specific code for automatic insertion, like below :



-> Then Graph will be inserted at this place.

But then you decide to replace this graph by another one. You generate a new graph in PostScript:

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```

/* Generate an other Graph in postscript, with ODS LATEX */
ods tagsets.tablesonlylatex
    file="C:/Temp/my_graph.tex" (notop nobot)
    newfile=table;
ods graphics on / imagename="C:/Temp/GraphName" reset;

proc lifetest data=mydata.survival;
    time surv*censor(1);
    strata trt;
    survival plots=(survival);
    id subjid;
run;

ods graphics off;
ods tagsets.tablesonlylatex close;

```

You just have to compile the TeX file in PDF, and you obtain the following result:

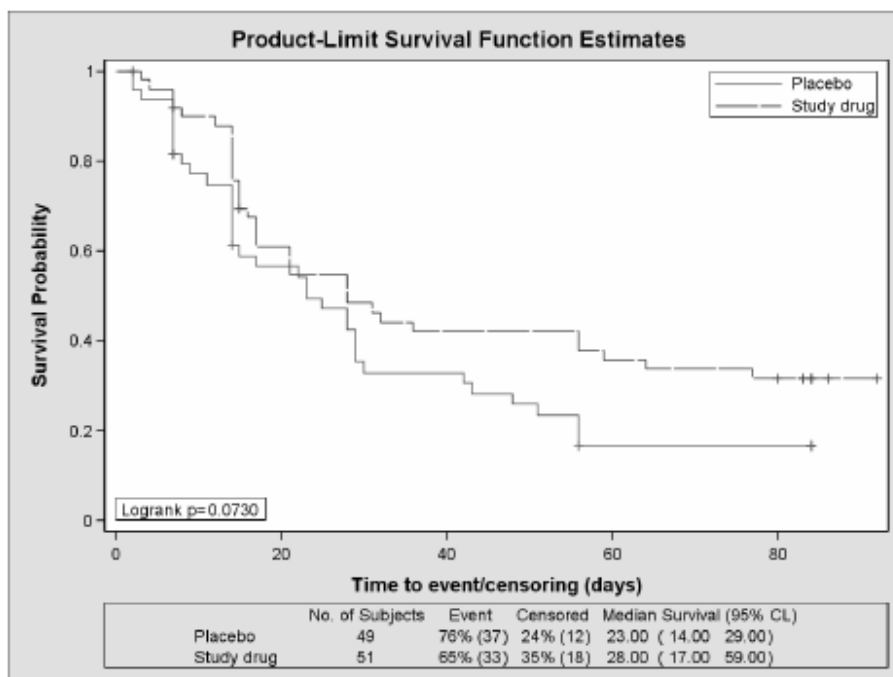
1 Test for Title I

1.1 Test for Part I.1

This is a new Paragraph

This is a test.

... just write specific code for automatic insertion, like below :



-> Then Graph will be inserted at this place.

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You can easily change the style of the graph, for example you want a graph with the 'journal' style:

```
/* Generate an other Graph in postscript, with ODS LATEX */
ods tagsets.tablesonlylatex
    file="C:/Temp/my_graph.tex" (notop nobot)
    newfile=table style=journal;
ods graphics on / imagename="C:/Temp/GraphName" reset;

proc lifetest data=mydata.survival;
    time surv*censor(1);
    strata trt;
    survival plots=(survival);
    id subjid;
run;

ods graphics off;
ods tagsets.tablesonlylatex close;
```

After having compiled the TeX file in PDF you will obtain:

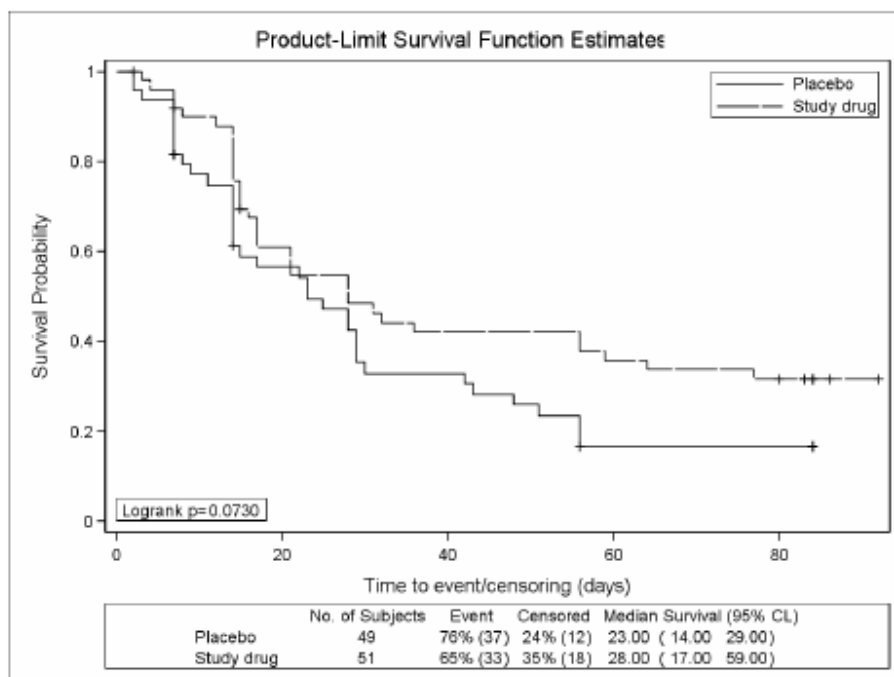
1 Test for Title I

1.1 Test for Part I.1

This is a new Paragraph

This is a test.

... just write specific code for automatic insertion, like below :



-> Then Graph will be inserted at this place.

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Whatever the changes you want to apply to the graph, you don't need to change the LaTeX code, you just need to produce the graph and to compile the TeX file and you not have to worry about the layout.

CONCLUSION

Even if official submissions cannot be made with LaTeX, this new tagset destination is a good beginning for us to go to LaTeX for all other types of documents, and to give a better image of what we can produce with SAS in terms of graphics. Then this first step is a good added value to presentations or publications. In future version, we would expect to have a better control and direct output from any SAS procedure to LaTeX document.

RECOMMENDED READING

SAS 9 online documentation about ODS Graphics: <http://support.sas.com/rnd/app/da/stat/odsgraph/index.html>

SAS 9 & LaTeX: <http://support.sas.com/rnd/base/ods/odsmarkup/latex.html>

LaTeX: <http://www.latex-project.org/>

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