

The smartdiagram package*

Claudio Fiandrino

claudio.fiandrino@gmail.com

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Abstract

This package provides a way to easily draw diagrams in documents and presentations from a list of items thanks to TikZ. The idea came out from [this question](#) on [TeX.StackExchange](#).

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*This document corresponds to smartdiagram v0.3b, dated 2016/12/23; it is released under and subject to the [L^AT_EX](#) Project Public License (LPPL).

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1 Introduction and requirements

The aim of the package is to provide a way to draw diagrams starting from a list of items colored automatically. The diagrams created could be used in a simple document or in a presentation: in the latter case, while using the Beamer class, the user could decide if diagrams should be overlay-awared or not.

Automatically, the smartdiagram package loads:

- `TikZ`;
- `etoolbox`;
- `xparse`;
- `xstring` (from version 0.2).

Moreover, the package loads the following TikZ libraries:

- `backgrounds`;
- `calc`;
- `fadings`;
- `shadows`;
- `shapes.arrows`;
- `shapes.symbols` (from version 0.2).

and it sets a new layer called `smart diagram arrow back`. From version 0.3, the package is composed of three core libraries:

- `core.definitions`,
- `core.styles`,
- `core.commands`

which actually form the package `smartdiagram.sty` and of the external library:

- `additions`

which can be loaded separately by the user. By loading this library:

```
\usesmartdiagramlibrary{additions}
```

forces the TikZ library `positioning` to be loaded as well.

The package could be loaded by means of `\usepackage{smartdiagram}`.

2 Basic Usage

`\smartdiagram` The basic command is `\smartdiagram[⟨type of diagram⟩]{⟨list of items⟩}`. The `{⟨list of items⟩}` should be comma-delimited: to insert, for example, a comma as part of the item label use `\smartdiagram[...]{elem1,{elem2,text},elem3}`.

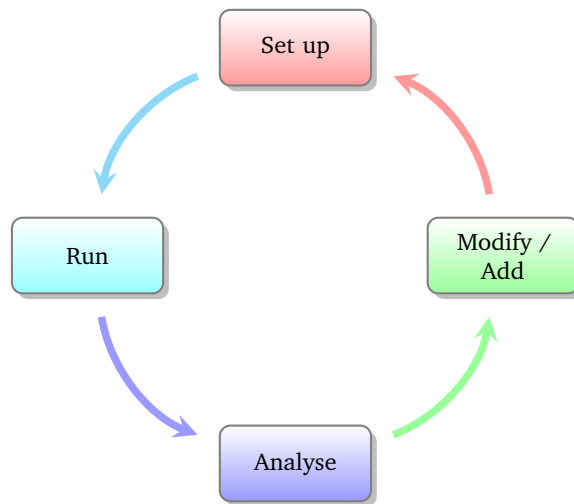
The possible diagrams that could be created are:

- **circular diagram**: the items in the list are displayed around a circle typically in counterclockwise order;
- **circular diagram:clockwise**: same as before, but now items are placed in clockwise order (no space between names and `:`);
- **flow diagram**: the items in the list are displayed as a flow chart;
- **flow diagram:horizontal**: the items in the list are displayed as an horizontal flow chart (no space between names and `:`);
- **descriptive diagram**: a diagram in which are displayed concepts and their description;
- **priority descriptive diagram**: a diagram in which the items are deployed based on their relevance;
- **bubble diagram**: each item is a bubble deployed around a bubble center, which is the first element in the list;
- **constellation diagram**: each item is a circle connected to the center, the first element in the list again;
- **connected constellation diagram**: each item is a circle and, a part from the first element in the list, the other ones are connected together;
- **sequence diagram**: the items in the list are displayed in sequence and each item points to the subsequent.

For example:

```
\begin{center}
\smartdiagram[circular diagram]{Set up,Run,Analyse,Modify~/ Add}
\end{center}
```

produces:



All diagrams could be customized in various ways, from the selection of the background colors to the font size, from the size of the items to the shape of the border. The keys necessary for this task will be analysed in detail in section 4.

For what concern the **bubble diagram**, the **constellation diagram** and the **connected constellation diagram**, they are a bit different from the rest of the diagrams, in the sense that the first item in the $\{\langle list\ of\ items \rangle\}$ is particular: called *bubble center* and *planet*, respectively, its aspect is different and it could be customized with dedicated keys.

From version 0.2 there is available also the **sequence diagram** which displays the $\{\langle list\ of\ items \rangle\}$ with a particular shape.

`\smartdiagramanimated`

Inside presentations, the user could select if the diagram should be displayed in a *persistent* way, or with an animation. The *persistent* way is achieved by exploiting, again, `\smartdiagram`, while to have the diagram *overlay-aware* the command is `\smartdiagramanimated[⟨type of diagram⟩]{⟨list of items⟩}`.

For diagrams like the **circular diagram** and the **flow diagram** the animation runs as follows: at the beginning the first item of the list is displayed, then each time appears an arrow connecting the previous element with the new one; at the end it is displayed the arrow connecting the last element with the first one. Considering instead the **descriptive diagram**, per couple description title-description, first it is shown the description title and subsequently the description. In the **priority descriptive diagram**, very simply, the list of items is deployed starting from the bottom, that is the less relevant item, to the top to progressively show much relevant items. For what concern the **bubble diagram**, the **constellation diagram** and the **connected constellation diagram**, at first it is always shown the *bubble center* and *planet*, respectively and later all the items subsequently. Finally, in the **sequence diagram**, the items are presented one at a time starting from the left one ending with the right one.

3 Additions

`\usesmartdiagramlibrary`

From version 0.3, it is possible to load a separate library called **additions** which allows to create annotations over a smart diagram. Load the library through:

`\usesmartdiagramlibrary{additions}`

`\smartdiagramadd` in the preamble. The basic command introduced by the library is `\smartdiagramadd[⟨type of diagram⟩]{⟨list of items⟩}{⟨list of additions⟩}`. The `{⟨list of additions⟩}` have a special syntax:

`⟨position of module/Annotation text⟩`

where:

- *position* is an anchor of TikZ (i.e above, below right and so on);
- *module* is the name of a module in the smart diagram;
- *position* and *module* should be separated by the string of: spaces before and after the string are *mandatory*.

Smartdiagram defines as names:

- for the diagrams `circular diagram` and `circular diagram:clockwise:`
`moduleprogressive-number` (no space or other symbols in between); example: `module1;`
- for the diagrams `flow diagram` and `flow diagram:horizontal:`
`moduleprogressive-number`; example: `module3;`
- for the diagram `descriptive diagram: module-title``progressive-number` for titles and `moduleprogressive-number` for descriptions; example: `module-title1` and `module1;`
- for the diagram `bubble diagram: center bubble` for the center module and `moduleprogressive-number` for the other modules; example: `center bubble` and `module2;`
- for the diagrams `constallation diagram` and `connected constellation diagram:`
`planet` for the center module and `satelliteprogressive-number` for the other modules; example: `planet` and `satellite3;`
- for the diagram `priority descriptive diagram: moduleprogressive-number;`
- for the diagram `sequence diagram: sequence-item``progressive-number`; example: `sequence-item1.`

The use of the library `additions` in a document requires two compilation runs at least because of the TikZ options `remember picture` and `overlay`.

An example:

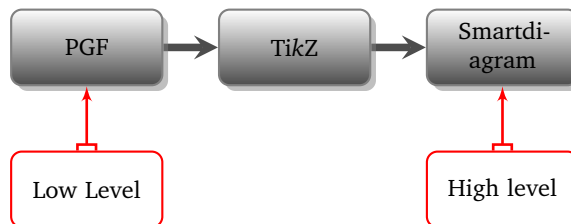
```
\begin{minipage}[t][3.5cm]{\textwidth}
\begin{center}
\smartdiagramset{
uniform color list=gray!60!black for 3 items,
back arrow disabled=true,
additions={
additional item offset=0.85cm,
additional item border color=red,
additional connections disabled=false,
additional arrow color=red,
additional arrow tip=stealth,
additional arrow line width=1pt,
additional arrow style=-latex',
}
```

```

}
\smartdiagramadd[flow diagram:horizontal]{%
PGF,Ti\textit{k}Z,Smartdiagram%
}{%
below of module1/Low Level, below of module3/High level%
}
\end{center}
\end{minipage}

```

The result:



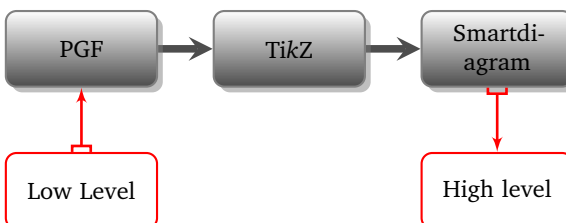
`\smartdiagramconnect` Notice that with the `\smartdiagramadd` facility it is not possible to fine customize the direction of the arrow tips. Since each additional module has as name `additional-moduleprogressive-number`, then by means of the specific command `\smartdiagramconnect{<arrow options>}{<start module/end module>}` one could do better. For example:

```

\begin{minipage}[t][3.5cm]{\textwidth}
\begin{center}
\smartdiagramset{
uniform color list=gray!60!black for 3 items,
back arrow disabled=true,
additions={
additional item offset=0.85cm,
additional item border color=red,
additional arrow color=red,
additional arrow tip=stealth,
additional arrow line width=1pt,
additional arrow style=-latex',
}
}
\smartdiagramadd[flow diagram:horizontal]{%
PGF,Ti\textit{k}Z,Smartdiagram%
}{%
below of module1/Low Level, below of module3/High level%
}
\smartdiagramconnect{{-latex'}}{additional-module1/module1}
\smartdiagramconnect{{latex'-[]}}{additional-module2/module3}
\end{center}
\end{minipage}

```

gives:



Because of the option `overlay`, it is better to protect within a `minipage` the diagram: in this way the missing bounding box update would not affect the subsequent/precedent text.

By default, the arrows are customized by the keys which start with `additional` (explained more in detail in the subsection 4.2.3), but it is possible to override locally this definition, for example with:

```
\smartdiagramconnect{{\latex'-[]},green}{additional-module2/module3}
```

For the moment, the library `additions` *does not work* in the animated mode.

4 The options

4.1 Setting the options

`\smartdiagramset` The options should be introduced similarly to what happens with `\tikzset` in TikZ: `\smartdiagramset{<list of options>}`. As well as in TikZ, it is possible to collect options within styles: see for more details subsection 6.2. Examples in which the options are used are shown in section 5.

4.2 Available options

Here follows the list of general available options: these options are related to generic aspects as color lists or arrows.

4.2.1 General options

- `set color list` (initial: none): this option allows the user to define the list of colors usable in the diagram;
- `uniform color list` (initial: none): this option allows the user to set one single color for the whole list of colors usable in the diagram;
- `use predefined color list` (initial: none): this option allows the user to reuse the pre-defined colors whenever in a previous diagram they have been changed;
- `insert decoration` (initial: none): this option allows to decorate the border of the module; the user should declare properly a decoration style and load manually the libraries required, e.g. `decorations.pathmorphing`; some more hints are given in section 6;

- `arrow line width` (initial: 0.1cm): this option sets the width of the connection arrows within two modules;
- `arrow tip` (initial: stealth): this option allows to select the single arrow tip; possible choices are described in the pgfmanual and for particular types it is recommended to load the library `arrows`;
- `arrow style` (initial: <-): this option allows the user to define a new style for the arrow; as well as the key `arrow tip`, see the pgfmanual to see a list of possible arrow styles;
- `uniform arrow color` (initial: false): this option, set to true, activates the possibility to use one single arrow color for all the connections;
- `arrow color` (initial: gray): this option, when the key `uniform arrow color` is set to true, allows to select the uniform arrow color.

4.2.2 Specific options

Here follows the list of specific available options per type of diagram.

For what concern the `circular diagram`, `circular diagram:clockwise`, the `flow diagram` and the `flow diagram:horizontal`:

- `module minimum width` (initial: 2cm): this option sets the minimum width of the module;
- `module minimum height` (initial: 1cm): this option sets the minimum height of the module;
- `module y sep` (initial: 1.65): this option sets a vertical distance factor among the modules in a `flow diagram`;
- `module x sep` (initial: 2.75): this option sets an horizontal distance factor among the modules in a `flow diagram:horizontal`;
- `module shape` (initial: rectangle,rounded corners): this option should be used to change the shape of the module, but the user should load manually the proper TikZ library; for example, to user an ellipse, load `shapes.geometric` in the preamble;
- `text width` (initial: 1.75cm): this option sets the text width inside the module;
- `font` (initial: \small): this option sets the module font;
- `border color` (initial: gray): this option sets the border color of the module;
- `text color` (initial: black): this option sets the text color of the module;
- `circular distance` (initial: 2.75cm): this option sets the radius of circle around which the modules in a `circular diagram`;

Considering just the `flow diagram` and the `flow diagram:horizontal`, there is a specific option to disable the back arrow going from the final module to the first one and to set its distance from the modules:

- `back arrow distance` (initial: 0.5): the option sets the distance (it hold for both types);
- `back arrow disabled` (initial: false): the option, set to true disables the back arrow.

Similarly, in the `circular diagram` and in the `circular diagram:clockwise`, there is a specific option to disable the back arrow going from the final module to the first one:

- `circular final arrow disabled` (initial: `false`): the option, set to `true` disables the final connection.

For what concern the `descriptive diagram` and the `priority descriptive diagram`:

- `descriptive items y sep` (initial: `1.75`): this option sets a vertical distance factor among the descriptive items;
- `description title width` (initial: `1.5cm`): this option sets the minimum width of the description-title;
- `description title text width` (initial: `1.25cm`): this option sets the text width of the description-title;
- `description text width` (initial: `5cm`): this option sets the text width of the description;
- `description title font` (initial: `\small`): this option sets the font size of the description-title;
- `description font` (initial: `\small`): this option sets the font size of the description;
- `description width` (initial: `5.5cm`): this option sets the minimum width of the description;
- `priority arrow width` (initial: `1.5cm`): this option sets the width of the vertical arrow;
- `priority arrow head extend` (initial: `0.15cm`): this option sets the width of the arrow head extend;
- `priority tick size` (initial: `5pt`): this option sets the size of the line denoting the relevance position of items in the vertical arrow;
- `priority arrow height advance` (initial: `2cm`): this option specifies how much the vertical arrow is vertically extended above the most relevant item.

For what concern the `bubble diagram`, the `constellation diagram` and the `connected constellation diagram`:

- `bubble center node size` (initial: `4cm`): the option specifies the minimum size of the bubble center node;
- `bubble center node font` (initial: `\large`): this option sets the font size of the bubble center node;
- `bubble center node color` (initial: `lightgray!60`): this option allows to customize the background color of the bubble center node;
- `distance center/other bubbles` (initial: `0.8cm`): this options specifies which is the distance among the bubble center node and the other bubbles; keep this value under controll to avoid that bubbles do not overlap anymore the bubble center node;
- `distance text center bubble` (initial: `0.5cm`): this option sets the distance from the text to the border of the bubble center node;
- `bubble fill opacity` (initial: `0.5`): this option sets the opacity at which the bubbles are shown;

- `bubble node size` (initial: 2.5cm): the option specifies the minimum size of the bubbles;
- `bubble text opacity` (initial: 0.8): this option sets the opacity at which the bubble text is shown;
- `bubble node font` (initial: \normalfont): this option sets the font size of the bubbles;
- `planet size` (initial: 2.5cm): the option specifies the minimum size of the planet;
- `planet color` (initial: lightgray!60): this option allows to customize the background color of the planet;
- `planet font` (initial: \large): this option sets the font size of the planet;
- `distance planet-connection` (initial: 0.1cm): this option sets the distance from the planet to the arrow directed to the satellites;
- `distance planet-text` (initial: 0.5cm): this option sets the distance from the text to the border of the planet;
- `planet text width` (initial: 1.75cm): this option sets the planet text width;
- `satellite size` (initial: 1.75cm): the option specifies the minimum size of the satellites;
- `satellite font` (initial: \normalfont): this option sets the font size of the satellites;
- `satellite fill opacity` (initial: 0.5): this option sets the opacity at which the satellites are shown;
- `satellite text opacity` (initial: 0.8): this option sets the opacity at which the satellite text is shown;
- `satellite text width` (initial: 1.5cm): this option sets the satellite text width;
- `distance satellite-connection` (initial: 0.075cm): this option sets the distance from the satellites to the arrows directed to the planet;
- `connection line width` (initial: 0.1cm): this option allows to customize the width of the connections from the planet to the satellites;
- `distance planet-satellite` (initial: 3.5cm): this option determine the distance among any pair of planet-satellite.

Considering just the the `constellation diagram` and the `connected constellation diagram`:

- `uniform connection color` (initial: false): the option, set to true overrides the color list definition;
- `connection color` (initial: gray): this option allows to specify the color valid for all the connections.

For what concern the `sequence diagram`:

- `sequence item height` (initial: 1cm): the option specifies the minimum height of the items;
- `sequence item width` (initial: 2cm): the option specifies the minimum width of the items;

- `sequence item border color` (initial: gray): sets the border line color;
- `sequence item border size` (initial: 1.65\pgflinewidth): sets the border line width;
- `sequence item font size` (initial: \normalfont): this option sets the font size of the items;
- `sequence item fill opacity` (initial: 1): sets the opacity at which the item is shown;
- `sequence item text opacity` (initial: 1): sets the opacity at which the item text is shown;
- `sequence item text width` (initial: 1.9cm): the option allows to select the item text width;
- `sequence item text color` (initial: black): the option allows to select the item text color;
- `uniform sequence color` (initial: false): the option, set to true overrides the color list definition;
- `sequence item uniform color` (initial: gray!60!black): this option allows to specify the color valid for all the items in the sequence.

4.2.3 Options of the additions library

The options of the library necessitate to be set within a specific key `additions`; this key is defined as

```
\pgfkeys{/smart diagram/.cd,
  additions/.style={/smart diagram/additions/.cd,#1}%
}
```

and it basically sets the correct path; indeed all of these keys are defined in a subtree of the main path: `/smart diagram/additions`. For example:

```
\smartdiagramset{
  additions={
    additional item offset=0.85cm,
    additional item border color=red,
    additional arrow color=red,
    additional arrow tip=stealth,
    additional arrow line width=1pt,
    additional arrow style=-latex',
  }
}
```

Notice that each key starts with `additional`: in my opinion, although it may seem heavy type this every time, it could avoid some confusion with other keys.

- `additional item shape` (initial: rectangle,rounded corners): this option should be used to change the shape of the additional module; similarly to the key `module shape`, for some shapes the user should load manually the proper TikZ library;

- `additional item border color` (initial: none): sets the border line color;
- `additional item bottom color` (initial: white): this option sets the bottom color of the module; use it if you want to keep the same aspect of the diagrams: `circular diagram`, `flow diagram`, `circular diagram:clockwise` and `flow diagram:horizontal`;
- `additional item fill color` (initial: none): this option sets the fill color of the module; use it if you want to keep the same aspect of the other types of diagrams;
- `additional item text width` (initial: 1.75cm): it defines the text width of the module;
- `additional item width` (initial: 2cm): it defines the minimum width of the module;
- `additional item height` (initial: 1cm): it defines the minimum height of the module;
- `additional item font` (initial: \normalfont): this option allows to customize the font of the module;
- `additional item border decoration` (initial: none): this option allows to customize the module with a decoration; some more hints are given in section 6;
- `additional item offset` (initial: 0.25cm): this option defines the distance between the original module and the additional one;
- `additional item fill opacity` (initial: 1): it sets the fill opacity of the module;
- `additional item text opacity` (initial: 1): it sets the text opacity of the module;
- `additional arrow tip` (initial: stealth): this option defines the single arrow tip of the connection;
- `additional arrow line width` (initial: 0.1cm): this option defines the line width of the connection;
- `additional arrow color` (initial: gray): this option defines the connection color;
- `additional arrow style` (initial: ->): this option allows to customize the connection aspect, that is both arrow tips simultaneously;
- `additional item shadow` (initial: none): it allows to define a shadow for the module; use the usual TikZ shadow options;
- `additional connections disabled` (initial: true): this option when set to false makes all the connections visible.

5 Gallery of examples

Horizontal flow chart:
custom color list - no
back arrow

Example of an horizontal flow chart with custom color list and back arrow disabled:

```
\begin{center}
\smartdiagramset{border color=none,
set color list={blue!50!cyan,green!60!lime,orange!50!red,red!80!black},
back arrow disabled=true}
```

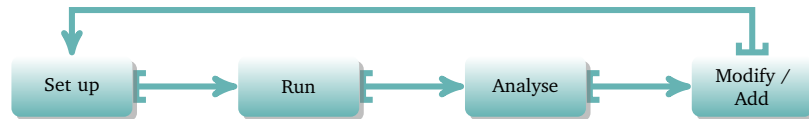
```
\smartdiagram[flow diagram:horizontal]{Set up,Run,Analyse,Modify~/ Add}
\end{center}
```



Horizontal flow chart: A similar example with an uniform color list and custom arrow style definition:

uniform color list -
custom arrow style

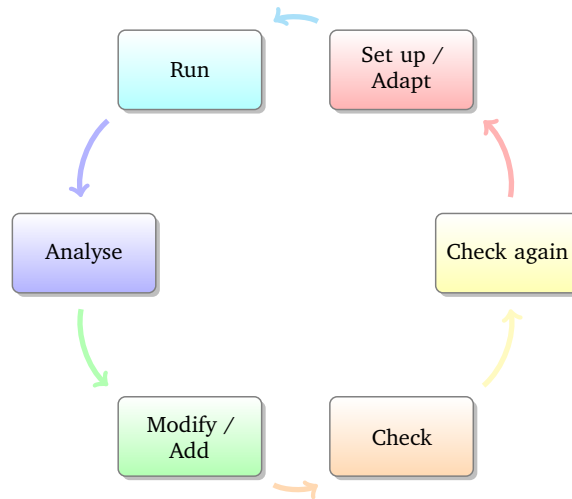
```
\begin{center}
\smartdiagramset{border color=none,
uniform color list=teal!60 for 4 items,
arrow style=[-stealth',
module x sep=3.75,
back arrow distance=0.75,
}
\smartdiagram[flow diagram:horizontal]{Set up,Run,Analyse,Modify~/ Add}
\end{center}
```



Circular diagram with
custom options

Another example:

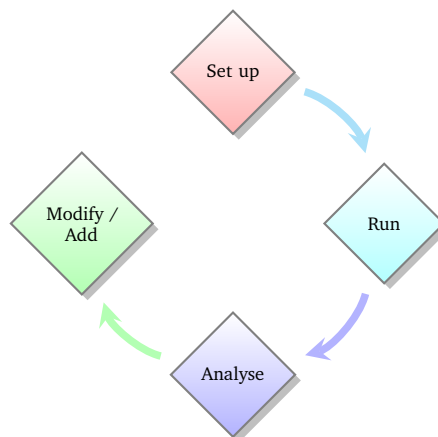
```
\begin{center}
\smartdiagramset{circular distance=4cm,
font=\large,
text width=2.5cm,
module minimum width=2.5cm,
module minimum height=1.5cm,
arrow tip=to}
\smartdiagram[circular diagram]{Set up~/ Adapt,Run,Analyse,Modify~/ Add,
Check,Check again}
\end{center}
```



Circular diagram with
custom shape and final
arrow disabled

An example with a diamond shape and the final arrow disabled:

```
\begin{center}
\usetikzlibrary{shapes.geometric} % required in the preamble
\smartdiagramset{module shape=diamond,
font=\scriptsize,
module minimum width=1cm,
module minimum height=1cm,
text width=1cm,
circular distance=2cm,
circular final arrow disabled=true,
}
\smartdiagram[circular diagram:clockwise]{Set up,Run,Analyse,Modify~/ Add}
\end{center}
```



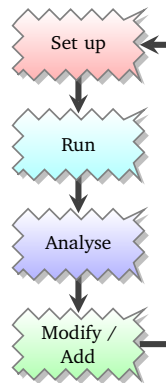
Flow diagram with
decorated border and
uniform arrow color

An example with a decorated shape and uniform arrow color:

```

\usetikzlibrary{decorations.pathmorphing} % required in the preamble
\begin{center}
\tikzset{my decoration/.style={decorate,decoration=zigzag}}
\smartdiagramset{module shape=rectangle,
  insert decoration={my decoration},
  uniform arrow color=true,
  arrow color=gray!50!black,
}
\smartdiagram[flow diagram]{Set up,Run,Analyse,Modify~/ Add}
\end{center}

```

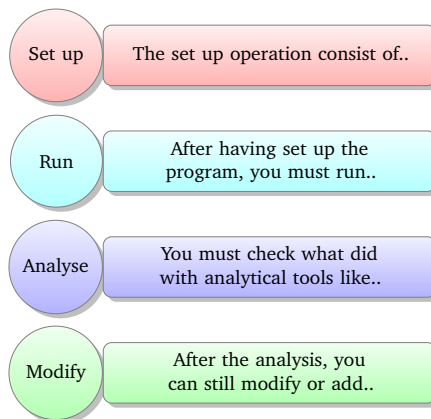


Descriptive diagram An example of descriptive diagram:

```

\begin{center}
\smartdiagram[descriptive diagram]{
{Set up,The set up operation consist of..},
{Run, {After having set up the program, you must run..}},
{Analyse, You must check what did with analytical tools like..},
{Modify, {After the analysis, you can still modify or add..}},
}
\end{center}

```



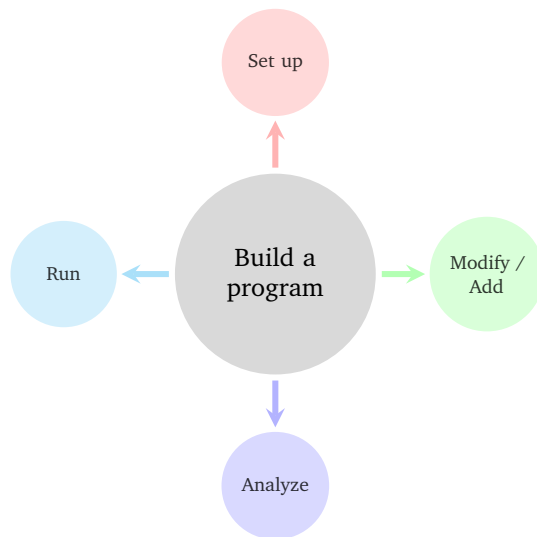
Bubble diagram An example of bubble diagram:

```
\begin{center}
\smartdiagram[bubble diagram]{
  Build a program,Set up,Run,Analyze,Modify~/\ Add,Check
}
\end{center}
```



Constellation diagram An example of constellation diagram:

```
\begin{center}
\smartdiagram[constellation diagram]{
  Build a program,Set up,Run,Analyze,Modify~/\ Add
}
\end{center}
```

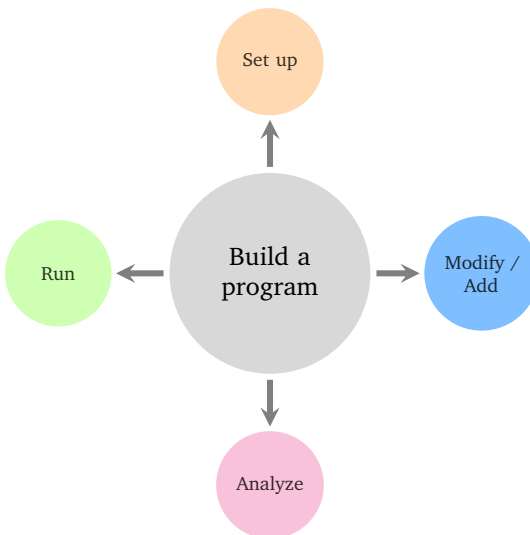
Constellation diagram with
custom colors

An example of constellation diagram with custom colors:

```

\begin{center}
\smartdiagramset{set color list={orange!60, green!50!lime!60,magenta!60,
blue!50!cyan},
uniform connection color=true
}
\smartdiagram[constellation diagram]{
Build a program,Set up,Run,Analyze,Modify~/\ Add
}
\end{center}

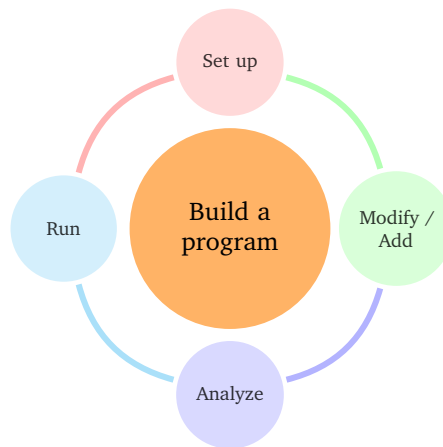
```



Connected constellation diagram An example of connected constellation diagram:

diagram

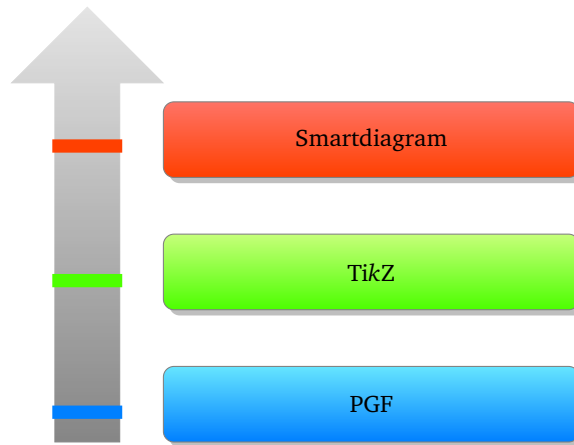
```
\begin{center}
\smartdiagramset{planet color=orange!60,
distance planet-satellite=1cm
}
\smartdiagram[connected constellation diagram]
{Build a program,Set up,Run,Analyze,Modify~/\ Add,Check}
\end{center}
```



Priority descriptive diagram An example of priority descriptive diagram describing that TikZ is built on top of PGF and Smartdiagram on top of TikZ:

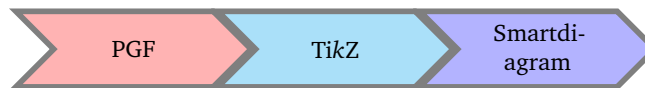
diagram

```
\begin{center}
\smartdiagramset{
set color list={blue!50!cyan,green!60!lime,orange!50!red},
priority arrow width=2cm,
priority arrow height advance=2.25cm
}
\smartdiagram[priority descriptive diagram]{PGF,TikZ,Smartdiagram}
\end{center}
```



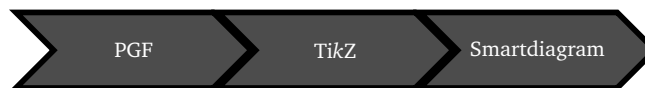
Sequence diagram The same previous example with a sequence diagram:

```
\begin{center}
\smartdiagram[sequence diagram]{PGF,Ti\textit{k}Z,Smartdiagram}
\end{center}
```



and with `uniform sequence color` set to true:

```
\begin{center}
\smartdiagramset{uniform sequence color=true,
sequence item border color=black,sequence item font size=\footnotesize,
sequence item text color=white
}
\smartdiagram[sequence diagram]{PGF,Ti\textit{k}Z,Smartdiagram}
\end{center}
```



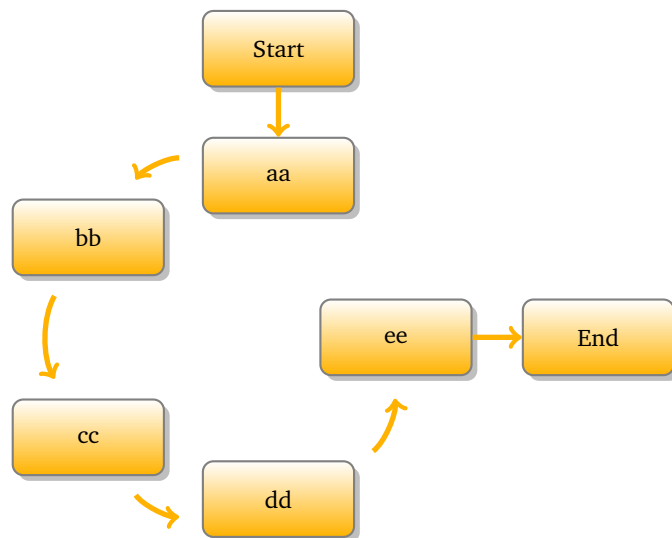
Put additions to a diagram Here is an example of a circular diagram with some additions:

```
\usesmartdiagramlibrary{additions} % required in the preamble
\usetikzlibrary{arrows} % required in the preamble
\bigskip
\begin{minipage}[c][8cm]{\textwidth}
\centering
\smartdiagramset{
uniform color list=orange!60!yellow for 5 items,
circular final arrow disabled=true,
```

```











circular distance=2.25cm,
arrow tip=to,
arrow line width=2pt,
additions={
  additional item bottom color=orange!60!yellow,
  additional item border color=gray,
  additional item shadow=drop shadow,
  additional item offset=0.65cm,
  additional arrow line width=2pt,
  additional arrow tip=to,
  additional arrow color=orange!60!yellow,
}
}
\smartdiagramadd[circular diagram]{
aa,bb,cc,dd,ee
}{
  above of module1/Start,right of module5/End
}
\smartdiagramconnect{to-}{module1/additional-module1}
\smartdiagramconnect{-to}{module5/additional-module2}
\end{minipage}

```



6 Recommendations and known issues

6.1 Something about colors

As seen in the section 4, the colors could be customized by means of the key `set color list`. By default there are 10 predefined colors; in order: red!40 , cyan!40 , blue!40 , green!40 , orange!40 , yellow!40 , magenta!40 , brown!40 , violet!40  and teal!40 . This implies that, by default, it is not possible to have lists longer than 10 items. This, of course, could be avoided by declaring proper lists with, say, 20 colors and therefore develop diagrams with more than 10 items. In any case, it is always possible to reset custom color lists by means of:

```
\smartdiagramset{use predefined color list}
```

In order to use one color for all the items it is possible to exploit the `uniform color list`; it has a particular syntax:

```
\smartdiagramset{uniform color list=<some color> for <n> items}
```

The `<some color>` is set for a list of `<n>` items and nothing more, so in order to avoid problems make sure you dimension `<n>` correctly. Indeed, in case `<n>` is lower than the number of items inside the diagram the following happens:

```
\begin{center}
\smartdiagramset{
  uniform color list=gray!60!black for 2 items,
  back arrow disabled=true,
}
\smartdiagram[flow diagram:horizontal]{PGF,Ti\textit{k}Z,Smartdiagram}
\end{center}
```



In conclusion, the uniform setting is extend only for `<n>` items, for the remaining ones the predefined or a custom color list is used.

Notice also that the key `uniform color list` makes the arrow color be uniform for `<n>` items, but it has no relation with the `uniform arrow color` which automatically makes *all* items with an uniform color. Indeed, the color taken by the arrows with:

```
\smartdiagramset{uniform arrow color=true}
```

could be customized through the key `arrow color`, while `uniform color list` make modules and arrows be rendered with the same color.

6.2 Defining styles

The smartdiagram package admits the definition of styles to collect key-definitions; for example:

```
\smartdiagramset{my diagram style/.style={
    module shape=diamond,
    font=\scriptsize,
    module minimum width=1cm,
    module minimum height=1cm,
    text width=1cm
}}
```

can be subsequently used in:

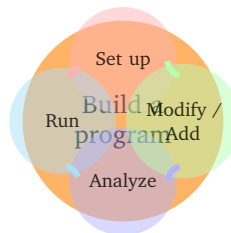
```
\begin{center}
\smartdiagramset{my diagram style, arrow tip=to}
\smartdiagram[circular diagram]{Do, This, Only, For, Me}
\end{center}
\begin{center}
\smartdiagramset{my diagram style, module y sep=2.5}
\smartdiagram[flow diagram]{Do, This, For, Me}
\end{center}
```

6.3 Circular, bubble and constellation diagrams

For these type of diagrams, the number of items is relevant: too many items lead to overlapping satellites and bubbles besides any attempt to resize things by means of keys that reduce the radius.

Notice also that imposing a too short distance from the planet to satellites is bad and leads to something like:

```
\begin{center}
\smartdiagramset{planet color=orange!60, distance planet-satellite=1cm}
\smartdiagram[connected constellation diagram]
{Build a program,Set up,Run,Analyze,Modify~/\ Add,Check}
\end{center}
```



6.4 Descriptive diagrams

When the user has to build a **descriptive diagram**, simple or animated, the following rules have to be respected:

- each description title and description should be separated by a comma;
- to use a comma inside a description, enclose by { } the description;
- use a comma after the last couple description title-description.

A working example:

```
\smartdiagram[descriptive diagram]{
{Set up, The set up operation consist of..},
{Run, {After having set up the program, you must run..}},
{Analyze, You must check what did with analytical tools like..},
}
```

A non-working example:

```
\smartdiagram[descriptive diagram]{
{Set up, The set up operation consist of..},
{Run, {After having set up the program, you must run..}},
{Analyze, You must check what did with analytical tools like..}
}
```

The *mandatory* final comma is missing thus, as result, the last couple description title-description will be entirely treated as a description title.

Another suggestion regarding descriptive diagrams is about the description title: it should be short in order to avoid the size of the circle explode. To kept it under controll, the keys **description title width**, **description title text width** and **description title font** are of help.

6.5 Decorations

To decorate the border of modules, it is kindly recommended to first declare the decoration choosen by means of an apposite style and then apply the style. The procedure, in code, should be as follows:

```
\tikzset{my wonderful decoration/.style={decorate,decoration=bent}}
\smartdiagramset{insert decoration=my wonderful decoration,...}
```

where the dots represent the other options.

The insertion of decorations inside a **descriptive diagram** are problematic: only random steps, bent and coil do not raise errors. Other decorations, like snake, raise as error:

```
! Dimension too large.
```

but, after all, the decoration is deployed anyway.

In case the user wants to decorate a border with a decoration that involves random numbers, such as `random steps` or other custom-built decorations, it is preferable to set a seed for the animated diagram, to avoid that at each step the border of the same module changes. An example:

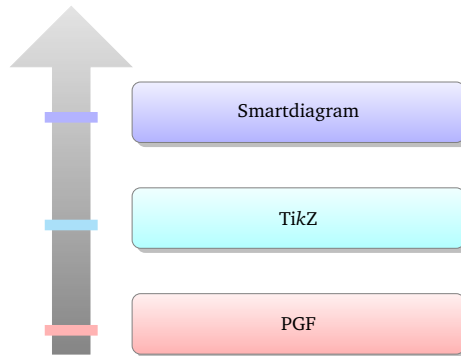
```
\begin{frame}
\begin{center}
\pgfmathsetseed{12354}
\tikzset{my decoration/.style={decorate,decoration=random steps}}
\smartdiagramset{insert decoration=my decoration}
\smartdiagramanimated[descriptive diagram]{
{Set up, The set up operation consist of..},
{Run, {After having set up the program, you must run..}},
{Analyze, You must check what did with analytical tools like..},
{Modify, {After the analysis, you can still modify or add..}},
}
\end{center}
\end{frame}
```

6.6 Priority descriptive diagrams

The vertical arrow is drawn in background with a fading effect: it may occur that under some pdf editor this effect is not shown (this happened to me with evince, but it perfectly worked with okular).

For what concern these diagrams there is a bug in displaying the tick line when the `priority arrow head extend` is set with a bigger size than the default; a minimal-non-working example:

```
\begin{center}
\smartdiagramset{priority arrow width=2cm,
priority arrow height advance=2.25cm,
priority arrow head extend=0.3cm}
\smartdiagram[priority descriptive diagram]{PGF,Ti\textit{k}Z,Smartdiagram}
\end{center}
```



7 Acknowledgements

I would like to acknowledge first of all [Alain Matthes](#) and [Mohsen](#) because the [bubble diagram](#) and the [constellation diagram](#) are based on [Alain's answer](#) while the [circular diagram](#) is based on [Mohsen's answer](#).

I would also like to thank [Enrico Gregorio](#) and [Ahmed Musa](#) for the courtesy of explaining me why my poor attempt in creating the [set color list](#) failed and for providing me valid solutions. Enrico also kindly fixed a spacing bug concerning the [uniform color list](#).

Last, but not least, I would like to thank prof. Ludger Humbert for suggesting and providing the code for the [circular diagram:clockwise](#) as well as for pointing out some bugs in the version 0.3 and André Hilbig for suggesting the key [back arrow disabled](#).

8 Implementation

8.1 Initialization and Package Options

This subsection highlights which are the package loaded and the tikzlibraries needed.

```
1 \RequirePackage{tikz}
2
3 \RequirePackage{etoolbox}
4 \RequirePackage{xparse}
5 \RequirePackage{xstring}
6
7 \usetikzlibrary{backgrounds,
8   calc,
9   fadings,
10  shadows,
11  shapes.arrows,
12  shapes.symbols
13 }
14 \pgfdeclarelayer{smart diagram arrow back}
15 \pgfsetlayers{background,smart diagram arrow back,main}
16
17
18 \def\usesmartdiagramlibrary{\pgfutil@ifnextchar[{\use@smartdiagramlibrary}{\use@@smartdiagramlibrary}}
19 \def\use@smartdiagramlibrary[#1]{\use@@smartdiagramlibrary{#1}}
20 \def\use@@smartdiagramlibrary#1{%
21   \edef\pgf@list{#1}%
22   \pgfutil@for\pgf@temp:=\pgf@list\do{%
23     \expandafter\pgfkeys@spdef\expandafter\pgf@temp\expandafter{\pgf@temp}%
24     \ifx\pgf@temp\pgfutil@empty
25       \else
26         \expandafter\ifx\csname smartdiagram@library@\pgf@temp @loaded\endcsname\relax%
27         \expandafter\global\expandafter\let\csname smartdiagram@library@\pgf@temp @loaded\endcsname\relax%
28         \expandafter\edef\csname smartdiagram@library@#1atcode\endcsname{\the\catcode'\@}
29         \expandafter\edef\csname smartdiagram@library@#1barcode\endcsname{\the\catcode'\|}
30         \catcode'\@=11
31         \catcode'\|=12
32         \pgfutil@InputIfFileExists{smartdiagramlibrary\pgf@temp.code.tex}{\}
```

```

33     \PackageError{smartdiagram}{I did not find the smartdiagram library '\pgf@temp'.}{%
34     }%
35     \catcode'\@=\csname smartdiagram@library@#1@atcode\endcsname
36     \catcode'\|= \csname smartdiagram@library@#1@barcode\endcsname
37     \fi%
38     \fi
39 }%
40 }
41
42 \usesmartdiagramlibrary{core.definitions}
43 \usesmartdiagramlibrary{core.styles}
44 \usesmartdiagramlibrary{core.commands}

```

8.2 Keys and color declaration

The predefined colors:

```

45 \@namedef{color@1}{red!40}
46 \@namedef{color@2}{cyan!40}
47 \@namedef{color@3}{blue!40}
48 \@namedef{color@4}{green!40}
49 \@namedef{color@5}{orange!40}
50 \@namedef{color@6}{yellow!40}
51 \@namedef{color@7}{magenta!40}
52 \@namedef{color@8}{brown!40}
53 \@namedef{color@9}{violet!40}
54 \@namedef{color@10}{teal!40}

```

Basic shape definition and function to compute the height of the **priority descriptive diagram**:

```

55 \tikzset{rnd rectangle/.style={rectangle,rounded corners}
56 }
57
58 \def\CalcHeight(#1,#2)#3{%
59 \pgfpointdiff{\pgfpointanchor{#1}{south west}}{\pgfpointanchor{#2}{north west}}
60 \pgfmathsetmacro{\myheight}{veclen(\pgf@x,\pgf@y)}
61 \global\expandafter\edef\csname #3\endcsname{\myheight}
62 }

```

The key definition and the functions to set them:

```

63 \pgfkeys{/smart diagram/.cd, module minimum width/.initial=2cm,
64   module minimum height/.initial={1cm},
65   module y sep/.initial={1.65},
66   module x sep/.initial={2.75},
67   descriptive items y sep/.initial={1.75},
68   text width/.initial={1.5cm},
69   description title width/.initial={1.5cm},
70   description text width/.initial={5cm},
71   description title text width/.initial={1.25cm},
72   description title font/.initial={\small},
73   description font/.initial={\small},

```

```

74 description width/.initial={5.5cm},
75 font/.initial={\small},
76 border color/.initial={gray},
77 circular distance/.initial={2.75cm},
78 arrow line width/.initial={0.1cm},
79 module shape/.initial={rnd rectangle},
80 insert decoration/.initial={},
81 arrow tip/.initial={stealth},
82 arrow color/.initial={gray},
83 bubble center node size/.initial={4cm},
84 bubble center node font/.initial={\large},
85 bubble center node color/.initial={lightgray!60},
86 distance center/other bubbles/.initial=0.8cm,
87 distance text center bubble/.initial={0.5cm},
88 bubble fill opacity/.initial={0.5},
89 bubble node size/.initial={2.5cm},
90 bubble text opacity/.initial={0.8},
91 bubble node font/.initial={\normalfont},
92 planet size/.initial={2.5cm},
93 planet color/.initial={lightgray!60},
94 planet font/.initial={\large},
95 distance planet-connection/.initial={0.1cm},
96 distance planet-text/.initial={0.5cm},
97 planet text width/.initial={1.75cm},
98 satellite size/.initial={1.75cm},
99 satellite font/.initial={\normalfont},
100 satellite fill opacity/.initial={0.5},
101 satellite text opacity/.initial={0.8},
102 satellite text width/.initial={1.5cm},
103 distance satellite-connection/.initial={0.075cm},
104 connection line width/.initial={0.1cm},
105 connection color/.initial={gray},
106 distance planet-satellite/.initial={3.5cm},
107 priority arrow width/.initial={1.5cm},
108 priority arrow head extend/.initial={0.15cm},
109 priority tick size/.initial={5pt},
110 priority arrow height advance/.initial={2cm},
111 sequence item height/.initial={1cm},
112 sequence item width/.initial={2cm},
113 sequence item border color/.initial={gray},
114 sequence item border size/.initial={1.75\pgflinewidth},
115 sequence item font size/.initial={\normalfont},
116 sequence item fill opacity/.initial={1},
117 sequence item text opacity/.initial={1},
118 sequence item text width/.initial={1.9cm},
119 sequence item text color/.initial={black},
120 sequence item uniform color/.initial={gray!60!black},
121 arrow style/.initial={<-},
122 text color/.initial={black},
123 back arrow distance/.initial={0.5},

```

```

124 }%
125
126 \pgfkeys{/smart diagram/.cd, module minimum width/.get=\sm@core@modulewidth,
127   module minimum height/.get=\sm@core@moduleheight,
128   module y sep/.get=\sm@core@moduleysep,
129   module x sep/.get=\sm@core@modulexsep,
130   descriptive items y sep/.get=\sm@core@descriptiveitemsysep,
131   text width/.get=\sm@core@moduletextwidth,
132   description title width/.get=\sm@core@descriptiontitlewidth,
133   description text width/.get=\sm@core@descriptiontextwidth,
134   description title text width/.get=\sm@core@descriptiontitletextwidth,
135   description title font/.get=\sm@core@descriptiontitlefontsize,
136   description font/.get=\sm@core@descriptionfontsize,
137   description width/.get=\sm@core@descriptionwidth,
138   font/.get=\sm@core@modulefontsize,
139   border color/.get=\sm@core@bordercolor,
140   circular distance/.get=\sm@core@circulardistance,
141   arrow line width/.get=\sm@core@arrowlinewidth,
142   module shape/.get=\sm@core@moduleshape,
143   insert decoration/.get=\sm@core@borderdecoration,
144   arrow tip/.get=\sm@core@arrowtip,
145   arrow color/.get=\sm@core@arrowcolor,
146   bubble center node size/.get=\sm@core@bubblecenternodesize,
147   bubble center node font/.get=\sm@core@bubblecenternodefont,
148   bubble center node color/.get=\sm@core@bubblecenternodecolor,
149   distance center/other bubbles/.get=\sm@core@distancecenterotherbubbles,
150   distance text center bubble/.get=\sm@core@distancetextcenterbubble,
151   bubble fill opacity/.get=\sm@core@bubblefillopacity,
152   bubble node size/.get=\sm@core@bubblenodesize,
153   bubble text opacity/.get=\sm@core@bubbletextopacity,
154   bubble node font/.get=\sm@core@bubblenodefont,
155   planet size/.get=\sm@core@planetminimumsize,
156   planet color/.get=\sm@core@planetcolor,
157   planet font/.get=\sm@core@planetfont,
158   distance planet-connection/.get=\sm@core@planetoutersep,
159   distance planet-text/.get=\sm@core@planetinnersep,
160   planet text width/.get=\sm@core@planettextwidth,
161   satellite size/.get=\sm@core@satelliteminimumsize,
162   satellite font/.get=\sm@core@satellitefont,
163   satellite fill opacity/.get=\sm@core@satellitefillopacity,
164   satellite text opacity/.get=\sm@core@satellitertextopacity,
165   satellite text width/.get=\sm@core@satellitertextwidth,
166   distance satellite-connection/.get=\sm@core@satelliteoutersep,
167   connection line width/.get=\sm@core@connectionlinewidth,
168   connection color/.get=\sm@core@connectioncolor,
169   distance planet-satellite/.get=\sm@core@distanceplanetsatellite,
170   priority arrow width/.get=\sm@core@priorityarrowwidth,
171   priority arrow head extend/.get=\sm@core@priorityarrowheadextend,
172   priority tick size/.get=\sm@core@prioritytick,
173   priority arrow height advance/.get=\sm@core@priorityarrowheightadvance,

```

```

174 sequence item height/.get=\sm@core@seqitemheight,
175 sequence item width/.get=\sm@core@seqitemwidth,
176 sequence item border color/.get=\sm@core@seqitembordercolor,
177 sequence item border size/.get=\sm@core@seqlinewidth,
178 sequence item font size/.get=\sm@core@seqitemfont,
179 sequence item fill opacity/.get=\sm@core@seqitemfillopacity,
180 sequence item text opacity/.get=\sm@core@seqitemtextopacity,
181 sequence item text width/.get=\sm@core@seqitemtextwidth,
182 sequence item text color/.get=\sm@core@seqitemtextcolor,
183 sequence item uniform color/.get=\sm@core@seqitemuniformcol,
184 arrow style/.get=\sm@core@arrowstyle,
185 text color/.get=\sm@core@textcolor,
186 back arrow distance/.get=\sm@core@backarrowdistance,
187 }%

```

The specific key to set the list of colors:

```

188 \pgfkeys{/smart diagram/.cd, set color list/.code={%
189     \foreach \listitem [count=\i] in {#1}{%
190         \global\@namedef{color@\i\expandafter}\expandafter{\listitem}%
191     }%
192 }%
193 }
194
195 \pgfkeys{/smart diagram/.cd, uniform color list/.code args={#1 for #2 items}{%
196     \foreach \listitem [count=\i] in {1,...,#2}{%
197         \global\@namedef{color@\i\expandafter}\expandafter{#1}%
198     }%
199 }%
200 }
201
202 \pgfkeys{/smart diagram/.cd, use predefined color list/.code={%
203     \@namedef{color@1}{red!30}%
204     \@namedef{color@2}{cyan!30}%
205     \@namedef{color@3}{blue!30}%
206     \@namedef{color@4}{green!30}%
207     \@namedef{color@5}{orange!30}%
208     \@namedef{color@6}{yellow!30}%
209     \@namedef{color@7}{magenta!30}%
210     \@namedef{color@8}{brown!30}%
211     \@namedef{color@9}{violet!30}%
212     \@namedef{color@10}{teal!30}%
213 }
214 }

```

The specific key to disable the back arrow in the **flow diagram** and in the **flow diagram:horizontal**:

```

215 \newif\ifbackarrowdisabled
216 \pgfkeys{/smart diagram/.cd,
217 back arrow disabled/.is if=backarrowdisabled,
218 back arrow disabled=false,
219 }

```

The specific key to disable the final arrow in the `circular diagram` and in the `circular diagram: clockwise`:

```

220 \newif\ifcircularfinalarrowdisabled
221 \pgfkeys{/smart diagram/.cd,
222   circular final arrow disabled/.is if=circularfinalarrowdisabled,
223   circular final arrow disabled=false,
224 }

```

The command to activate the various keys:

```

225 \NewDocumentCommand{\smartdiagramset}{m}{%
226   \pgfkeys{/smart diagram/.cd,#1}%
227   \pgfkeys{/smart diagram/.cd, module minimum width/.get=\sm@core@modulewidth,
228     module minimum height/.get=\sm@core@moduleheight,
229     module y sep/.get=\sm@core@moduleysep,
230     module x sep/.get=\sm@core@modulexsep,
231     descriptive items y sep/.get=\sm@core@descriptiveitemsysep,
232     text width/.get=\sm@core@moduletextwidth,
233     description title width/.get=\sm@core@descriptiontitlewidth,
234     description text width/.get=\sm@core@descriptiontextwidth,
235     description title text width/.get=\sm@core@descriptiontitletextwidth,
236     description title font/.get=\sm@core@descriptiontitlefontsize,
237     description font/.get=\sm@core@descriptionfontsize,
238     description width/.get=\sm@core@descriptionwidth,
239     font/.get=\sm@core@modulefontsize,
240     border color/.get=\sm@core@bordercolor,
241     circular distance/.get=\sm@core@circulardistance,
242     arrow line width/.get=\sm@core@arrowlinewidth,
243     module shape/.get=\sm@core@moduleshape,
244     insert decoration/.get=\sm@core@borderdecoration,
245     arrow tip/.get=\sm@core@arrowtip,
246     arrow color/.get=\sm@core@arrowcolor,
247     bubble center node size/.get=\sm@core@bubblecenternodesize,
248     bubble center node font/.get=\sm@core@bubblecenternodefont,
249     bubble center node color/.get=\sm@core@bubblecenternodecolor,
250     distance center/other bubbles/.get=\sm@core@distancecenterotherbubbles,
251     distance text center bubble/.get=\sm@core@distancetextcenterbubble,
252     bubble fill opacity/.get=\sm@core@bubblefillopacity,
253     bubble node size/.get=\sm@core@bubblenodesize,
254     bubble text opacity/.get=\sm@core@bubbletextopacity,
255     bubble node font/.get=\sm@core@bubblenodefont,
256     planet size/.get=\sm@core@planetminimumsize,
257     planet color/.get=\sm@core@planetcolor,
258     planet font/.get=\sm@core@planetfont,
259     distance planet-connection/.get=\sm@core@planetoutersep,
260     distance planet-text/.get=\sm@core@planetinnersep,
261     planet text width/.get=\sm@core@planettextwidth,
262     satellite size/.get=\sm@core@satelliteminimumsize,
263     satellite font/.get=\sm@core@satellitefont,
264     satellite fill opacity/.get=\sm@core@satellitefillopacity,
265     satellite text opacity/.get=\sm@core@satellitetextopacity,

```

```

266 satellite text width/.get=\sm@core@satellitewidth,
267 distance satellite-connection/.get=\sm@core@satelliteoutersep,
268 connection line width/.get=\sm@core@connectionlinewidth,
269 connection color/.get=\sm@core@connectioncolor,
270 distance planet-satellite/.get=\sm@core@distanceplanetsatellite,
271 priority arrow width/.get=\sm@core@priorityarrowwidth,
272 priority arrow head extend/.get=\sm@core@priorityarrowheadextend,
273 priority tick size/.get=\sm@core@prioritytick,
274 priority arrow height advance/.get=\sm@core@priorityarrowheightadvance,
275 sequence item height/.get=\sm@core@seqitemheight,
276 sequence item width/.get=\sm@core@seqitemwidth,
277 sequence item border color/.get=\sm@core@seqitembordercolor,
278 sequence item border size/.get=\sm@core@seqlinewidth,
279 sequence item font size/.get=\sm@core@seqitemfont,
280 sequence item fill opacity/.get=\sm@core@seqitemfillopacity,
281 sequence item text opacity/.get=\sm@core@seqitemtextopacity,
282 sequence item text width/.get=\sm@core@seqitemtextwidth,
283 sequence item text color/.get=\sm@core@seqitemtextcolor,
284 sequence item uniform color/.get=\sm@core@seqitemuniformcol,
285 arrow style/.get=\sm@core@arrowstyle,
286 text color/.get=\sm@core@textcolor,
287 back arrow distance/.get=\sm@core@backarrowdistance,
288 }%
289 }%

```

Key to let the sequence color be uniform:

```

290 \pgfkeys{/smart diagram/.cd,%
291   uniform sequence color/.is choice,%
292   uniform sequence color/true/.code={%
293     \tikzset{sequence item/.append style={%
294       fill=\sm@core@seqitemuniformcol,
295     },%
296   }%
297 },%
298   uniform sequence color/false/.style={sequence item},%
299   uniform sequence color/.default=false,%
300 }%

```

Key to let the connection planet satellite color be uniform:

```

301 \pgfkeys{/smart diagram/.cd,%
302   uniform connection color/.is choice,%
303   uniform connection color/true/.code={%
304     \tikzset{connection planet satellite/.append style={%
305       \sm@core@connectioncolor
306     },%
307   }%
308 },%
309   uniform connection color/false/.style={connection planet satellite},%
310   uniform connection color/.default=false,%
311 }%

```

Key to let the arrow color be uniform:

```

312 \pgfkeys{/smart diagram/.cd,%
313     uniform arrow color/.is choice,%
314     uniform arrow color/true/.code={%
315         \tikzset{diagram arrow type/.append style={%
316             \sm@core@arrowcolor
317         },%
318     }%
319 },%
320     uniform arrow color/false/.style={diagram arrow type},%
321     uniform arrow color/.default=false,%
322 }%
323

```

The fading style applied to the **priority descriptive diagram** and **styles diagram** definition:

```

324 \tikzfading[name=priorityarrowfading,
325     bottom color=transparent!5,
326     top color=transparent!80
327 ]
328 \tikzset{priority arrow fill/.style={
329     fill=gray,
330     path fading=priorityarrowfading
331 }}
332 }
333
334 \tikzset{module/.style={%
335     \pgfkeysvalueof{/smart diagram/module shape},
336     thick,
337     draw=\sm@core@bordercolor,
338     top color=white,
339     bottom color=\col,
340     text=\sm@core@textcolor,
341     text width=\sm@core@moduletextwidth,
342     minimum width=\sm@core@modulewidth,
343     minimum height=\sm@core@moduleheight,
344     font=\sm@core@modulefontsize,
345     \sm@core@borderdecoration
346 },
347     diagram arrow type/.style={%
348         \sm@core@arrowstyle,
349         >=\sm@core@arrowtip,
350         line width=\sm@core@arrowlinewidth,
351         \col
352     },%
353 }
354 \tikzset{description title/.style={%
355     circle,
356     draw=\sm@core@bordercolor,
357     minimum width=\sm@core@descriptiontitlewidth,

```



```

358     anchor=east,
359     bottom color=\col,
360     top color=white!80!\col,
361     font=\sm@core@descriptiontitlefontsize,
362     text width=\sm@core@descriptiontitletextwidth,
363     \sm@core@borderdecoration,
364 },
365 description/.style={%
366     \pgfkeysvalueof{/smart diagram/module shape},
367     text width=\sm@core@descriptiontextwidth,
368     draw=\sm@core@bordercolor,
369     anchor=west,
370     minimum height=\sm@core@moduleheight,
371     minimum width=\sm@core@descriptionwidth,
372     bottom color=\col,
373     top color=white!80!\col,
374     font=\sm@core@descriptionfontsize,
375     \sm@core@borderdecoration,
376 }%
377 }
378 \tikzset{priority arrow/.style={
379     draw=\sm@core@bordercolor,
380     single arrow,
381     minimum height=\distancemodules,
382     minimum width=\sm@core@priorityarrowwidth,
383     priority arrow fill,
384     rotate=90,
385     single arrow head extend=\sm@core@priorityarrowheadextend,
386     anchor=west,
387 }
388 }
389 \tikzset{bubble center node/.style={
390     minimum size=\sm@core@bubblecenternodesize,
391     circle,
392     fill=\sm@core@bubblecenternodecolor,
393     font=\sm@core@bubblecenternodefont,
394     outer sep=\sm@core@distancecenterotherbubbles,
395     inner sep=\sm@core@distancetextcenterbubble,
396 },
397 bubble node/.style={
398     minimum size=\sm@core@bubblenodesize,
399     circle,
400     ultra thick,
401     font=\sm@core@bubblenodefont,
402     draw=white,
403     fill opacity=\sm@core@bubblefillopacity,
404     fill=\col,
405     text opacity=\sm@core@bubbletextopacity,
406 }
407 }

```

```

408 \tikzset{planet/.style={
409     minimum size=\sm@core@planetminimumsize,
410     circle,
411     fill=\sm@core@planetcolor,
412     font=\sm@core@planetfont,
413     outer sep=\sm@core@planetoutersep,
414     inner sep=\sm@core@planetinnersep,
415     text width=\sm@core@planettextwidth,
416 },
417 satellite/.style={
418     minimum size=\sm@core@satelliteminimumsize,
419     circle,
420     font=\sm@core@satellitefont,
421     fill opacity=\sm@core@satellitefillopacity,
422     fill=\col,
423     text opacity=\sm@core@satellitertextopacity,
424     text width=\sm@core@satellitertextwidth,
425     outer sep=\sm@core@satelliteoutersep,
426 },
427 connection planet satellite/.style={
428     ->,
429     line width=\sm@core@connectionlinewidth,
430     >=\sm@core@arrowtip,
431     \col,
432 }
433 }
434
435 \tikzset{sequence item/.style={
436     minimum height=\sm@core@seqitemheight,
437     minimum width=\sm@core@seqitemwidth,
438     signal,
439     signal from=west,
440     signal to=east,
441     draw=\sm@core@seqitembordercolor,
442     line width=\sm@core@seqlinewidth,
443     font=\sm@core@seqitemfont,
444     fill opacity=\sm@core@seqitemfillopacity,
445     fill=\col,
446     text opacity=\sm@core@seqitemtextopacity,
447     text width=\sm@core@seqitemtextwidth,
448     text=\sm@core@seqitemtextcolor,
449 }
450 }
451 % let the first word of the item be hyphenate
452 \tikzset{let hyphenation/.style={%
453     execute at begin node={%
454         \hspace{0pt}%
455     }%
456 }%
457 }%

```

The definition of the visibility style:

```

458 \tikzset{%
459   sminvisible/.style={opacity=0,text opacity=0},
460   smvisible on/.style={smalt=#1}{sminvisible}},
461   smalt/.code args={<#1>#2#3}{%
462     \alt<#1>{\pgfkeysalso{#2}}{\pgfkeysalso{#3}}
463   },%
464 }%
```

8.3 Commands

Definition of the two commands. The diagrams:

```

465 \NewDocumentCommand{\smartdiagram}{r[] m}{%
466   \StrCut{#1}{:}\diagramtype\option
467   \IfNoValueTF{#1}{% true-no value 1
468     \PackageError{smartdiagram}%
469     {Type of the diagram not inserted. Please insert it}%
470     {Example: \protect\smartdiagram[flow diagram]}}
471   {%false-no value 1
472   \IfStrEq{\diagramtype}{%
473     \PackageError{smartdiagram}{Type of the diagram not inserted. Please insert it}%
474     {Example: \protect\smartdiagram[flow diagram]}
475   }{}
476   \IfStrEq{\diagramtype}{circular diagram}{% true-circular diagram
477   \begin{tikzpicture}[every node/.style={align=center,let hyphenation}]
478
479   \foreach \smitem [count=\xi] in {#2} {\global\let\maxsmitem\xi}
480
481   \foreach \smitem [count=\xi] in {#2}{%
482   \IfStrEq{\option}{clockwise}{% true-clockwise-circular diagram
483     \pgfmathtruncatemacro{\angle}{180+360/\maxsmitem*\xi}
484   }{% false-clockwise-circular diagram
485     \pgfmathtruncatemacro{\angle}{360/\maxsmitem*\xi}
486   }
487   \edef\col{\@nameuse{color@\xi}}
488   \IfStrEq{\option}{clockwise}{% true-clockwise-circular diagram
489     \node[module,drop shadow] (module\xi)
490       at (-\angle:\sm@core@circulardistance) {\smitem };
491   }{% false-clockwise-circular diagram
492     \node[module,drop shadow] (module\xi)
493       at (\angle:\sm@core@circulardistance) {\smitem };
494   }
495   }%
496   \foreach \smitem [count=\xi] in {#2}{%
497   \ifnum\xi=\maxsmitem
498     \ifcircularfinalarrowdisabled
499       \relax
500     \else
501       \pgfmathtruncatemacro{xj}{mod(\xi, \maxsmitem) + 1}}
```

```

502     \edef\col{\@nameuse{color@\xj}}
503     \IfStrEq{\option}{clockwise}{% true-clockwise-circular diagram
504         \draw[diagram arrow type,shorten <=0.3cm,shorten >=0.3cm]
505             (module\xj) to[bend right] (module\xi);
506     }{% false-clockwise-circular diagram
507         \draw[diagram arrow type,shorten <=0.3cm,shorten >=0.3cm]
508             (module\xj) to[bend left] (module\xi);
509     }
510     \fi
511 \else
512     \pgfmathtruncatemacro{\xj}{mod(\xi, \maxsitem) + 1}
513     \edef\col{\@nameuse{color@\xj}}
514     \IfStrEq{\option}{clockwise}{% true-clockwise-circular diagram
515         \draw[diagram arrow type,shorten <=0.3cm,shorten >=0.3cm]
516             (module\xj) to[bend right] (module\xi);
517     }{% false-clockwise-circular diagram
518         \draw[diagram arrow type,shorten <=0.3cm,shorten >=0.3cm]
519             (module\xj) to[bend left] (module\xi);
520     }
521
522 \fi
523 }%
524 \end{tikzpicture}
525 }{% end-circular diagram
526 \IfStrEq{\diagramtype}{flow diagram}{% true-flow diagram
527     \begin{tikzpicture}[every node/.style={align=center,let hyphenation}]
528
529     \foreach \sitem [count=\xi] in {\#2} {\global\let\maxsitem\xi}
530
531     \foreach \sitem [count=\xi] in {\#2}{%
532         \edef\col{\@nameuse{color@\xi}}
533         \IfStrEq{\option}{horizontal}{% true-horizontal-flow diagram
534             \path let \n1 = {int(0-\xi)}, \n2={0+\xi*\sm@core@modulexsep} in
535                 node[module,drop shadow] (module\xi) at +(\n2,0) {\sitem};
536         }{% false-horizontal-flow diagram
537             \path let \n1 = {int(0-\xi)}, \n2={0-\xi*\sm@core@moduleysep} in
538                 node[module,drop shadow] (module\xi) at +(0,\n2) {\sitem};
539         }
540     }%
541
542     \foreach \sitem [count=\xi] in {\#2}{%
543         \pgfmathtruncatemacro{\xj}{mod(\xi, \maxsitem) + 1}
544         \edef\col{\@nameuse{color@\xj}}
545         \ifnum\xi<\maxsitem
546             \begin{pgfonlayer}{smart diagram arrow back}
547             \draw[diagram arrow type] (module\xj) -- (module\xi);
548             \end{pgfonlayer}
549         \fi
550         % last arrow - not display it in background - check if disabled
551         \ifbackarrowdisabled

```

```

552     \relax
553   \else
554     \ifnum\xi=\maxsmitem
555       \IfStrEq{\option}{horizontal}{% true-horizontal-flow diagram
556         \tikzset{square arrow/.style={%
557           to path={-- ++(0,\sm@core@backarrowdistance) -| (\tikztotarget)}}
558         }%
559       }%
560       \draw[diagram arrow type, square arrow]
561         (module\xj.north) to (module\xi.north);
562     }{% false-horizontal-flow diagram
563       \tikzset{square arrow/.style={%
564         to path={-- ++(\sm@core@backarrowdistance,0) |- (\tikztotarget)}}
565       }%
566     }%
567     \draw[diagram arrow type,square arrow]
568       (module\xj.east) to (module\xi);
569   }%
570   \fi
571 \fi
572 }%
573 \end{tikzpicture}
574 }{% end-flow diagram
575 \IfStrEq{\diagramtype}{descriptive diagram}{% true-descr. diagram
576   \begin{tikzpicture}[every node/.style={align=center,let hyphenation}]
577     \foreach \smitem [count=\xi] in {#2}{%
578       \edef\col{\@nameuse{color@\xi}}
579       \foreach \subitem [count=\xii] in \smitem{%
580         \ifnumequal{\xii}{1}{% true
581           \node[description title,drop shadow]
582             (module-title\xi) at (0,0-\xi*\sm@core@descriptiveitemsysep) {\subitem};
583         }{
584           \ifnumequal{\xii}{2}{% true
585             \node[description,drop shadow](module\xi)
586               at (0,0-\xi*\sm@core@descriptiveitemsysep) {\subitem};
587           }{
588             }%
589           }%
590         \end{tikzpicture}
591       }{% end-descr. diagram
592       \IfStrEq{\diagramtype}{bubble diagram}{% true-bubble diagram
593         \begin{tikzpicture}[every node/.style={align=center,let hyphenation}]
594           \foreach \smitem [count=\xi] in {#2}{\global\let\maxsmitem\xi
595             \pgfmathtruncatemacro\actualnumitem{\maxsmitem-1}
596             \foreach \smitem [count=\xi] in {#2}{%
597               \ifnumequal{\xi}{1}{% true
598                 \node[bubble center node](center bubble){\smitem};
599               }{%false
600                 \pgfmathtruncatemacro\xj{\xi-1}
601                 \pgfmathtruncatemacro{\angle}{360/\actualnumitem*\xj}

```

```

602 \edef\col{\@nameuse{color@\xj}}
603 \node[bubble node] (module\xi)
604   at (center bubble.\angle) {\smitem };
605 }%
606 }%
607 \end{tikzpicture}
608 }{}%end-bubble diagram
609 \IfStrEq{\diagramtype}{constellation diagram}{% true-const diagram
610 \begin{tikzpicture}[every node/.style={align=center,let hypenation}]
611 \foreach \smitem [count=\xi] in {#2}{\global\let\maxsmitem\xi}
612 \pgfmathtruncatemacro\actualnumitem{\maxsmitem-1}
613 \foreach \smitem [count=\xi] in {#2}{%
614 \ifnumequal{\xi}{1}{ %true
615 \node[planet] (planet){\smitem};
616 }{%false
617 \pgfmathtruncatemacro{\xj}{\xi-1}
618 \pgfmathtruncatemacro{\angle}{360/\actualnumitem*\xj}
619 \edef\col{\@nameuse{color@\xj}}
620 \node[satellite] (satellite\xi)
621   at (\angle:\sm@core@distanceplanetsatellite) {\smitem };
622 \draw[connection planet satellite] (planet) -- (satellite\xi);
623 }%
624 }%
625 \end{tikzpicture}
626 }{}%end-const diagram
627 \IfStrEq{\diagramtype}{connected constellation diagram}{% true-conn const diagram
628 \begin{tikzpicture}[every node/.style={align=center,let hypenation}]
629 \foreach \smitem [count=\xi] in {#2}{\global\let\maxsmitem\xi}
630 \pgfmathtruncatemacro\actualnumitem{\maxsmitem-1}
631 \foreach \smitem [count=\xi] in {#2}{%
632 \ifnumequal{\xi}{1}{ %true
633 \node[planet] (planet){\smitem};
634 }{%false
635 \pgfmathtruncatemacro{\xj}{\xi-1}
636 \pgfmathtruncatemacro{\angle}{360/\actualnumitem*\xj}
637 \edef\col{\@nameuse{color@\xj}}
638 \node[satellite] (satellite\xj)
639   at (\angle:\sm@core@distanceplanetsatellite) {\smitem };
640 }%
641 }%
642 \foreach \smitem [count=\xi] in {#2}{%
643 \ifnumgreater{\xi}{1}{ %true
644 \pgfmathtruncatemacro{\xj}{\xi-1}
645 \edef\col{\@nameuse{color@\xj}}
646 \pgfmathtruncatemacro{\xk}{mod(\xj,\actualnumitem) +1}
647 \path[connection planet satellite,-]
648   (satellite\xj) edge[bend right] (satellite\xk);
649 }{}
650 }%
651 \end{tikzpicture}

```

```

652 }{}%end-connected constellation diagram
653 \IfStrEq{\diagramtype}{priority descriptive diagram}{% true-priority descriptive diagram
654 \pgfmathparse{subtract(\sm@core@priorityarrowwidth,\sm@core@priorityarrowheadextend)}
655 \pgfmathsetmacro\sm@core@priorityticksize{\pgfmathresult/2}
656 \pgfmathsetmacro\arrowtickxshift{(\sm@core@priorityarrowwidth-\sm@core@priorityticksize)/2}
657 \begin{tikzpicture}[every node/.style={align=center,let hyphenation}]
658 \foreach \smitem [count=\xi] in {#2}{\global\let\maxsmitem\xi}
659 \foreach \smitem [count=\xi] in {#2}{%
660 \edef\col{\@nameuse{color@\xi}}
661 \node[description,drop shadow](module\xi)
662 at (0,0+\xi*\sm@core@descriptiveitemsysep) {\smitem};
663 \draw[line width=\sm@core@prioritytick,\col]
664 ([xshift=-\arrowtickxshift pt]module\xi.base west)--
665 ($([xshift=-\arrowtickxshift pt]module\xi.base west)-(\sm@core@priorityticksize pt,0)$);
666 }%
667 \coordinate (A) at (module1);
668 \coordinate (B) at (module\maxsmitem);
669 \CalcHeight(A,B){heightmodules}
670 \pgfmathadd{\heightmodules}{\sm@core@priorityarrowheightadvance}
671 \pgfmathsetmacro{\distancemodules}{\pgfmathresult}
672 \pgfmathsetmacro\arrowxshift{\sm@core@priorityarrowwidth/2}
673 \begin{pgfonlayer}{background}
674 \node[priority arrow] at ([xshift=-\arrowxshift pt]module1.south west){};
675 \end{pgfonlayer}
676 \end{tikzpicture}
677 }{}% end-priority descriptive diagram
678 \IfStrEq{\diagramtype}{sequence diagram}{% true-sequence diagram
679 \begin{tikzpicture}[every node/.style={align=center,let hyphenation}]
680 \foreach \x[count=\xi, count=\prevx from 0] in {#2}{%
681 \edef\col{\@nameuse{color@\xi}}
682 \ifnum\xi=1
683 \node[sequence item] (sequence-item\xi) {\x};
684 \else
685 \node[sequence item,anchor=west] (sequence-item\xi) at (sequence-item\prevx.east) {\x};
686 \fi
687 }
688 \end{tikzpicture}
689 }{}% end-sequence diagram
690 }% end-no value 1
691 }% end-command

```

The command definition for the animated diagrams:

```

692 \NewDocumentCommand{\smartdiagramanimated}{r[] m}{%
693 \StrCut{#1}{:}\diagramtype\option
694 \IfNoValueTF{#1}{% true-no value 1
695 \PackageError{smartdiagram}{Type of the diagram not inserted. Please insert it}
696 {Example: \protect\smartdiagram[flow diagram]}}
697 {%false-no value 1
698 \IfStrEq{\diagramtype}{%
699 \PackageError{smartdiagram}{Type of the diagram not inserted. Please insert it}

```

```

700     {Example: \protect\smartdiagram[flow diagram]}
701   }{}
702   \IfStrEq{\diagramtype}{circular diagram}{% true-circular diagram
703   \begin{tikzpicture}[every node/.style={align=center,let hypenation}]
704   \foreach \smitem [count=\xi] in {#2} {\global\let\maxsmitem\xi}
705   \foreach \smitem [count=\xi] in {#2}{%
706   \IfStrEq{\option}{clockwise}{% true-clockwise-circular diagram
707     \pgfmathtruncatemacro{\angle}{180+360/\maxsmitem*\xi}
708   }{% false-clockwise-circular diagram
709     \pgfmathtruncatemacro{\angle}{360/\maxsmitem*\xi}
710   }
711   \edef\col{\@nameuse{color@\xi}}
712   \IfStrEq{\option}{clockwise}{% true-clockwise-circular diagram
713     \node[module,
714       drop shadow={smvisible on=<\xi->},
715       smvisible on=<\xi->] (module\xi)
716       at (-\angle:\sm@core@circulardistance) {\smitem};
717   }{% false-clockwise-circular diagram
718     \node[module,
719       drop shadow={smvisible on=<\xi->},
720       smvisible on=<\xi->] (module\xi)
721       at (\angle:\sm@core@circulardistance) {\smitem};
722   }
723   }%
724   \foreach \smitem [count=\xi] in {#2}{%
725   \ifnum\xi=\maxsmitem
726     \ifcircularfinalarrowdisabled
727       \relax
728     \else
729       \pgfmathtruncatemacro{\xj}{mod(\xi, \maxsmitem) + 1)}
730       \pgfmathtruncatemacro{\adv}{\xi + 1)}
731       \edef\col{\@nameuse{color@\xj}}
732       \IfStrEq{\option}{clockwise}{% true-clockwise-circular diagram
733         \draw[diagram arrow type,shorten <=0.3cm,shorten >=0.3cm,
734           smvisible on=<\adv->]
735           (module\xj) to[bend right] (module\xi);
736       }{% false-clockwise-circular diagram
737         \draw[diagram arrow type,shorten <=0.3cm,shorten >=0.3cm,
738           smvisible on=<\adv->]
739           (module\xj) to[bend left] (module\xi);
740       }
741     \fi
742   \else
743     \pgfmathtruncatemacro{\xj}{mod(\xi, \maxsmitem) + 1)}
744     \pgfmathtruncatemacro{\adv}{\xi + 1)}
745     \edef\col{\@nameuse{color@\xj}}
746     \IfStrEq{\option}{clockwise}{% true-clockwise-circular diagram
747       \draw[diagram arrow type,shorten <=0.3cm,shorten >=0.3cm,
748         smvisible on=<\adv->]
749       (module\xj) to[bend right] (module\xi);

```



```

750     }{% false-clockwise-circular diagram
751         \draw[diagram arrow type,shorten <=0.3cm,shorten >=0.3cm,
752             smvisible on=<\adv->]
753             (module\xj) to[bend left] (module\xi);
754     }
755
756 \fi
757 }%
758 \end{tikzpicture}
759 }{% end-circular diagram
760 \IfStrEq{\diagramtype}{flow diagram}{% true-flow diagram
761 \begin{tikzpicture}[every node/.style={align=center,let hyphenation}]
762
763 \foreach \smitem [count=\xi] in {#2} {\global\let\maxsmitem\xi}
764
765 \foreach \smitem [count=\xi] in {#2}{%
766 \edef\col{\@nameuse{color@\xi}}
767 \IfStrEq{\option}{horizontal}{% true-horizontal-flow diagram
768     \path let \n1 = {int(0-\xi)}, \n2={0+\xi*\sm@core@modulexsep}
769         in node[module,drop shadow={smvisible on=<\xi->},
770             smvisible on=<\xi->] (module\xi) at +(\n2,0) {\smitem};
771 }{% false-horizontal-flow diagram
772     \path let \n1 = {int(0-\xi)}, \n2={0-\xi*\sm@core@moduleysep}
773         in node[module,drop shadow={smvisible on=<\xi->},
774             smvisible on=<\xi->] (module\xi) at +(0,\n2) {\smitem};
775 }
776 }%
777
778 \foreach \smitem [count=\xi] in {#2}{%
779 \pgfmathtruncatemacro{xj}{mod(\xi, \maxsmitem) + 1}}
780 \edef\col{\@nameuse{color@\xj}}
781 \ifnum\xi<\maxsmitem
782 \begin{pgfonlayer}{smart diagram arrow back}
783 \draw[diagram arrow type,smvisible on=<\xi->]
784     (module\xj) -- (module\xi);
785 \end{pgfonlayer}
786 \fi
787 % last arrow - not display it in background - check if disabled
788 \ifbackarrowdisabled
789     \relax
790 \else
791     \ifnum\xi=\maxsmitem
792         \IfStrEq{\option}{horizontal}{% true-horizontal-flow diagram
793             \tikzset{square arrow/.style={
794                 to path={-- ++(0,\sm@core@backarrowdistance) -| (\tikztotarget)}
795             }}
796         }
797         \draw[diagram arrow type, square arrow,smvisible on=<\xi->]
798             (module\xj.north) to (module\xi.north);
799     }{% false-horizontal-flow diagram

```

```

800         \tikzset{square arrow/.style={
801             to path={-- ++(\sm@core@backarrowdistance,0) |- (\tikztotarget)}
802         }
803     }
804     \draw[diagram arrow type,square arrow,smvisible on=<\xi->]
805         (module\xj.east) to (module\xi);
806     }
807     \fi
808     \fi
809 }%
810 \end{tikzpicture}
811 }{}% end-flow diagram
812 \IfStrEq{\diagramtype}{descriptive diagram}{% true-descriptive diagram
813 \begin{tikzpicture}[every node/.style={align=center,let hyphenation}]
814 \foreach \smitem [count=\xi] in {#2}{%
815 \edef\col{\@nameuse{color@\xi}}
816
817 \foreach \subitem [count=\xii] in \smitem{%
818     \pgfmathtruncatemacro\subitemvisible{\xi}
819     \ifnumequal{\xii}{1}{% true
820 \node[description title,drop shadow, smvisible on=<\subitemvisible->]
821 (module-title\xi) at (0,0-\xi*\sm@core@descriptiveitemsysep) {\subitem};\pause
822 }{}
823 \ifnumequal{\xii}{2}{% true
824 \node[description,drop shadow,smvisible on=<\subitemvisible->]
825 (module\xi)at (0,0-\xi*\sm@core@descriptiveitemsysep) {\subitem};\pause
826 }{}
827 }%
828 }%
829 \end{tikzpicture}
830 }{}% end-descriptive diagram
831 \IfStrEq{\diagramtype}{bubble diagram}{% true-bubble diagram
832 \begin{tikzpicture}[every node/.style={align=center,let hyphenation}]
833 \foreach \smitem [count=\xi] in {#2}{\global\let\maxsmitem\xi}
834 \pgfmathtruncatemacro\actualnumitem{\maxsmitem-1}
835 \foreach \smitem [count=\xi] in {#2}{%
836 \ifnumequal{\xi}{1}{% true
837 \node[bubble center node, smvisible on=<\xi->](center bubble){\smitem};
838 }{%false
839 \pgfmathtruncatemacro\xj{\xi-1}
840 \pgfmathtruncatemacro\angle{360/\actualnumitem*\xj}
841 \edef\col{\@nameuse{color@\xj}}
842 \node[bubble node, smvisible on=<\xi->](module\xi)
843     at (center bubble.\angle) {\smitem };
844 }%
845 }%
846 \end{tikzpicture}
847 }{}%end-bubble diagram
848 \IfStrEq{\diagramtype}{constellation diagram}{% true-const diagram
849 \begin{tikzpicture}[every node/.style={align=center,let hyphenation}]

```

```

850 \foreach \smitem [count=\xi] in {#2}{\global\let\maxsmitem\xi}
851 \pgfmathtruncatemacro\actualnumitem{\maxsmitem-1}
852 \foreach \smitem [count=\xi] in {#2}{%
853 \ifnumequal{\xi}{1}{ %true
854 \node[planet, smvisible on=<\xi->](planet){\smitem};
855 }{%false
856 \pgfmathtruncatemacro{xj}{\xi-1}
857 \pgfmathtruncatemacro{angle}{360/\actualnumitem*xj}
858 \edef\col{\@nameuse{color@\xj}}
859 \node[satellite, smvisible on=<\xi->] (satellite\xi)
860 at (\angle:\sm@core@distanceplanetsatellite) {\smitem };
861 \draw[connection planet satellite, smvisible on=<\xi->]
862 (planet) -- (satellite\xi);
863 }%
864 }%
865 \end{tikzpicture}
866 }{%end-constellation diagram
867 \IfStrEq{\diagramtype}{connected constellation diagram}{% true-conn const diagram
868 \begin{tikzpicture}[every node/.style={align=center,let hyphenation}]
869 \foreach \smitem [count=\xi] in {#2}{\global\let\maxsmitem\xi}
870 \pgfmathtruncatemacro\actualnumitem{\maxsmitem-1}
871 \foreach \smitem [count=\xi] in {#2}{%
872 \ifnumequal{\xi}{1}{ %true
873 \node[planet,smvisible on=<\xi->](planet){\smitem};
874 }{%false
875 \pgfmathtruncatemacro{xj}{\xi-1}
876 \pgfmathtruncatemacro{angle}{360/\actualnumitem*xj}
877 \edef\col{\@nameuse{color@\xj}}
878 \node[satellite,smvisible on=<\xi->] (satellite\xj)
879 at (\angle:\sm@core@distanceplanetsatellite) {\smitem };
880 }%
881 }%
882 \foreach \smitem [count=\xi] in {#2}{%
883 \ifnumgreater{\xi}{1}{ %true
884 \pgfmathtruncatemacro{xj}{\xi-1}
885 \edef\col{\@nameuse{color@\xj}}
886 \pgfmathtruncatemacro{xk}{mod(\xj,\actualnumitem) +1}
887 \pgfmathtruncatemacro{smvisible}{\xi+1}
888 \path[connection planet satellite,-,smvisible on=<\smvisible->]
889 (satellite\xj) edge[bend right] (satellite\xk);
890 }{ }
891 }%
892 \end{tikzpicture}
893 }{%end-connected constellation diagram
894 \IfStrEq{\diagramtype}{priority descriptive diagram}{% true-priority descriptive diagram
895 \pgfmathparse{subtract(\sm@core@priorityarrowwidth,\sm@core@priorityarrowheadextend)}
896 \pgfmathsetmacro\sm@core@priorityticksize{\pgfmathresult/2}
897 \pgfmathsetmacro\arrowtickxshift{(\sm@core@priorityarrowwidth-\sm@core@priorityticksize)/2}
898 \begin{tikzpicture}[every node/.style={align=center,let hyphenation}]
899 \foreach \smitem [count=\xi] in {#2}{\global\let\maxsmitem\xi}

```

```

900 \foreach \smitem [count=\xi] in {#2}{%
901 \edef\col{\@nameuse{color@\xi}}
902 \pgfmathtruncatemacro\smvisible{\xi+1}
903 \node[description,drop shadow={\smvisible on=<\smvisible->},smvisible on=<\smvisible->]
904 (module\xi) at (0,0+\xi*\sm@core@descriptiveitemsysep) {\smitem};
905 \draw[line width=\sm@core@prioritytick,\col,smvisible on=<\smvisible->]
906 ([xshift=-\arrowtickxshift pt]module\xi.base west)--
907 ($([xshift=-\arrowtickxshift pt]module\xi.base west)-(\sm@core@priorityticksize pt,0)$);
908 }%
909 \coordinate (A) at (module1);
910 \coordinate (B) at (module\maxsmitem);
911 \CalcHeight(A,B){heightmodules}
912 \pgfmathadd{\heightmodules}{\sm@core@priorityarrowheightadvance}
913 \pgfmathsetmacro{\distancemodules}{\pgfmathresult}
914 \pgfmathsetmacro{\arrowxshift}{\sm@core@priorityarrowwidth/2}
915 \begin{pgfonlayer}{background}
916 \node[priority arrow] at ([xshift=-\arrowxshift pt]module1.south west){};
917 \end{pgfonlayer}
918 \end{tikzpicture}
919 }{}% end-priority descriptive diagram
920 \IfStrEq{\diagramtype}{sequence diagram}{% true-sequence diagram
921 \begin{tikzpicture}[every node/.style={align=center,let hyphenation}]
922 \foreach \x[count=\xi, count=\prevx from 0] in {#2}{%
923 \edef\col{\@nameuse{color@\xi}}
924 \ifnum\xi=1
925 \node[sequence item,smvisible on=<\xi->] (sequence-item\xi) {\x};
926 \else
927 \node[sequence item,anchor=west,smvisible on=<\xi->]
928 (sequence-item\xi) at (sequence-item\prevx.east) {\x};
929 \fi
930 }
931 \end{tikzpicture}
932 }{}% end-sequence diagram
933 }% end-no value 1
934 }% end-command

```

8.4 Library Additions

The library at first loads the TikZ library **positioning**.

```
935 \usetikzlibrary{positioning}
```

Key definition:

```

936 \pgfkeys{/smart diagram/additions/.cd,
937 additional item shape/.initial=\pgfkeysvalueof{/smart diagram/module shape},
938 additional item shape/.get=\sm@additions@additionalitemshape,
939 additional item shape/.store in=\sm@additions@additionalitemshape,
940 additional item border color/.initial=none,
941 additional item border color/.get=\sm@additions@additionalitembordercolor,
942 additional item border color/.store in=\sm@additions@additionalitembordercolor,
943 additional item bottom color/.initial=white,

```

```

944 additional item bottom color/.get=\sm@additions@additionalitembottomcolor,
945 additional item bottom color/.store in=\sm@additions@additionalitembottomcolor,
946 additional item fill color/.initial=none,
947 additional item fill color/.get=\sm@additions@additionalitemfillcolor,
948 additional item fill color/.store in=\sm@additions@additionalitemfillcolor,
949 additional item text width/.initial=1.75cm,
950 additional item text width/.get=\sm@additions@additionalitemtextwidth,
951 additional item text width/.store in=\sm@additions@additionalitemtextwidth,
952 additional item width/.initial=2cm,
953 additional item width/.get=\sm@additions@additionalitemwidth,
954 additional item width/.store in=\sm@additions@additionalitemwidth,
955 additional item height/.initial=1cm,
956 additional item height/.get=\sm@additions@additionalitemheight,
957 additional item height/.store in=\sm@additions@additionalitemheight,
958 additional item font/.initial=\normalfont,
959 additional item font/.get=\sm@additions@additionalitemfont,
960 additional item font/.store in=\sm@additions@additionalitemfont,
961 additional item border decoration/.initial={},
962 additional item border decoration/.get=\sm@additions@additionalitemdecoration,
963 additional item border decoration/.store in=\sm@additions@additionalitemdecoration,
964 additional item offset/.initial={0.25cm},
965 additional item offset/.get=\sm@additions@additionalitemoffset,
966 additional item offset/.store in=\sm@additions@additionalitemoffset,
967 additional item fill opacity/.initial={1},
968 additional item fill opacity/.get=\sm@additions@additionalitemfilloppacity,
969 additional item fill opacity/.store in=\sm@additions@additionalitemfilloppacity,
970 additional item text opacity/.initial={1},
971 additional item text opacity/.get=\sm@additions@additionalitemtextopacity,
972 additional item text opacity/.store in=\sm@additions@additionalitemtextopacity,
973 additional arrow tip/.initial={stealth},
974 additional arrow tip/.get=\sm@additions@additionalarrowtip,
975 additional arrow tip/.store in=\sm@additions@additionalarrowtip,
976 additional arrow line width/.initial={0.1cm},
977 additional arrow line width/.get=\sm@additions@additionalarrowlinewidth,
978 additional arrow line width/.store in=\sm@additions@additionalarrowlinewidth,
979 additional arrow color/.initial={gray},
980 additional arrow color/.get=\sm@additions@additionalarrowcolor,
981 additional arrow color/.store in=\sm@additions@additionalarrowcolor,
982 additional arrow style/.initial={->},
983 additional arrow style/.get=\sm@additions@additionalarrowstyle,
984 additional arrow style/.store in=\sm@additions@additionalarrowstyle,
985 additional item shadow/.initial={},
986 additional item shadow/.get=\sm@additions@additionalitemshadow,
987 additional item shadow/.store in=\sm@additions@additionalitemshadow,
988 }
989
990 \newif\ifconnectionsdisabled
991 \pgfkeys{/smart diagram/additions/.cd,
992   additional connections disabled/.is if=connectionsdisabled,
993   additional connections disabled=true,

```

```

994 }
995
996 \pgfkeys{/smart diagram/.cd,
997   additions/.style={/smart diagram/additions/.cd,#1}%
998 }

```

Style definition; the additional item style comprises lot of usual TikZ options: it possible to select a coloring with a vertical shading or an uniform filling.

```

999 \tikzset{additional item/.style={
1000   align=center,
1001   \sm@additions@additionalitemshape,
1002   thick,
1003   draw=\sm@additions@additionalitembordercolor,
1004   top color=white,
1005   bottom color=\sm@additions@additionalitembottomcolor,
1006   postaction={fill=\sm@additions@additionalitemfillcolor},
1007   text width=\sm@additions@additionalitemtextwidth,
1008   minimum width=\sm@additions@additionalitemwidth,
1009   minimum height=\sm@additions@additionalitemheight,
1010   font=\sm@additions@additionalitemfont,
1011   fill opacity=\sm@additions@additionalitemfillopacity,
1012   text opacity=\sm@additions@additionalitemtextopacity,
1013   \sm@additions@additionalitemshadow,
1014   \sm@additions@additionalitemdecoration
1015 },
1016   additional item arrow type/.style={
1017     \sm@additions@additionalarrowstyle,
1018     >=\sm@additions@additionalarrowtip,
1019     line width=\sm@additions@additionalarrowlinewidth,
1020     \sm@additions@additionalarrowcolor
1021   },
1022 }

```

Command definition; at first the diagram is created with the usual command, then the foreach iterates in order to get additions. The additions' strings are cut by means of the package xstring and its macro \StrCut. Of course, to all the tikzpictures, the option remember picture is added.

```

1023 \NewDocumentCommand{\smartdiagramadd}{r[] m m}{
1024 \tikzstyle{every picture}+=[remember picture]
1025 \smartdiagram[#1]{#2}
1026 \begin{tikzpicture}[remember picture,overlay,
1027   every node/.style={align=center,let hyphenation}]
1028 \foreach \smitem [count=\xi] in {#2} {\global\let\numitems\xi}
1029 \foreach \smitem[count=\xi] in {#3}{
1030 \StrCut{\smitem}{/}\pos\textitem
1031 \StrCut{\pos}{\space of\space}\point\modulenum
1032 \node[additional item,
1033   \point=\sm@additions@additionalitemoffset of \modulenum]
1034   (additional-module\xi) {\textitem};
1035 \ifconnectionsdisabled
1036   \relax

```

```

1037 \else
1038   \begin{pgfonlayer}{smart diagram arrow back}
1039   \draw[additional item arrow type]
1040     (additional-module\xi) -- (\modulenum);
1041   \end{pgfonlayer}
1042 \fi
1043 }
1044 \end{tikzpicture}
1045 }

```

Definition of the command to connect additions with diagram modules:

```

1046 \NewDocumentCommand{\smartdiagramconnect}{m m}{%
1047   \begin{tikzpicture}[remember picture,overlay]
1048     \foreach \start/\end in {#2}
1049       \draw[additional item arrow type,#1]
1050         (\start) -- (\end);
1051   \end{tikzpicture}
1052 }

```