The smartdiagram package[*]

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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 Ti*k*Z. The idea cames out from this question on TeX.StackExchange.

Contents

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[*]This document corresponds to smartdiagram v0.3a, dated 2013/04/19; it is released under and subject to the LaTeX Project Public License (LPPL).

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 diplayed 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 diplayed as a flow chart;

- `flow diagram:horizontal`: the items in the list are diplayed 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 deployted based on their relevance;

- `bubble diagram`: each item is a bubble deployted 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 toghether;

- `sequence diagram`: the items in the list are diplayed 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:

Set up

Run

Modify /
Add
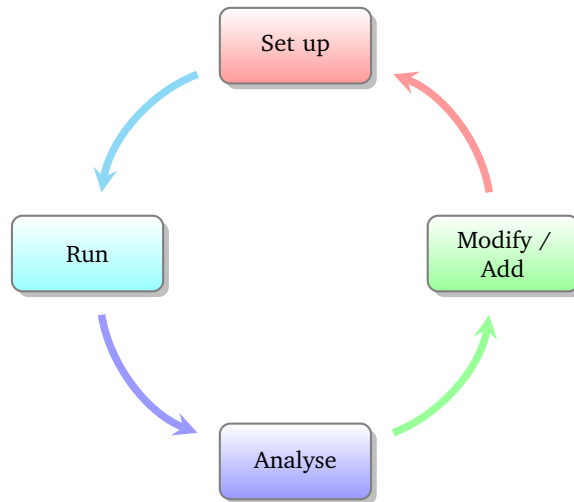
Analyse

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 {⟨*list of items*⟩} 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 availble also the `sequence diagram` which displays the {⟨*list of items*⟩} 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 Ti*k*Z (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`: `module``progressive-number` (no space or other symbols in between); example: `module1`;
- for the diagrams `flow diagram` and `flow diagram:horizontal`: `module``progressive-number`; example: `module3`;
- for the diagram `descriptive diagram`: `module-title``progressive-number` for titles and `module``progressive-number` for descriptions; example: `module-title1` and `module1`;
- for the diagram `bubble diagram`: `center bubble` for the center module and `module``progressive-number` for the other modules; example: `center bubble` and `module2`;
- for the diagrams `constellation diagram` and `connected constellation diagram`: `planet` for the center module and `satellite``progressive-number` for the other modules; example: `planet` and `satellite3`;
- for the diagram `priority descriptive diagram`: `module``progressive-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 Ti*k*Z 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:
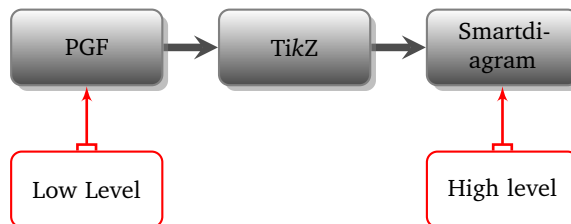
```
\begin{minipage}[t][3.5cm]{\textwidth}
\begin{center}
\smartdiagramset{
 uniform color list=gray!60!black for 3 items,
 back arrow disabled=true,
 additions={
  additional item offset=0.85cm,
  additional item border color=red,
  additional arrow color=red,
  additional arrow tip=stealth,
  additional 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:
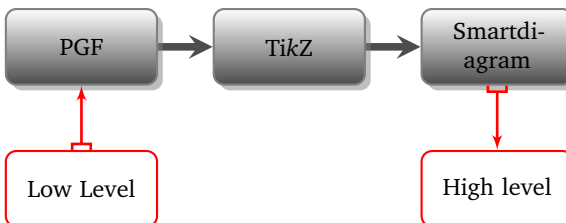
Because of the option `overlay`, it is better to protect within a `minipage` the diagram: in this way the missing bounding box update would not affect the subsequent/precedent text.

By default, the arrows are customized by the keys which start with `additional` (explained more in detail in the subsubsection 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;

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- `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 cirle 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 seems 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.
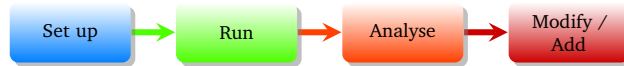
5   Gallery of examples

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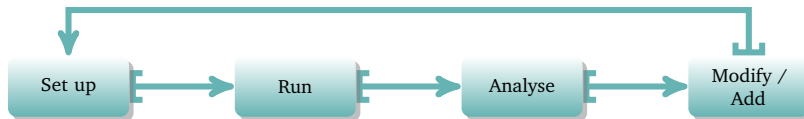
```
\smartdiagram[flow diagram:horizontal]{Set up,Run,Analyse,Modify~/ Add}
\end{center}
```

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

```
\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}
```

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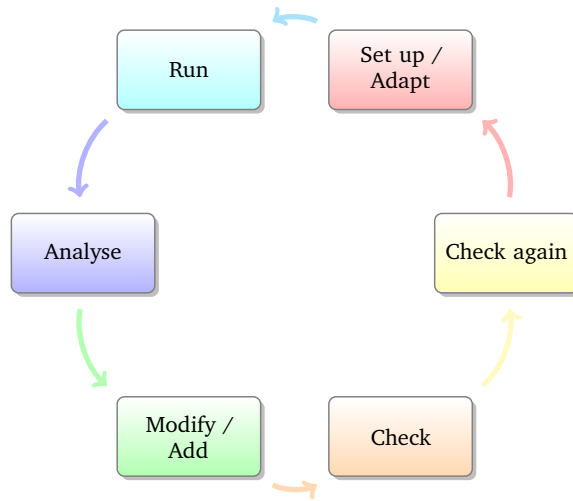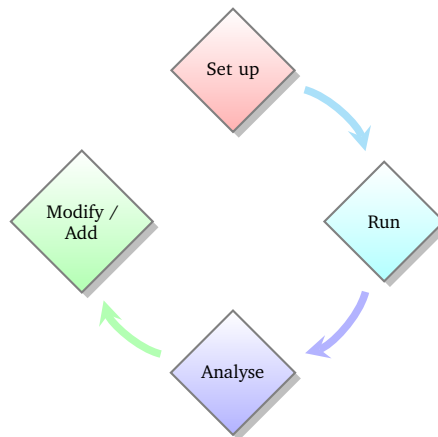
An example with a diamond shape and the final arrow disabled:

```
\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}
```
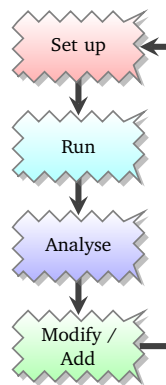
An example with a decorated shape and uniform arrow color:

```
\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}
```
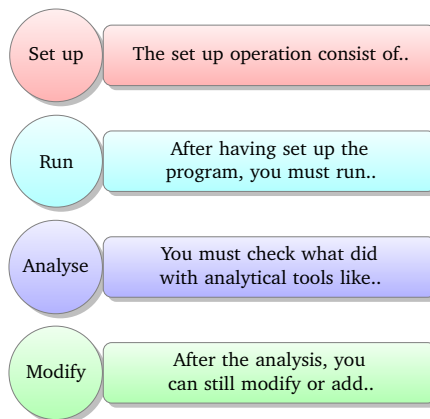
Bubble diagram   An example of bubble diagram:

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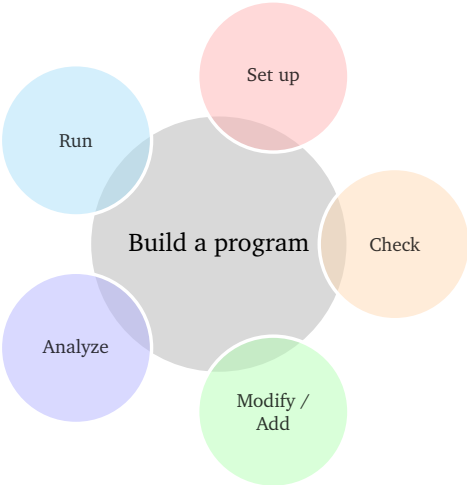

Constellation diagram   An example of constellation diagram:

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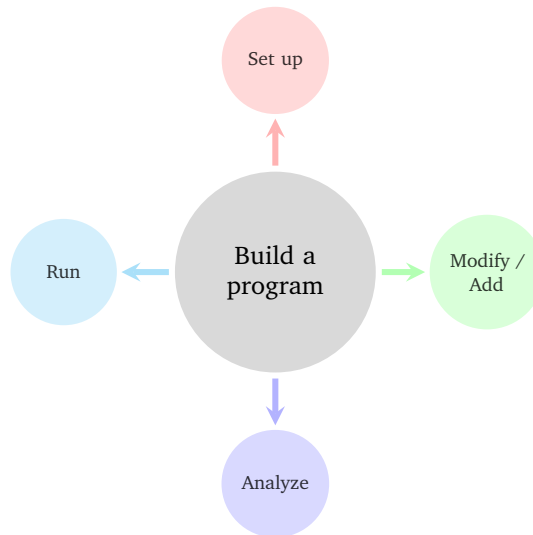
Constellation diagram with custom colors

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}
```
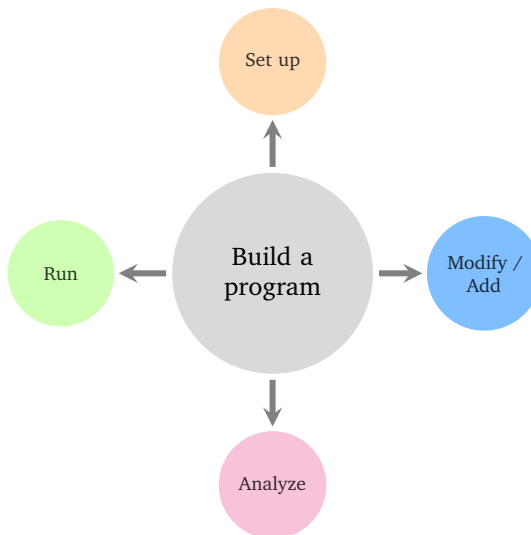
Connected constellation diagram   An example of connected constellation diagram:

```
\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}
```
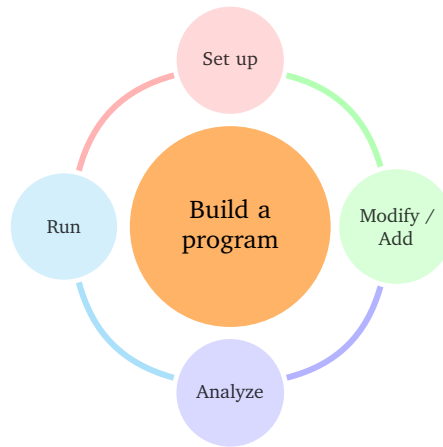

Priority descriptive diagram   An example of priority descriptive diagram describing that TikZ is built on top of PGF and Smartdiagram on top of TikZ:

```
\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,Ti\textit{k}Z,Smartdiagram}
\end{center}
```
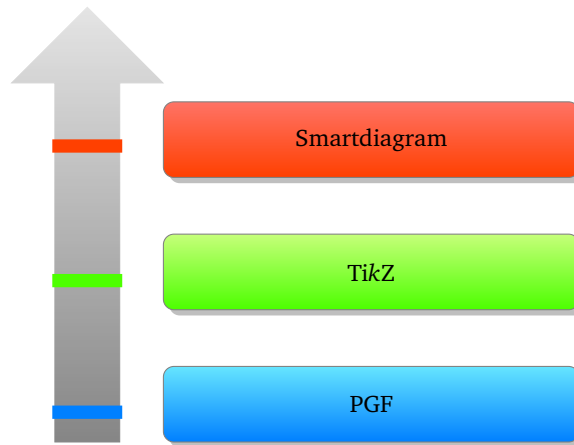
Sequence diagram The same previous example with a sequence diagram:

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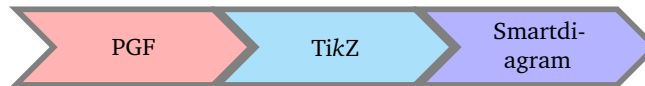

and with `uniform sequence color` set to true:

```
\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}
```
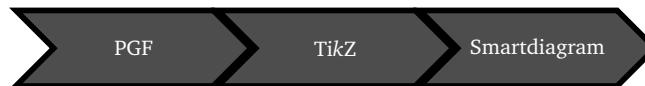

Put additions to a diagram Here is an example of a circular diagram with some additions:

```
\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}
```
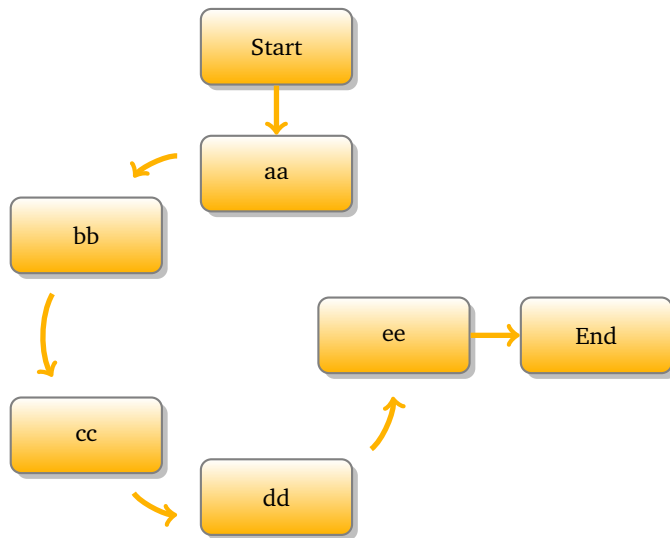
6 Recommendations and known issues

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}
```

PGF → Ti*k*Z → Smartdiagram

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 throught 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}
```
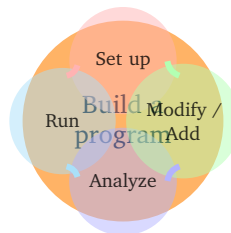
6.4 Descriptive diagrams

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 occurr 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}
```
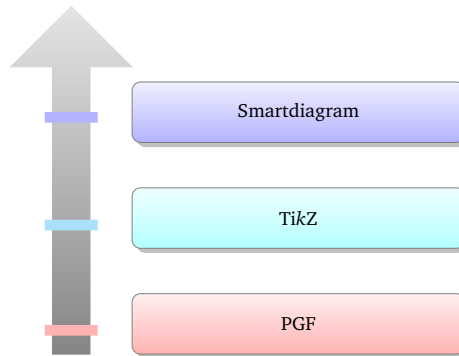
7 Aknowledgements

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.

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@@smartdiagraml
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\endcsnam
28    \expandafter\edef\csname smartdiagram@library@#1@atcode\endcsname{\the\catcode`\@}
29    \expandafter\edef\csname smartdiagram@library@#1@barcode\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@satellitetextopacity,
165     satellite text width/.get=\sm@core@satellitetextwidth,
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@satellitetextwidth,
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@satellitetextopacity,
424    text width=\sm@core@satellitetextwidth,
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 hypenate
452 \tikzset{let hypenation/.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 hypenation}]
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, \maxsmitem) + 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 hypenation}]
528
529    \foreach \smitem [count=\xi] in {#2}  {\global\let\maxsmitem\xi}
530
531    \foreach \smitem [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) {\smitem};
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) {\smitem};
539    }
540    }%
541
542    \foreach \smitem [count=\xi] in {#2}{%
543    \pgfmathtruncatemacro{\xj}{mod(\xi, \maxsmitem) + 1)}
544    \edef\col{\@nameuse{color@\xj}}
545    \ifnum\xi<\maxsmitem
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
```

36

```
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 hypenation}]
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 hypenation}]
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}
```

```latex
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 hypenation}]
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 hypenation}]
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 hypenation}]
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
```

41

```
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 hypenation}]
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 hypenation}]
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 hypenation}]
```

```
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 hypenation}]
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 hypenation}]
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 hypenation}]
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@additionalitemfillopacity,
969  additional item fill opacity/.store in=\sm@additions@additionalitemfillopacity,
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 Ti*k*Z 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 hypenation}]
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
```

46

```
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 }
```