

Single Day Event

Reusable UI components enable faster and easier automation

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Novartis

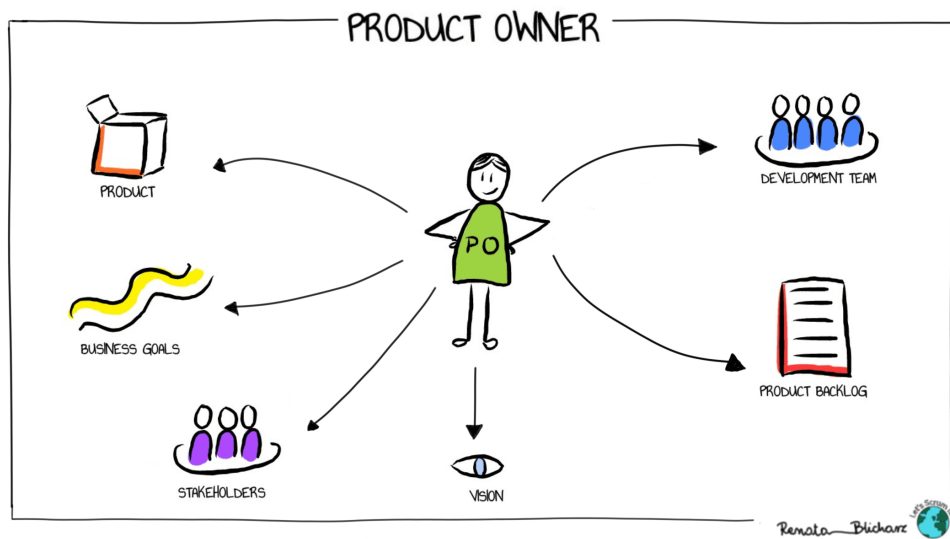


Content

- Design products, not tools
- How to design user interfaces
 - Desktop application
 - R Shiny
 - Web application
- Reusable UI components

Design products, not tools

How to design a popular product as a statistical programmer?





Design products, not tools

- Tool without UI

```
[wangch5s@GLCHBS-SP200209 ~]$ ./rtf2pdf.sh
Please enter the directory of your study (
```

```
Please select the category of RTF
1) All
2) Safety
3) Efficacy
4) PKPD
Use number to select a category: 2
You have chosen Safety
Converting RTF to PDF
9 of 95 rtf files have been converted to PDF
```

- Tool with UI

The image shows a graphical user interface (GUI) window titled "RTF to PDF". The window has a light gray background and standard window controls (minimize, maximize, close) in the top right corner. The main content area is white. At the top, it says "Please select your rtf files here" followed by a "Select files" button. Below this, it says "Please enter the final pdf file name below, e.g., out.pdf" followed by a text input field. Underneath the input field are two checkboxes: "Use short bookmarks" and "Delete intermediate pdf files". Below the checkboxes is a "Run" button. At the bottom of the window is a large, empty rectangular box, likely for displaying progress or output.



Design products, not tools

- Tool without UI

```
#-----preset variables
oldfile_name=input('please input old file name, e.g old.xlsx ')
newfile_name=input('please input new file name, e.g new.xlsx ')
unique1 = input('please input unique variable name with case sensitive, e.g Subject ')
unique2 = input('please input another unique variable name with case sensitive, e.g RecordId ')
#-----read excel for circle
wb_old = openpyxl.load_workbook(oldfile_name)
wb_new = openpyxl.load_workbook(newfile_name)
sheets_old = wb_old.sheetnames
sheets_new = wb_new.sheetnames
```

- Tool with UI

The screenshot shows the 'Spreadsheet Compare' web application. The header includes 'Data Review Toolkits', the title 'Spreadsheet Compare', and user information 'WANGCHSS' and 'NOVARTIS'. Below the header, there are buttons for 'Select Base File', 'Select Compare File', 'Clear Selection', and 'Reset All'. A 'Case sensitive' checkbox is checked, and a 'Start Compare (0 sheet selected)' button is visible. On the left, there are tabs for 'Config' and 'Overview'. The main area features a table with columns for file selection, sheet names, and comparison details. The table is currently empty, displaying a 'No Data' message with a folder icon.

#	Base File	Compare File	Sheet Name	Base		Compare		Key Column(s)	Excluded Columns	Carried Col	Action
				Row#	Column#	Row#	Column#				
No Data											



Design products, not tools

Benefits of a good UI

- Better operating experience
- Simpler user manuals
- Lower learning cost





How to design user interfaces

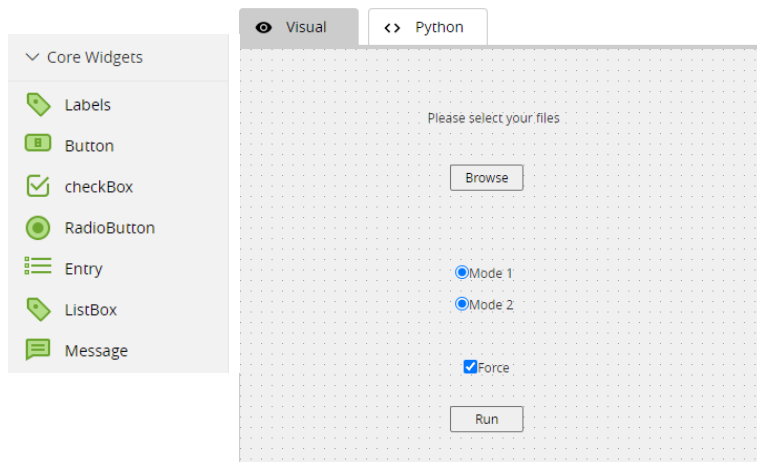
- Desktop application

Tkinter

+ Visual TK

Python
source code

```
from tkinter import *
from tkinter import ttk
root = Tk()
frm = ttk.Frame(root, padding=10)
frm.grid()
ttk.Label(frm, text="Hello World!").grid(column=0, row=0)
ttk.Button(frm, text="Quit", command=root.destroy).grid(column=1, row=0)
root.mainloop()
```



```
1 import tkinter as tk
2 import tkinter.font as tkFont
3
4 class App:
5     def __init__(self, root):
6         #Setting title
7         root.title('undefined')
8         #Setting window size
9         width=500
10        height=400
11        screenwidth = root.winfo_screenwidth()
12        screenheight = root.winfo_screenheight()
13        alignstr = '%dx%d+%d+%d' % (width, height, (screenwidth - width)/2, (screenheight - height)/2)
14        root.geometry(alignstr)
15        root.resizable(width=False, height=False)
16
17        GButton_312=tk.Button(root)
18        GButton_312["bg"] = "#f0f0f0"
19        ft = tkFont.Font(family='Times',size=10)
20        GButton_312["font"] = ft
21        GButton_312["fg"] = "#000000"
22        GButton_312["justify"] = "center"
23        GButton_312["text"] = "Run"
24        GButton_312.place(x=200,y=340,width=70,height=25)
25        GButton_312["command"] = self.GButton_312_command
```

Design UI
with mouse

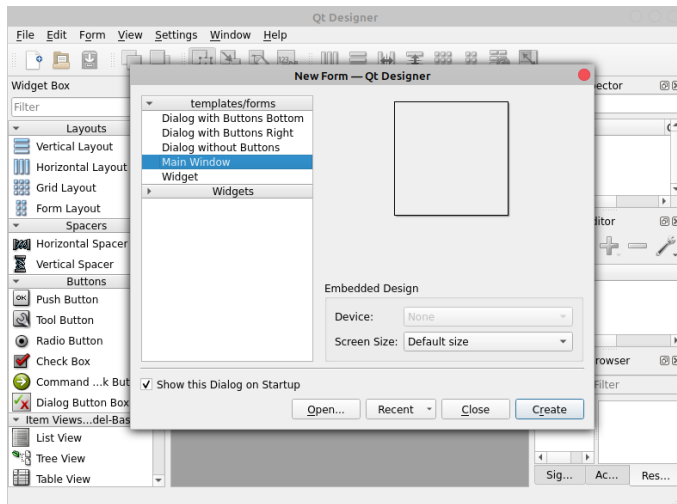


How to design user interfaces

- Desktop application

PyQT

+ designer



Pyinstaller



How to design user interfaces

- R Shiny

Shiny

Shinydashboard

shinywidgets

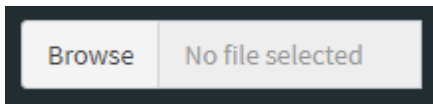
...



How to design user interfaces

- R Shiny

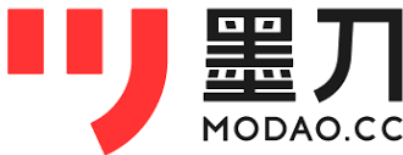
Customize with CSS



```
tags$style(type="text/css",  
  "#inputf, #inputf:active {  
    margin-left: 20px;  
    padding-left: 5px;  
  }  
"),
```

How to design user interfaces

- Web application
 - Design UI

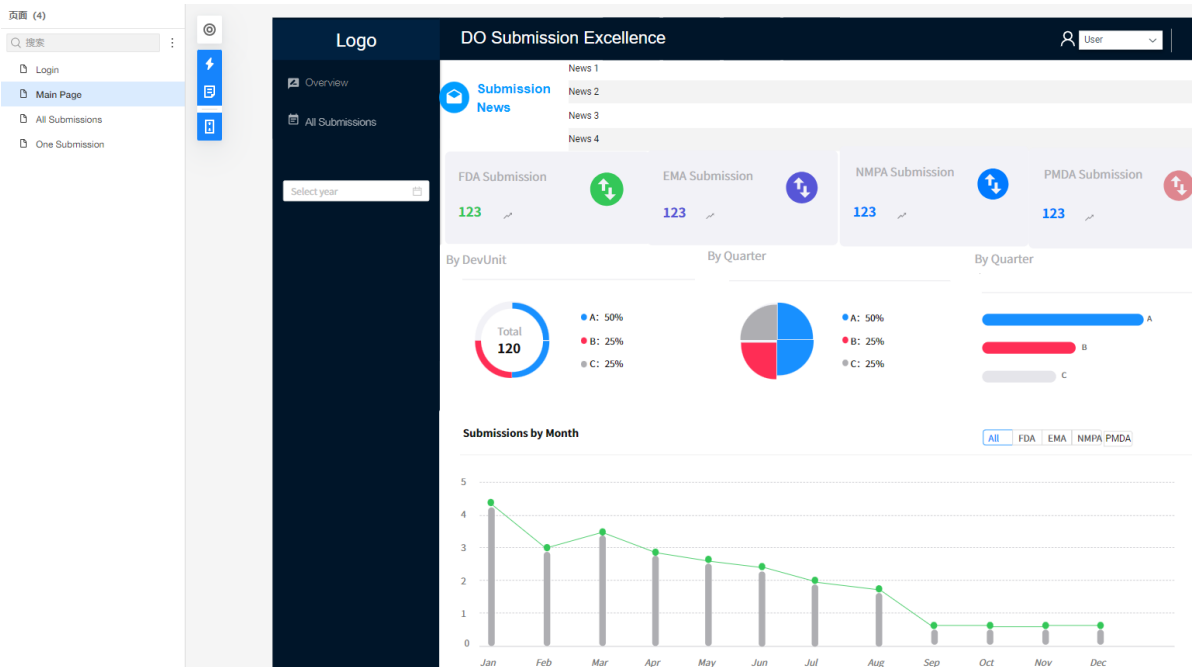


- Create UI



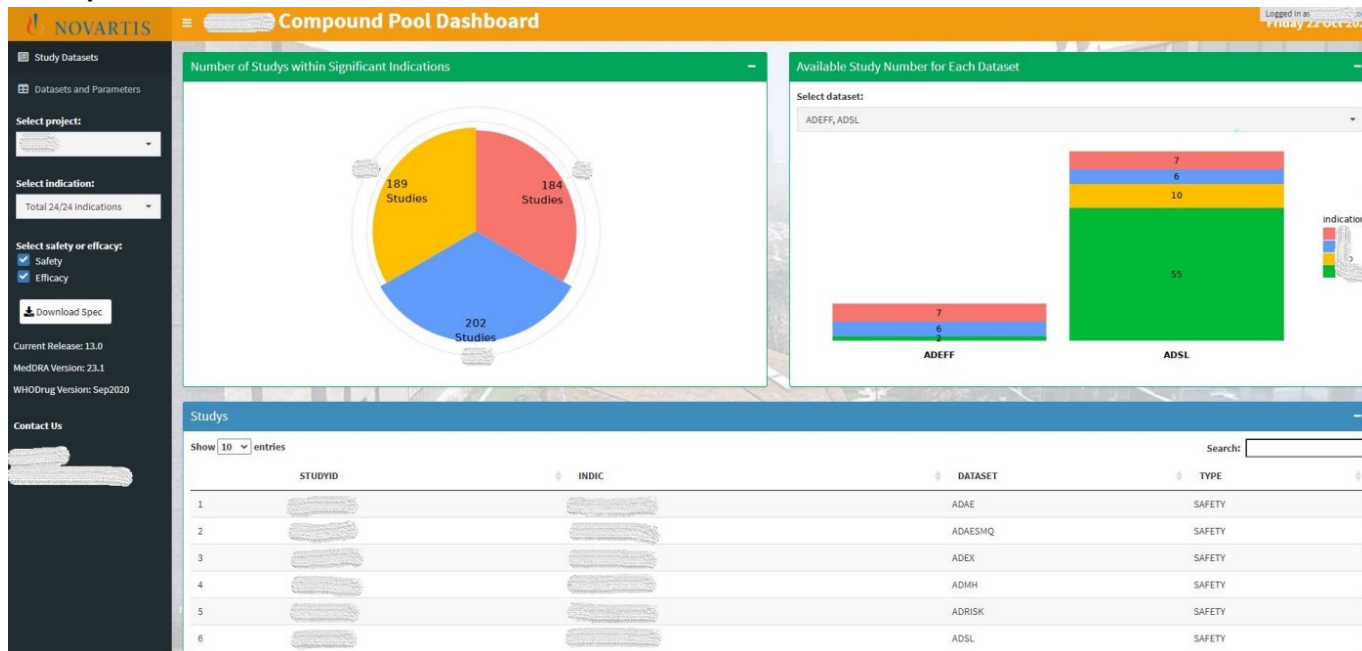
How to design user interfaces

- Web application



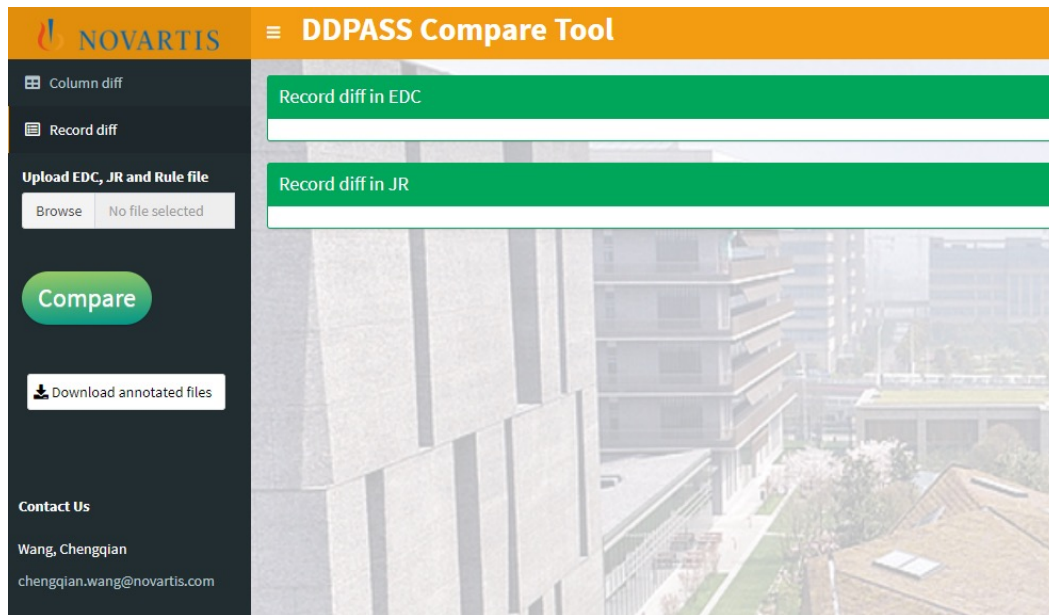
Reusable UI components

- R Shiny
 - Simple dashboard



Reusable UI components

- R Shiny
 - Spreadsheet compare tool





Reusable UI components

- Web application
 - Paper database

The screenshot displays the PHUSE Knowledge Library Paper database. On the left is a dark sidebar with a 'Knowledge Library' menu containing categories like 'All Knowledge', 'Data Standards', 'Submission', 'Programming' (highlighted), 'Graphics', 'CDISC SDTM', 'CDISC ADaM', 'Safety Analysis', 'Efficacy Analysis', 'Oncology Analysis', 'Coding Techniques', 'AI/ML/BI', 'Regulations', and 'Real World Data'. The main content area features a search bar with 'Zhijun' entered, a year filter dropdown set to '2021', and a table of results. The table has columns for selection, count, source, NKC, subject, link, year, and operations. It lists 24 papers, with the first three shown in detail.

	#	Source	NKC	Subject	Link	Year	Operation
+ ☐	16	PHARMASUG	NKC-PRG	AP034: From %Let to %Local: Methods, Use, and Scope of Macro Variables in SAS Programming	b	2021	e o d
+ ☐	17	PHARMASUG	NKC-PRG	AP053: A SAS Macro to Generate Slim Version of Define for RTOR	b	2021	e o d
+ ☐	18	PHARMASUG	NKC-PRG	AP066: Dynamic macro using the convergence dataset to generate the Odds Ratio (OR), Risk Ratio (RR) and Risk Difference (RD) per SOC/PT using Genmod procedure	b	2021	e o d
+ ☐	19	PHARMASUG	NKC-PRG	AP117: Under the Hood: The Mechanics of Various SQL Query Optimization Techniques	b	2021	e o d
+ ☐	20	PHARMASUG	NKC-PRG	AP120: Programming Time Varying Concomitant Medication Covariates in NONMEM PopPK Dataset	b	2021	e o d
+ ☐	21	PHARMASUG	NKC-PRG	AP207: GCIG Criteria, Programming Makes It Easy	b	2021	e o d
+ ☐	22	PHUSE-US	NKC-PRG	AS03: ParmSurv: An SAS Macro for Flexible Parametric Survival Analysis with Long-term Predictions	b	2021	e o d
+ ☐	23	PHUSE-US	NKC-PRG	AS06: Dynamic Macro Using the Convergence Dataset to Generate the Odds Ratio (OR), Risk Ratio (RR) and Risk Difference (RD) per SOC and PT Using the Genmod Procedure	b	2021	e o d
+ ☐	24	PHARMASUG	NKC-PRG	Best PaperAD179: Macro to Compare Titles and Footnotes in Produced TLF and Corresponding Shells	b	2021	e o d



Reusable UI components

- Web application
 - Translation tool

11 时 56 分 54 秒 [ZhiJun Wei](#)

研究编号 ---Show All--- ---Show All--- 库 组 前

新增 全选 清除选定 全部 A B C D E F H I L M N O P Q R S T U V

总共 10 条数据 < 1 > 10 / page

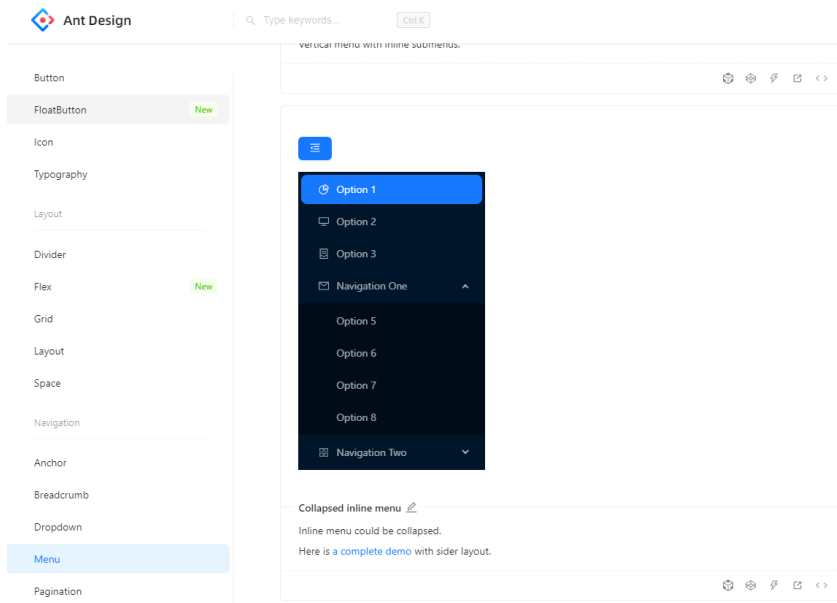
	#	名称	英文	中文	状态	添加时间
+	1	FAAE	Findings About Adverse Events	不良事件相关发现	LOCKED	2021-08-10T14-15-53
+	2	FAZT	Findings About Antineoplastic Therapies	抗肿瘤治疗相关发现	LOCKED	2021-08-10T14-15-53
+	3	FACE	Findings About Clinical Events	临床事件相关发现	LOCKED	2021-08-10T14-15-53
+	4	FACM	Findings About Concomitant Medications	既往与合并用药相关发现	LOCKED	2021-08-10T14-15-53
+	5	FACM	Findings About Concomitant Meds	既往与合并用药相关发现	LOCKED	2021-08-10T14-15-53
+	6	FAZD	Findings About Death	死亡相关发现	LOCKED	2021-08-10T14-15-53
+	7	FAZH	Findings About Hospitalization	住院相关发现	LOCKED	2021-08-10T14-15-53
+	8	ADFAMH	Findings About Medical History	病史相关发现分析数据集	LOCKED	2021-08-10T14-15-53
+	9	FAMH	Findings About Medical History	病史相关发现	LOCKED	2021-08-10T14-15-53
+	10	FAZU	Findings About Procedures	诊疗操作相关发现	LOCKED	2021-08-10T14-15-53



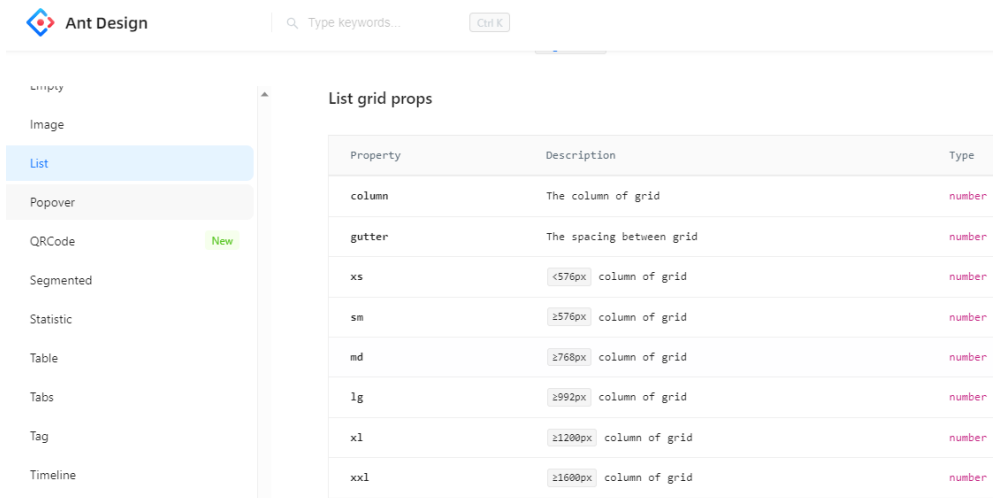
Reusable UI components

- UI Components

Menu



List





Reusable UI components

- Web application
 - Metadata-driven tool

The screenshot shows the 'WebSMT Prod - SP' application interface. The left sidebar contains a navigation menu with items like Global Metadata, Global Reference, Study Metadata, Setup, Codelist, Domain, Elements, SDE (Stage Dom...), External Data, Study Reference, and SMT Checks. The main content area is titled 'Please select study' and shows the selected study 'CSTDTEST_SMT: csr_9'. Below this, there are tabs for EDC, DRM, SDTM, and ADaM. The SDTM tab is active, displaying a list of study metadata details such as 'Created user: jiangy1a', 'Modified user: jiangy1a.weizh4', 'Last created date: 2022-11-25 03:37:12', 'Last modified date: 2023-08-09 09:27:28', '# of domains: 28', '# of elements: 434', '# of stage elements: 623', and 'Team members: jiangy1a'. There is also a 'Read-only' toggle and a 'Switch' button. To the right, there is a section titled 'Add New Study Reporting Activity' with a yellow plus icon and a message: 'Up to 8 study reporting activities might be added.'

The screenshot shows the 'WebSMT Prod - SP' application interface, specifically the 'SDE (Stage Domain)' section. The left sidebar is the same as the previous screenshot. The main content area displays a table with columns: #, Action, SMT flag, Status, Keep for next stage, Data State, Data Domain, Target Data Element, SDTM Domain Filter, and Derivation Name. The table contains 9 rows of data, each representing a study reporting activity. The first row is highlighted in blue. Below the table, there is a pagination bar showing 'Total 2148 Items' and a page number '1' out of '10 / page'. There are also links for 'Go to' and 'Reload'.

#	Action	SMT flag	Status	Keep for next stage	Data State	Data Domain	Target Data Element	SDTM Domain Filter	Derivation Name
1	[icon]	Yes	Active	No	SDTM	AE	AEACN	N/A	APPEND
2	[icon]	No	Active	No	SDTM	AE	AEACNBGT	N/A	APPEND
3	[icon]	No	Active	No	SDTM	AE	AEACNDEV	N/A	APPEND
4	[icon]	No	Active	Yes	SDTM	AE	AEACNLDC	N/A	COPY_ELEMENT
5	[icon]	No	Active	Yes	SDTM	AE	AEACNLKP	N/A	COPY_ELEMENT
6	[icon]	No	Active	Yes	SDTM	AE	AEACNO1	N/A	COPY_ELEMENT
7	[icon]	No	Active	Yes	SDTM	AE	AEACNO2	N/A	COPY_ELEMENT
8	[icon]	No	Active	Yes	SDTM	AE	AEACNO3	N/A	COPY_ELEMENT
9	[icon]	No	Active	Yes	SDTM	AE	AEACNS1	N/A	COPY_ELEMENT



Reusable UI components

- UI Components

Card

Examples

Default size card

More

Card content
Card content
Card content

Small size card

More

Card content
Card content
Card content

Table

Bordered: ☐ loading: ☐ Title: ☐ Column Header: ☒ Footer: ☒ Expandable: ☒ Checkbox: ☒ Fixed Header: ☐ Has Data: ☒

Ellipsis: ☐ Size: Table Scroll: Fixed Columns: Table Layout:

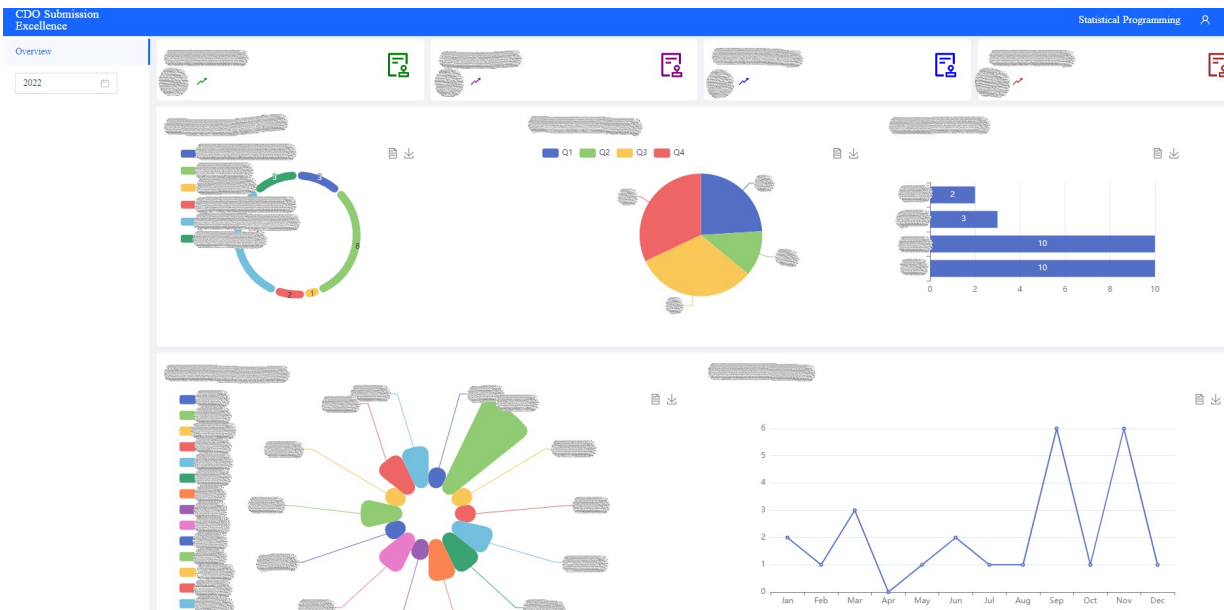
Pagination Top: Pagination Bottom:

☐	Name	Age	Address	Action
+	☐ John Brown	12	New York No. 1 Lake Park	Delete More actions
+	☐ John Brown	22	New York No. 2 Lake Park	Delete More actions
+	☐ John Brown	32	New York No. 3 Lake Park	Delete More actions
+	☐ John Brown	42	New York No. 4 Lake Park	Delete More actions
+	☐ John Brown	52	New York No. 5 Lake Park	Delete More actions
+	☐ John Brown	62	New York No. 6 Lake Park	Delete More actions
+	☐ John Brown	72	New York No. 7 Lake Park	Delete More actions
+	☐ John Brown	82	New York No. 8 Lake Park	Delete More actions
+	☐ John Brown	92	New York No. 9 Lake Park	Delete More actions
+	☐ John Brown	102	New York No. 10 Lake Park	Delete More actions

Here is footer

Reusable UI components

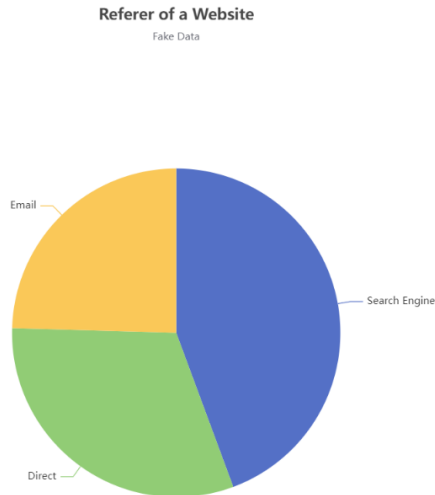
- Web application
 - Dashboard



Reusable UI components

- UI Components

Search Engine
Direct
Email



Once you have the dashboard framework, you can add one graph in **3 minutes**.

```
1 option = {  
2   title: {  
3     text: 'Referer of a Website',  
4     subtext: 'Fake Data',  
5     left: 'center'  
6   },  
7   tooltip: {  
8     trigger: 'item'  
9   },  
10  legend: {  
11    orient: 'vertical',  
12    left: 'left'  
13  },  
14  series: [  
15    {  
16      name: 'Access From',  
17      type: 'pie',  
18      radius: '50%',  
19      data: [  
20        { value: 1048, name: 'Search Engine' },  
21        { value: 735, name: 'Direct' },  
22        { value: 580, name: 'Email' }  
23      ],  
24      emphasis: {  
25        itemStyle: {  
26          shadowBlur: 10,  
27          shadowOffsetX: 0,  
28          shadowColor: 'rgba(0, 0, 0, 0.5)'  
29        }  
30      }  
31    ]  
32  }  
33 };
```



Reusable UI components

- UI Components

Take VUE for example

```
<template>
  <div class="chartBox tm-mt-1 tm-flex">
    <div class="tm-flex-1 tm-p-2">
      <div class="tm-text-grey-9 tm-mb-1">Pie Chart</div>
      <div class="myChart" id="chart2"></div>
    </div>
  </div>
</template>
```

```
<script>
  option = {
    title: {
      text: 'Pie Chart',
      subtext: 'Fake Data',
      left: 'center'
    },
    tooltip: {
      trigger: 'item'
    },
    legend: {
      orient: 'vertical',
      left: 'left'
    },
    series: [
      {
        name: 'Access From',
        type: 'pie',
        radius: '50%',
        data: [
          { value: 1048, name: 'Search Engine' },
          { value: 735, name: 'Direct' },
          { value: 580, name: 'Email' }
        ],
        emphasis: {
          itemStyle: {
            shadowBlur: 10,
            shadowOffsetX: 0,
            shadowColor: 'rgba(0, 0, 0, 0.5)'
          }
        }
      }
    ]
  };
</script>
```

```
<style>
  .chartBox {
    .tm-flex-1 {
      background-color: #fff;

      .myChart {
        padding: 10px;
        height: 300px;
        width: auto;
      }
    }
  }
</style>
```

Thanks!



**The Global Healthcare
Data Science Community**

Contact Channels

📞 UK +44 1843 609600
✉ office@phuse.global
🌐 phuse.global

Social Media

🐦 [@phusetwitta](https://twitter.com/phusetwitta)
📘 [/phusebook](https://facebook.com/phusebook)
▶ [/phusetube](https://youtube.com/phusetube)
🌐 [/company/phuse](https://company.phuse)