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Single Day Event

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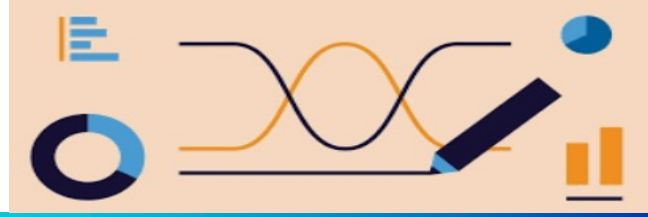
Pharmaceutical Product Development (PPD)

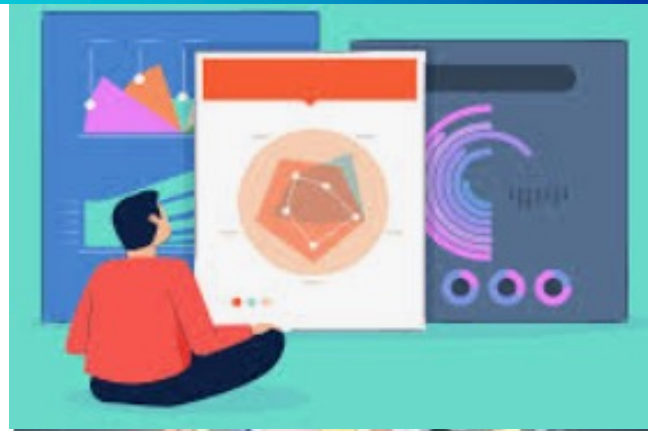
Data visualization in Clinical Trials and Insights

phuse.global

Data Visualization

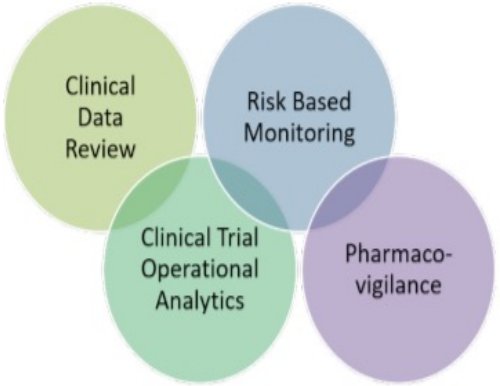


- Structured data through visual representations
- Describes dense and complex information in graphical form
- Data to information conversion
- Enable fast and effective decisions
- Provides meaningful insights
- Analyze different patterns in data



An Industry Change

- New digital technologies
- Clinical trials and digital health is no longer clearly obvious
- Evaluating volume of data for safety and efficacy.
- Operational efficiency enhancements and minimizing the costs
- Process optimization - Data analytics



An Industry Change

- Manage and analyze the data collected
- Identify hidden patterns in patient behavior
- Visualization tools for data management
- Report and analyze key trial information
- React in real-time to vital trial information and patient and site data
- Meaningful insights and smarter decisions

Clinical trial Visualization

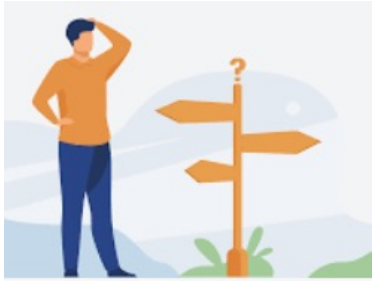
Centralized Monitoring

Data Listings (Versus) Visualization

Key Risk Indicators/Primary Endpoints

Tools – REACT & DETECT

Guidance for designing effective reports for eCOA trials



- Engage early with the eCOA ensure all necessary data is captured
- Include key team members in report design to ensure their needs are met
- Design reports - Monitoring plans and what actions need to be taken
- Save time - Eliminate errors by having the report perform calculations
- Identify areas requiring action, using data visualization tools like color coding to highlight outliers or areas of concern
- Use filters to drill into the data interactively to see
- what's happening quickly and why
- Focus on priorities for specific study team members,
- customizing reports and dashboards by role
- Add reports when needed as the study progresses
- Choose reports that best suit study requirements, taking only the information needed
- Track report usage to identify which are more used and tailor the reports accordingly

Principles

- **Accurate**

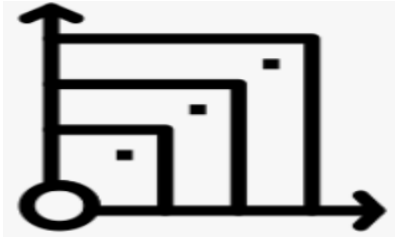
Prioritize data accuracy, clarity, and integrity, presenting information in a way that doesn't mislead/misinterpret.

- **Helpful**

Help users navigate data with context and affordances that emphasize exploration and comparison.

- **Scalable**

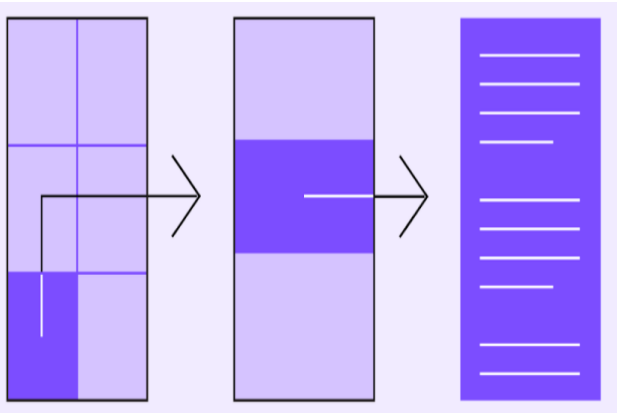
Adapt visualizations for different device sizes, while anticipating user needs on data depth, complexity, and modality.



Dashboards and Design

- Data visualization can be displayed across a series of multiple charts, in User Interfaces called **dashboards**.
- **Better communicates** - Than one complex chart; Multiple, separate charts.
- Data can be filtered or changed using toggle controls, tabs, and drop-downs.
- Display metrics, while users adjust the controls.

Dashboards and Design



A dashboard should:

- Prioritize the most important information (using layout)
- Display a focal point that prioritizes information according to hierarchy using color, position, size, and visual weight.

Information should be prioritized and arranged based on the questions asked on the data.

1. Issues that need attention
2. Time that issue occurred
3. Location that issues occurred
4. Other variables affected by the issue

Types, Styles & Behaviors

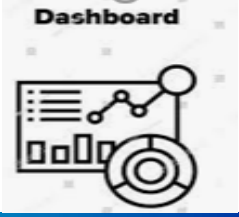
- Different forms - Charts are a common way of expressing data.

  Two things – i) The **data you want to communicate**

  ii) What you want to **convey about that data**

- **Custom styles and shapes** to make data easier to understand at a glance, in ways that suit the user's needs and context.
- **Patterns** that give users **control over the data displayed**. These patterns let users focus on a chart's specific values or ranges.

Dashboards



- **Patient data dashboard**

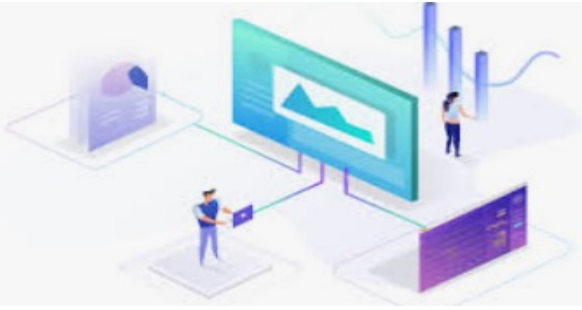
  Standardized and consolidated data from multiple sources to provide study teams.

- **Study operations dashboard**

  Demonstrates a holistic oversight of study.

- **Metrics dashboard**

  Executive management - Portfolio and Client relationship management.

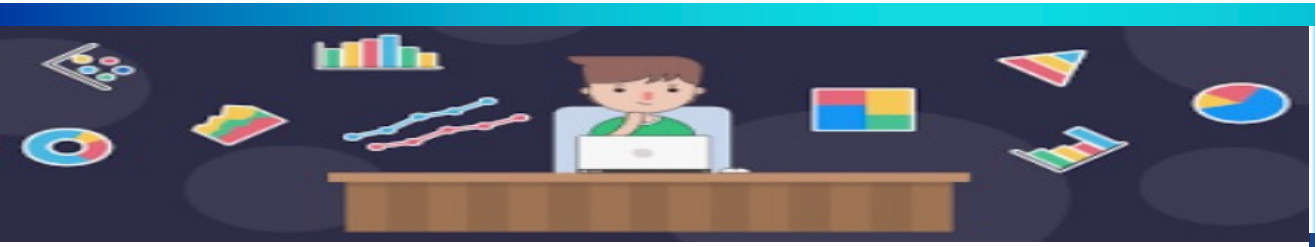


Reporting Types

- Study Team Metric Reports – to enable identification of significant trends and deviations, allowing for real-time reaction and intervention Site Staff Metric Reports – to enable site staff to identify instances of low compliance or missing data
- Eligibility and Enrollment Reports – to enable site personnel to review subject inclusion criteria alongside subject data
- Compliance Reports – to ensure studies align with regulatory requirements and study protocol

- Data Management Reports – to ensure clean, accurate, high-quality data
- User Activity Reports – to enable the study team to identify volume of user activity and identify those requiring assistance

Chart Types



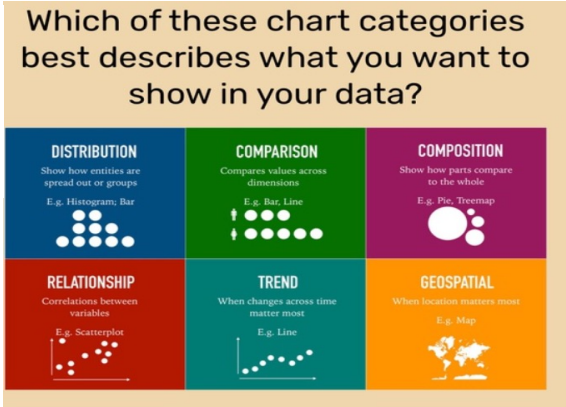
TransCelerate
BIOPHARMA INC.

- Indicators show one KPI, clearly
- Line charts display trends
- Bar charts break things down, simply
- Column charts compare values side-by-side
- Pie charts clearly show proportions
- Area charts *compare* proportions
- Pivot table easily present key figures

Chart Types

Know the Message → Arrange Data → Prepare Chart → Format

- Scatter charts: distribution and relationships
- Bubble charts: understand multiple variables
- Treemaps display hierarchies, compare values
- Polar charts show relationships between multiple variables
- Area/scatter maps show geographic data
- Funnel charts display a pipeline
- Fisheye/Cartesian distortion



Validation Process

- **Dashboards and data visualizations don't operate on static data sources**
- **The data is changing at some velocity**

✓ Data by itself is imperfect, with known and often unknown data-quality issues.

✓ Trying to capture validation rules isn't trivial - rules for different types of outliers.

✓ Trying to capture and code for these rules may be a difficult and complex proposition for applications and data visualizations that process large volumes of complex data sets.

✓ Active data-driven organizations are loading new data sets and evolving data pipelines to improve analytics and decision-making.

✓ Data-processing systems are often complex, with different tools for integrating, managing, processing, modeling, and delivering results.

✓ Developers and data scientists - data flows, algorithms, and visualizations.
Difficult to separate whether an unanticipated data issue is due from a programmatic change or if it's related to data or data-quality changes.

✓ Validating data and analytics - hard for developers, testers, and data scientists – especially on how dashboards and applications are used to develop insights or drive decision-making.

Validation Process

Golden dataset

- Help validate data flow, application, and data visualization changes.
- Testing team can define unit, functional, and performance tests to validate and compare outputs.
- Testers can run A/B tests, where A is the output before implementation changes were introduced and B is the output after the changes were made.
- The test should only show differences in output in expected areas where the data flows, models, analytics, logic, or visualizations were changed.
- Once golden data sets are created, testing teams may require additional environments or tools to switch the underlying data sources in their environments.
- Testing teams need tools to implement A/B testing of data and results.
  - ✓ Manually by writing SQL queries and then comparing the results (for simple data sets and tests).
  - ✓ Automate using tools to centralize test queries and generate reports to validate changes.

Study Management More Manageable

- Make Trial Data Actionable
- Focus on The Most Relevant
- Lower Monitoring Costs
- Save Time with Best Practices
- Analyze Across Multiple Dimensions
- Consolidate Oversight Boost CRO Performance

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