

Analytic Solutions

Executive Overview



BCT PARTNERS

The Challenge: Accurate, Equitable Program Evaluation

In today's complex social landscape, data analytics and program evaluation have become critical tools for understanding impact and guiding decision-making. However, as social issues grow more intricate and data volumes expand exponentially, traditional evaluation methods are struggling to keep pace. Yet, there is hope in the potential of innovative solutions. Organizations and funders face a series of interconnected challenges that demand these innovative solutions:

- 1 Identifying True Causal Relationships**

While correlation can provide useful insights, it often falls short of demonstrating direct causation. This distinction is crucial for funders and policymakers deciding resource allocation and program design. Without clear causality, there's a risk of funding programs that appear effective but aren't driving meaningful change, potentially wasting resources and missing opportunities for real social impact.
- 2 Managing and Analyzing Complex Big Data**

The rise of big data brings both opportunities and obstacles. We can access more information than ever about program participants, community contexts, and long-term outcomes. However, managing and analyzing this wealth of data requires sophisticated tools and expertise that many organizations lack. Traditional methods often struggle to handle the scale and diversity of modern datasets, potentially missing critical insights.
- 3 Ensuring Equitable Distribution of Resources**

As awareness of systemic inequalities grows, there's an increasing demand for evaluation methods that can identify and address disparities in program access and outcomes. This requires analyzing not just overall effectiveness, but how different subgroups are impacted. Traditional methods often lack the granularity to provide these nuanced insights, potentially perpetuating existing inequities.
- 4 Providing Timely, Actionable Insights**

The pace of social change demands rapid response and continuous improvement. Yet traditional evaluation methods often operate on extended timelines, producing reports months or years after data collection. By the time insights are available, they may already be outdated or irrelevant to current challenges.

These interconnected challenges – from the lack of causal insights to the complexity of big data and the need for equity – strain traditional evaluation methods. Relying on correlational analysis and periodic assessments, these methods struggle to provide the depth, speed, and equity of insights needed in today's complex social landscape. While the wealth of available data holds tremendous potential, unlocking it requires a new approach. Precision Analytics offers a powerful solution, leveraging advanced machine learning and artificial intelligence to navigate big data intricacies, uncover causal relationships, ensure equity, and deliver real-time, actionable insights, transforming how we evaluate and improve social programs.

The Solution: Precision Analytics

In response to the complex challenges facing social program evaluation, BCT Partners has developed an innovative approach called Precision Analytics (PA). This cutting-edge solution harnesses the power of machine learning algorithms to build highly accurate, valid, and reliable decision-making tools for all stakeholders in social programs.

At its core, Precision Analytics is designed to address the key limitations of traditional evaluation methods while maximizing the potential of big data. By leveraging advanced artificial intelligence techniques, PA can uncover causal relationships, manage complex datasets, ensure equitable analysis, and provide real-time insights – all within a single, integrated framework.

How Precision Analytics Works

The PA process unfolds in three key stages, each building upon the last to create a comprehensive evaluation framework:



Finding Matched Comparison Groups

In this initial stage, PA uses sophisticated algorithms to identify subgroups within the target population that share similar characteristics. This process considers a wide range of contextual variables that could influence program engagement and outcomes. By creating these matched comparison groups, PA minimizes selection bias and ensures that any comparisons made are fair and meaningful. This step is crucial for establishing a solid foundation for causal analysis.



Determining the Ideal Program Model

Once comparison groups are established, PA analyzes historical data to determine the optimal combination of interventions for each subgroup. This isn't a one-size-fits-all approach; instead, PA recognizes that different groups may respond differently to various interventions. By tailoring the program model to each subgroup, PA maximizes the likelihood of achieving desired outcomes across the entire population.



Causal Evaluation of the Program Model

In the final stage, PA conducts a rigorous assessment of the significance and effect size of each intervention within the program model. This goes beyond simple correlation, providing robust measures of program effectiveness that can confidently inform decision-making. By quantifying the impact of specific interventions for each subgroup, PA offers invaluable insights for program refinement and resource allocation.

Key Features

What sets Precision Analytics apart is not just its sophisticated methodology, but also its commitment to transparency, fairness, and equity. Key features include:

Transparent Machine Learning

PA prioritizes making insights interpretable and actionable. While it utilizes advanced techniques like Random Forest in the modeling to capture complex patterns in the data, PA takes extensive measures to ensure transparency and minimize bias. This includes using a sophisticated model evaluation technique called, “input shuffling,” calculating the unique importance of each variable and providing clear, contextual explanations of how different factors influence outcomes. This approach ensures that even with sophisticated models, our clients can fully understand the drivers behind our predictions and make informed decisions.

Bias Prevention

In the crucial matching process, PA intentionally omits personal identity characteristics unless they are directly relevant to determining program eligibility or intervention appropriateness. For instance, PA would exclude the race of a youth participating in a youth development program because this personal identity characteristic should play no role in who gets selected to participate in the program. Alternatively, PA would include gender identity as a matching variable for gender-affirming medical treatments, as this identity should determine intervention eligibility. This approach helps prevent unintended bias and ensures that evaluations are based on factors that truly matter for program success rather than on irrelevant personal characteristics.

Equity Evaluation

PA goes beyond overall effectiveness to evaluate whether all demographic groups have equitable access to effective interventions. This feature is critical for identifying and addressing disparities in program delivery and outcomes.

By combining these features with its powerful analytical capabilities, Precision Analytics offers a comprehensive solution to social program evaluation challenges. It provides the causal insights, big data management, equity focus, and real-time analysis that traditional methods struggle to deliver.

As we’ll explore in the following sections, the impact of Precision Analytics extends far beyond theoretical improvements. Through real-world case studies, we’ll see how PA is already transforming program evaluation and decision-making across various social initiatives.



Real-World Impact: Case Studies

CASE STUDY: Revolutionizing Equitable Funding in Pittsburgh with Precision Analytics

To illustrate the transformative power of Precision Analytics (PA), let's examine its application in addressing a complex challenge faced by Pittsburgh's Program to Aid Citizen Enterprise (PACE).

Challenge: Assessing Equity in Nonprofit Funding for Capacity Building

PACE, an organization dedicated to fostering community economic development, needed to evaluate the equity of capacity-building funding and support for nonprofits serving disadvantaged communities in greater Pittsburgh, particularly focusing on organizations serving communities of color. This task was complicated by:

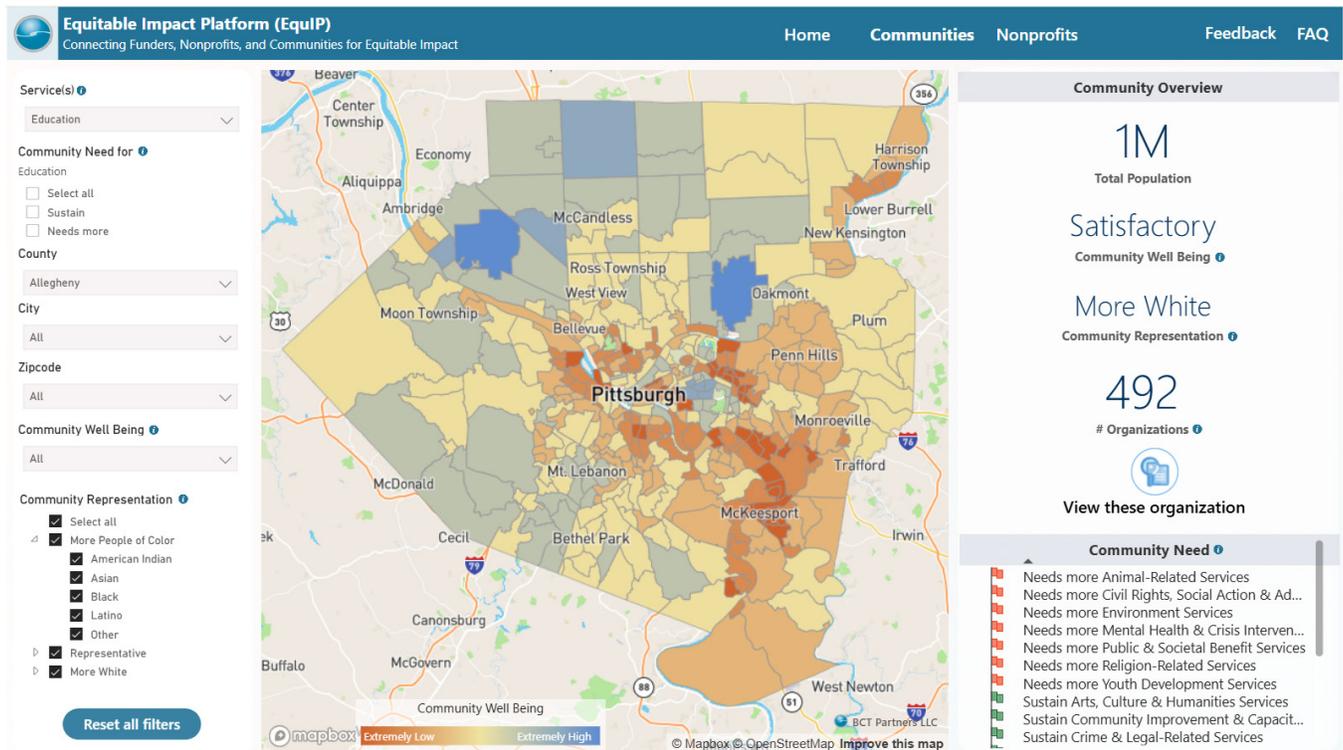
- Fragmented data across multiple sources
- Varying needs and services across different neighborhoods
- Complex interplay of demographic factors and community needs
- The influence of historical funding patterns on current conditions

Traditional evaluation methods struggled to integrate these diverse factors and provide actionable insights.

Solution: BCT's Equitable Impact Platform (Equip)

To address this challenge, BCT Partners deployed its Equitable Impact Platform (Equip), which leverages Precision Analytics to provide a comprehensive, data-driven assessment. Equip applied PA to analyze:

- IRS Form 990 data on nonprofit finances
- US Census Bureau's American Community Survey demographic and economic data
- Geographic distribution of services and needs



View of the Community Map, which allows users to visualize community well-being, diversity, and socioeconomic patterns across selected communities.

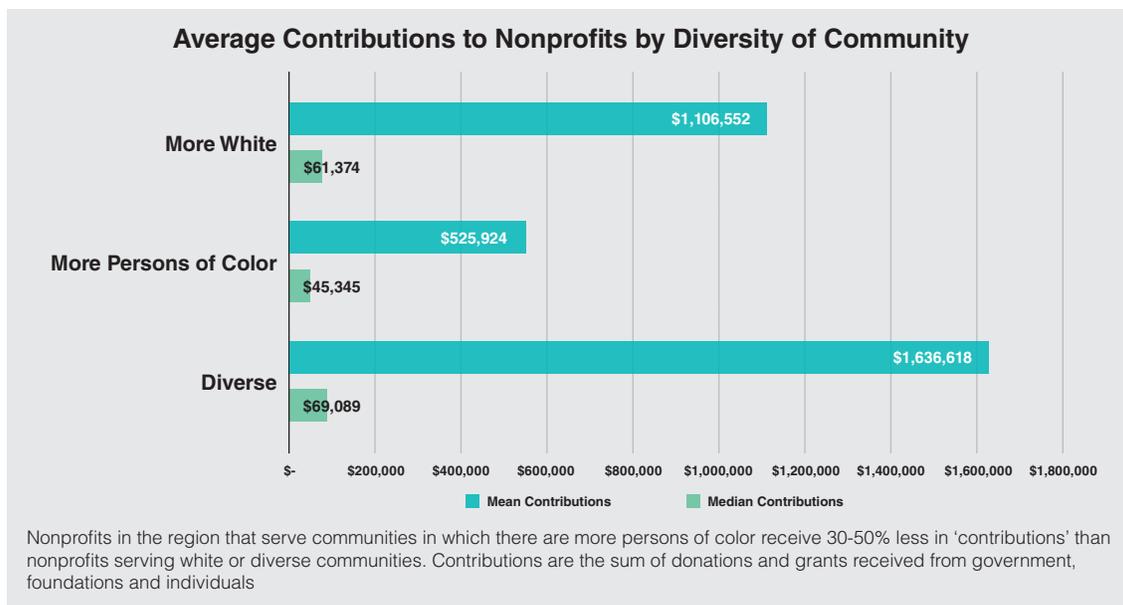
- PA algorithms integrated these diverse data sources, identifying patterns and relationships that wouldn't be apparent through traditional analysis. By applying sophisticated matching techniques, PA compared similar communities and nonprofits, ensuring that any disparities identified were due to genuine inequities rather than differences in community characteristics or nonprofit focus.

Results: Actionable Insights for Equitable Grantmaking

The application of Precision Analytics through EquiP yielded several significant insights:

- Identified statistically significant disparities in support for organizations serving communities of color
- Generated detailed maps showing the distribution of nonprofit resources relative to community needs
- Developed predictive models to forecast the potential impact of different funding strategies
- Established data-driven benchmarks for equitable funding
- Provided specific recommendations for more equitable grantmaking

	Ideal Capacity Building Investment	Need More Capacity Building
Region	11%	66%
Allegheny	17%	60%
Armstrong	0%	65%
Beaver	3%	66%
Butler	2%	77%
Fayette	4%	73%
Greene	0%	80%
Indiana	2%	78%
Lawrence	0%	79%
Washington	1%	79%
Westmoreland	6%	75%



These insights enabled PACE to:

- Reallocate resources to significantly underserved areas
- Develop targeted capacity-building programs for nonprofits serving communities of color
- Engage other funders in collaborative efforts to address systemic funding disparities
- Implement data-driven monitoring to track progress towards more equitable funding distribution

“*EquiP revolutionized our understanding of resource allocation. We now have the data to drive truly equitable funding decisions. This isn't just about moving money around; it's about ensuring that every community in Pittsburgh has access to the resources and support they need to thrive.*”

– Executive Director of PACE

This case study demonstrates how Precision Analytics can transform complex, multifaceted challenges into clear, actionable insights, enabling organizations to make data-driven decisions that promise to have a lasting impact on equity in their communities.

CASE STUDY: Transforming Youth Mental Health Care with Precision Analytics

Gemma Services, a leading provider of mental health care for at-risk youth aged 6-14, faced significant challenges in providing personalized care that led to lasting positive outcomes. Recognizing the potential for data-driven innovation, the Thomas Scattergood Behavioral Health Foundation funded this groundbreaking project to explore innovative approaches to improving care.

The Challenge

- High variability in treatment effectiveness across youth subgroups
- Difficulty predicting effective interventions for each child
- Long average lengths of stay, impacting costs and youth well-being
- High rates of post-discharge hospitalization

Gemma Services needed a solution to understand each child's complex needs and provide tailored, effective interventions. They partnered with BCT Partners to implement Precision Analytics (PA).

The Precision Analytics Approach



Data Integration and Analysis

PA integrated Gemma's extensive administrative data.



Subgroup Identification

Advanced machine learning algorithms identified distinct youth subgroups with similar characteristics and needs.



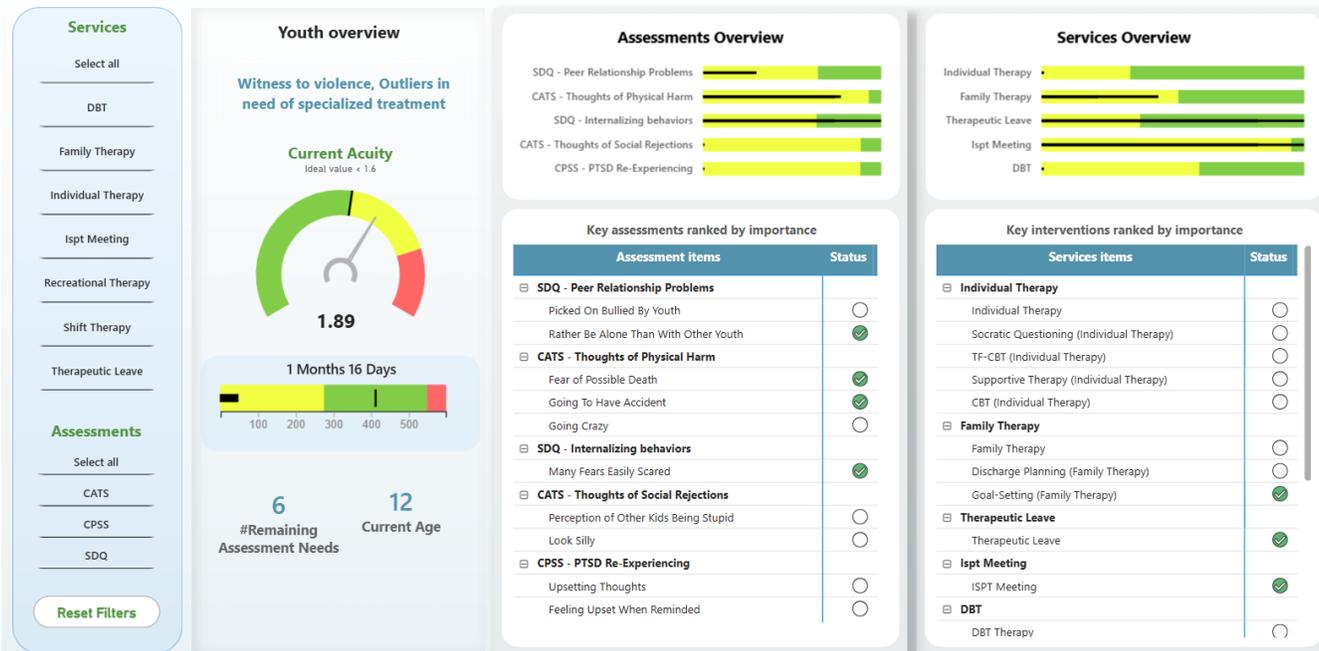
Intervention Effectiveness Modeling

Historical data analysis determined optimal intervention combinations for each subgroup.



Real-Time Decision Support

Practitioner dashboards provided real-time treatment recommendations based on each child's unique profile.



Last Refresh: 10/30/2024

BCT Partners LLC

Sample page of an Outcome Generator that automates Precision Analytics results to provide service recommendations to increase an individual's likelihood of success based on their current progress.

Transformative Results

- 30-day reduction in average length of stay, allowing faster community reintegration and cost savings.
- 40% decrease in exit acuity scores, indicating significantly improved mental health and readiness for community reintegration.
- Increased likelihood of youth remaining safely in the community one-year post-discharge, with reduced re-hospitalization rates.

PA transformed Gemma Services' approach to youth mental health care

Personalized Treatment Plans

Tailored intervention strategies based on historical success.

Proactive Care

Early identification of potential issues through real-time dashboards.

Continuous Learning

Ongoing analysis refined and improved recommendations.

“Precision Analytics has transformed our ability to provide personalized, effective care. Our practitioners now have the insights they need to make a real difference in these young lives.”

– Dr. Kristen Gay, President and CEO of Gemma Services

By leveraging Precision Analytics, Gemma Services turned their wealth of data into actionable insights, dramatically improving outcomes for vulnerable youth. This case study demonstrates PA's potential to revolutionize mental health care, offering hope for more effective, personalized treatment approaches.

The project's success, made possible by the Scattergood Foundation's support, underscores the importance of innovative funding in driving transformative change in mental health care delivery. As Joseph Pyle, Foundation President, emphasized, this approach has “the potential to revolutionize the way mental health treatment is

delivered by improving clinical decision-making and thereby improving providers' ability to match the right interventions with the right client."

This case study showcases how Precision Analytics can address complex challenges in mental health care, providing data-driven, personalized solutions that significantly improve outcomes for at-risk youth.

Precision Analytics for Funders: Enhancing Grantmaking and Evaluation

Precision Analytics (PA) offers grantmakers powerful tools to revolutionize their funding, evaluation, and capacity-building approach. PA can be applied in various ways to enhance funders' decision-making and impact assessment.

Community and Nonprofit Assessment

Using PA-driven tools like the Equitable Impact Platform (EquiP), funders can conduct in-depth analyses of communities and nonprofits. EquiP provides causal precision analytics for due diligence, offers decision support, monitors progress and results over time, and evaluates the impact of grantees and initiatives longitudinally.

Rigorous Program Evaluation

PA enables automated, ongoing evaluations of strategies and initiatives using secondary and administrative datasets, providing deeper insights into program effectiveness.

Qualitative Data Analysis

PA can be applied to analyze proposals, reports, and other text documents by applying BCT Partners' advanced natural language understanding (NLU) methodology using Large Language Models (LLM), and integrating and automating insights into the evaluation process.

Portfolio Management

PA allows funders to monitor and benchmark investments across entire portfolios, with the ability to visualize grantee locations and impacts.

Support for Evaluation Teams

Funders can partner with existing evaluation teams, providing PA-powered tools and methodological support to enhance their work.

Grantee Capacity Building

PA can be used to develop "outcome generators" for grantees, enabling real-time, evidence-based decision support for practitioners and automated outcome evaluation.

By integrating PA into their grantmaking processes, funders can make more informed decisions, track impact more effectively, and support their grantees in developing data-driven approaches to their work. This comprehensive approach enhances transparency, equity, and effectiveness across the philanthropic sector.

Implementation and Integration

BCT Partners works closely with organizations to seamlessly integrate PA into existing systems:



Future Developments

BCT Partners is committed to continually enhancing Precision Analytics:

- Expanding data sources for richer contextual analysis
- Developing advanced natural language processing for qualitative data
- Exploring federated learning for cross-organization insights while maintaining data privacy

Frequently Asked Questions

Q: How does PA differ from traditional evaluation methods?

A: PA provides causal insights, real-time analysis, and automated reporting, unlike traditional methods that often rely on correlations and periodic assessments.

Q: Is PA compliant with data privacy regulations?

A: BCT Partners is committed to maintaining full compliance with all relevant data privacy regulations, including our recent alignment with the EU-US Data Privacy Framework (DPF). We ensure that our projects meet the highest standards of security and privacy, tailoring our approach to the specific needs of each client. We are fully equipped to handle Personally Identifiable Information (PII) and Protected Health Information (PHI), ensuring seamless and compliant execution across all types of projects while adhering to a wide variety of security and privacy protocols.

Q: How long does it take to implement PA?

A: Initial implementation typically takes 12-16 weeks, with ongoing refinement and support.

Q: Where can I find open access publications and resources on Precision Analytics?

A: Publications and resources on Precision Analytics:

- [Unlocking Real-Time Evidence for Practitioners](#)
- [A New Way to Use Data](#)
- [The Health of the Nonprofit Sector in Western Pennsylvania \(PACE\)](#)

Discover how Precision Analytics can transform your social impact efforts.

Join leading organizations like PACE and Gemma Services in harnessing the power of Precision Analytics to drive equitable, effective social change.

Schedule a personalized demo today.

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