



Optimization Intelligence Solver for Structured Finance, Covered Bonds and Regulatory Compliance

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Executive Summary

In today's structured finance landscape, financial institutions and finance companies face mounting pressure to optimize treasury funding activities under tight regulatory and market constraints. Traditional asset selection and pool structuring methods rely on spreadsheets and manual trial-and-error, leading to suboptimal results, higher funding costs, and compliance risks. Sculpt by TAO Solutions' algorithmic optimization engine – emerges as a game-changer. It leverages advanced mathematical optimization to automate and optimize asset selection for several use cases involving a variety of transaction types; by systematically evaluating millions of asset combinations against all rules, Sculpt finds the most efficient, compliant pools in minutes, far beyond human capability.

Business Benefits: Sculpt delivers tangible value to CFOs, CEOs, and Treasurers. It reduces funding costs by ensuring each asset is optimally placed. It addresses regulatory compliance and eliminates human errors via automated rule enforcement. Institutions gain speed and scalability – what once took weeks of analysis now completes in minutes, enabling faster deal execution. Sculpt's cloud-enabled, enterprise integration (via TAO's SecureHub platform) provides a secure, auditable environment for optimization within existing workflows. The result is a transformative ROI: accelerated execution, lower cost of funds, and empowered decision-making.

How It Works: Sculpt combines the proven power of Linear Programming (LP) with innovative AI heuristics in its proprietary Sculpt solver. Users input their asset data and define objectives/constraints (eligibility criteria, concentration limits, capital targets, etc.). Sculpt's engine then constructs an optimization model and solves for the optimal asset pool composition that meets all constraints while maximizing the defined objective. Results are delivered through intuitive dashboards and reports, and users can adjust parameters or override selections to fine-tune outcomes. Sculpt thus acts like a "24/7 quantitative analyst", instantly producing optimal solutions but leaving final control in the hands of executives.

In summary, Sculpt is a strategic must-have for the structured finance industry. It automates intricate funding decisions with mathematical precision, cuts execution time by ~95%, and provides confidence that every deal is structured for minimum cost, maximum compliance, and optimal performance. Senior decision-makers can rely on Sculpt to materially improve funding economics and operational efficiency, while ensuring rigorous compliance – a combination that directly strengthens the institution's competitive position and bottom line.

Introduction: The Need for Optimization Improvements within Structured Finance and Treasury

Structured finance operations – from managing warehouse credit lines, monthly portfolio rebalancing to pooling securitizations continue to challenge most firms. Institutions must juggle diverse asset pools, varying stakeholder requirements, and strict regulatory criteria (e.g. SRT regulations, capital rules) all at once. Traditionally, assembling a compliant and cost-effective asset pool was a manual, iterative process, often involving manual processing and internal resources. This approach is both time-consuming and error-prone, frequently yielding suboptimal results. In an era of tight margins and fast-moving markets, these inefficiencies translate into lost opportunities and increased funding costs.

Sculpt was developed to address these challenges head-on. As a state-of-the-art optimization engine embedded in TAO Solutions' platform, Sculpt replaces guesswork with mathematical rigor and automation. It is purpose-built for a variety of structured finance tasks: asset selection for term transactions, warehouse utilization, portfolio rebalancing, covered bond pooling, SRT, repurchase facility compliance assessments and more. By formalizing these problems as mathematical programs, Sculpt can systematically explore possibilities and find the best solution, all in a fraction of the time. Crucially, Sculpt was designed with real-world constraints in mind – it simultaneously enforces required asset-level covenants, pool concentration limits, and regulatory rules, ensuring that optimized solutions are feasible and compliant by design.

For financial executives, the value proposition is compelling: better outcomes achieved faster, more reliably, less costly with an audit trail. Sculpt turns structured finance complexity into a competitive advantage by enabling firms to lower their cost of capital, maximize operational efficiencies, support of variety of transaction types, and structure pools swiftly. The following sections provide an overview of Sculpt's core technology and features, key use cases with quantifiable outcomes, and how it integrates into existing workflows to deliver transformational benefits.

Sculpt - Overview and Core Technology

Sculpt is an algorithmic optimization engine integrated within TAO Solutions' SecureHub platform. At its core, Sculpt models asset allocation and structuring as a large-scale optimization problem – essentially a mathematical puzzle of selecting the right assets under dozens of constraints to achieve the best outcome. To solve this puzzle, Sculpt employs a hybrid solver called Sculpt that combines Linear Programming (LP) techniques with AI-driven heuristics. This hybrid approach is key to balancing precision and speed:

- Linear Programming Engine: Sculpt first formulates the asset selection problem as an LP, defining decision variables for each asset (to include or exclude), a clear objective (e.g. minimize weighted average funding cost, or maximize pool yield or capital relief), and a comprehensive set of linear constraints encoding all rules. Modern LP solvers are extremely powerful at finding optimal solutions for such formulations, ensuring Sculpt's recommendations are mathematically optimal given the input parameters. Every constraint – from eligibility criteria on individual loans to aggregate portfolio limits – is translated into the solver's language, guaranteeing that any solution Sculpt produces adheres to all specified requirements.
- AI Heuristics (Sculpt): Real-world structured finance problems can be massive, sometimes involving tens of thousands of assets and intricate constraints, pushing beyond what vanilla LP solvers can handle in practical time. Sculpt's proprietary Sculpt algorithm intelligently augments the solver with heuristic techniques to conquer these large-scale cases. It can pre-process and reduce the problem size and guide the solver toward promising regions of the solution space using machine learning insights. The result is a solver that maintains the optimality and transparency of LP while gaining the speed and scalability of AI. In practice, Sculpt can find near-optimal solutions for extremely large pools in minutes, where a brute-force exact method might take hours or fail to solve. This gives Sculpt a unique ability to handle realistic portfolio sizes without sacrificing rigor.

Beyond the solver itself, Sculpt is supported by the core functionality of SecureHub. After computing an optimal solution, it generates clear outputs and visualizations as required: an optimal asset pool list, constraint adherence checks (showing all limits satisfied), and key metrics of the optimized pool (yield, funding cost, capital usage, etc.). Interactive dashboards let users perform “what-if” analyses – for example, adjusting a constraint or objective weight and re-running the optimization on the fly. Importantly, the user remains in control: Sculpt allows manual overrides or exclusions if, say, an executive prefers to remove a particular asset; the solver can then re-optimize given that adjustment. This ensures that Sculpt's recommendations align with practical business insights and strategies, rather than being a black box.

Integration and Security: Sculpt is embedded in TAO's SecureHub, meaning it fits seamlessly into existing structured finance workflows. Users can securely import loan data from internal systems or spreadsheets

(SecureHub accepts various data sources), define optimization scenarios, and then export the optimized pool as required. Every run is fully auditable – the platform logs the input data, constraints, and solver output, creating an audit trail for regulators or internal risk. SecureHub’s enterprise-grade security and permissioning ensure that sensitive loan data and model parameters are always protected. In short, Sculpt acts as an on-demand, cloud-based “quant team” for the organization, accessible through a user-friendly interface but underpinned by powerful optimization technology.

Key Use Cases and Applications

Sculpt's versatility allows it to tackle a range of structured finance optimization challenges. Below are three high-impact use cases where Sculpt is delivering significant value:

1. Warehouse Facility Optimization and Portfolio Rebalancing

Challenge: Banks and non-bank lenders and other originators often fund loans using multiple warehouse lines of credit, each provided by a lender with its own eligibility covenants and advance rates. Allocating new loans to the right facility each day is a notoriously complex task – lenders must minimize carry cost and maximize usage across 5, 10, or even 15 facilities, all while respecting each facility's limits and rules. Manually, this becomes “spreadsheet gymnastics” – a puzzle that is tedious, error-prone, and suboptimal, often leaving some credit lines underused or breaching covenant limits inadvertently.

Solution: Sculpt automates the funding facility allocation process. The lender feeds in its pipeline of new loans and the parameters of each warehouse (limits, haircuts, eligibility criteria, concentration limits). The Sculpt solver instantly evaluates all loans against all facilities and assigns each loan to the optimal facility (or leaves it unallocated if ineligible) to maximize overall funding and minimize cost. Essentially, Sculpt solves a complex assignment optimization – considering up to millions of combinations – to find the allocation that funds the loans without breaking covenants. It even considers secondary objectives (e.g. prefer cheaper facilities first or maintain diversification across lenders).

Thereafter, at any time (however, this usually occurs at month end), the portfolio management team can also undertake a monthly rebalancing exercise, with Sculpt determining which assets can be reallocated between facilities based upon pre-defined metrics.

Outcome: Lenders will see dramatic improvements when using Sculpt, involving optimized asset allocations, reducing unused facility capacity, while also lowering overall cost of debt. This was achieved by technology that solves in a matter of seconds / minutes. The lender's team saved countless hours of manual work – freeing them to work on other tasks, instead of juggling spreadsheets – and no covenants were breached thanks to Sculpt's strict rule adherence. Moreover, Sculpt's portfolio rebalancing capabilities means if facility criteria or available lines change, the model can be rerun to adjust allocations dynamically, ensuring continuous optimal utilization of all facilities.

2. Central Bank Repurchase Facilities and Significant Risk Transfer Portfolio Structuring for Banks

Challenge: Bank treasury teams utilizing Central Bank Repurchase Facilities and Significant Risk Transfer (SRT) securitizations face a delicate balance. They aim to use such facilities for a variety of reasons, including increasing liquidity, freeing up regulatory capital, but they must strictly comply with regulatory requirements and satisfy other stakeholders (including rating agencies / investors' criteria for the SRT deal to be viable). Selecting the right mix of loans to securitize – to hit the required targets while meeting numerous concentration limits and thresholds – is enormously complex. It often requires weeks of iterative analysis, manually testing different pool compositions to see if they meet all conditions and deliver the desired capital relief, with rework required for evolving pools that close months after commencing the initial pooling.

Solution: Sculpt brings speed and certainty to pool structuring. The bank inputs its available portfolio of loans and encodes all the regulatory and structural constraints into Sculpt (e.g. maximum PD or LGD levels, required risk weight density, portfolio granularity criteria, exclusion of certain high-risk assets, etc.). Sculpt's solver rapidly searches for the optimal pool that achieves the target state (often equivalent to maximizing the pool's risk-weighted assets transferred) while strictly obeying every constraint. It effectively automates the scenario testing that analysts would do but evaluates far more combinations than manual methods. The result is an optimized pool that provides for business requirements.

Outcome: Using Sculpt for Central Bank Repurchase Facilities as well as Significant Risk Transfer Securitizations enable Banks to meet its required goals with regulatory compliance, audit, risk and governance. The automated pooling process compresses the timeline from weeks to just minutes, enabling clients to perform periodic rebalancing and compliance checking in minutes. Sculpt also provides institutions confidence that changes to regulatory requirements, SRT ratings processes can be addressed by updating Sculpt's assessment criteria, eliminating the risk of any related last-minute compliance issues. By automating this process of analysis, the bank accelerates deal execution and avoids potential penalties or delays. In short, Sculpt achieves the desired risk transfer efficiently but also de-risked the pooling process itself, providing assurance to senior management and regulators that the pool was optimally and correctly assembled.

3. ABS, MBS & Covered Bond Pooling and Deal Execution

Challenge: Whether cutting an Asset-Backed Securitization (ABS), Mortgage-Backed Securitization (MBS) or a Covered Bond Cover Pool, structured finance treasury teams must select pools that satisfy a myriad of criteria: investor mandates, rating agency requirements (e.g. weighted average FICO, seasoning, LTV limits), and internal risk limits, all while trying to maximize proceeds and execute under tight timelines. The process is labor-intensive – analysts sift through loan tapes, apply filters, and run countless checks. Even then, manual processes can miss ineligible assets or fail to find the absolute best pool composition, leading to deal delays, re-pricing, or suboptimal execution in the market.

Solution: Sculpt streamlines ABS, MBS and covered bond pool cutting from start to finish. Users load the entire eligible collateral pool (which could be hundreds of thousands of loans) into Sculpt and input all deal criteria: e.g. “at most 5% of loans can be jumbo”, “minimum weighted-average interest rate X”, “exclude loans from certain regions”, etc. They can also specify goals like maximizing total collateral yield or minimizing required credit enhancement. Sculpt then identifies the optimal subset of assets for the deal that meets every single criterion. The Sculpt engine provides both forward and backward looking compliance assessments, meaning if assets are sourced from Warehouses (or vehicles that have required portfolio parameters / concentration limits), then the solver will provide a solution that addresses the new transaction whilst keeping existing facilities compliant. The issuer can then use SecureHub’s integrated analytics and reporting engines to project expected pool performance (loss distribution, prepayment speeds, etc.) for that optimal pool, and even allow quick re-optimization if, say, the issuer wants to see an alternative scenario (e.g. maximizing pool size instead of yield).

Outcome: Issuers who adopted Sculpt cut their pool assembly time from days to minutes. Instead of spending a week in frantic manual assembly and revision cycles, the deal team obtained a fully optimized pool at the click of a button. Sculpt ensured all investor and rating agency criteria were satisfied on the first pass, so there were no ineligible assets creeping into the pool (avoiding deal amendments or investor pushback). Issuers then have added flexibility to update pools with the same characteristics at any time (likely at issuance), giving them a material operational advantage when undertaking multiple issuances each year.

Quantified Results & Key Benefits

Sculpt's impact can be measured across several attributes critical to financial institutions. Below we highlight some of the key benefits and quantifiable results reported:

Dramatic Time Savings: Sculpt automates complex analyses that usually take structured finance teams days or weeks. Optimal pools are generated in seconds or minutes, reducing structuring time by ~95% in many cases. This accelerated execution means faster deal pooling and more efficient use of staff time. (Example: A process that took a team 2 weeks can be done within <30 minutes using Sculpt).

Risk Reduction, Compliance Assurance with Audit Trail: By design, Sculpt eliminates human error in asset selection. Every pool it produces strictly adheres to all constraints – if a loan violates any rule, the solver will exclude it. This enables zero covenant breaches or eligibility mistakes in optimized pools. The platform provides a complete audit trail and compliance report for each run, giving 100% confidence to risk managers and regulators that the output meets regulatory requirements.

Lower Funding Costs & Better ROI: Sculpt's optimized allocations directly translate to genuine financial gains. By finding the ideal mix of assets (from related facilities) for funding, weighted-average funding costs drop. With automated and auditability, financial institutions have seen reductions in warehouse funding costs through loan-to-facility portfolio optimization. Similarly, better-structured SRT, ABS, MBS pools mean tighter spreads and lower cost of debt.

Scalability and Volume Handling: Sculpt is built to handle very large portfolios without performance degradation. It can manage tens of thousands of loans across dozens of facilities or multiple deal structures simultaneously. To properly benchmark this, we have tested Sculpt allocating 400,000+ assets to multiple facilities. Sculpt found an optimal solution in under 90 seconds. This scalability ensures that as an institution grows (more loans, more programs), Sculpt keeps pace and continues to optimize effectively – something impractical with manual methods.

Enhanced Decision Intelligence: Sculpt goes beyond a static tool – it offers dynamic analytics and scenario testing capabilities, including adjusting parameters for “what-if” scenarios to understand the impact of changing conditions. For example, “What if we tighten the FICO constraint?”, “What if interest rates move and we change the objective to maximize yield?”. Sculpt provides answers in real-time, allowing decision-makers to probe different strategies and stress-test their portfolios with ease. This leads to more informed and strategic funding decisions overall.

Operational Efficiency and Focus: By automating repetitive, complex tasks, Sculpt frees skilled professionals to focus on higher-value work. Instead of crunching numbers or checking compliance line-by-line, analysts and treasury staff can concentrate on strategy, investor engagement, and new opportunities. This not only improves job satisfaction (letting people avoid drudgery and excel in analytical thinking) but also means institutions can do more with the same staff – increasing throughput of deals or analyses without adding headcount.

Collectively, these benefits give institutions a powerful competitive advantage. Faster and better execution of structured finance deals means accessing markets at the right time and price. Lower funding costs and efficient capital usage improve financial performance. And rigorous compliance with less effort reduces regulatory risk. The return on investment for Sculpt is evidenced by both hard numbers (e.g. basis points saved, hours freed) and strategic gains (e.g. ability to undertake more transactions, stronger relationships with funding partners due to reliability and speed). Many users liken Sculpt to adding an expert quantitative analyst (or an entire team) to their staff – one that works tirelessly and delivers consistent results.

Implementation and Workflow Integration

One of Sculpt's strengths is how easily it integrates into existing workflows. It was designed not to disrupt but to enhance and streamline the processes CFOs, Treasurers and their treasury teams already follow. Here's an overview of a typical workflow with Sculpt:

Data Ingestion: Users begin by securely loading the relevant data into Sculpt. This could be a loan-level data extract from the core banking system, a spreadsheet of assets, or a direct database connection (via Restful API). Sculpt is data-source agnostic and can ingest large datasets from various formats and asset classes. All sensitive data remains within the secure SecureHub Microsoft SQL Server environment, ensuring confidentiality and integrity. The platform supports delta uploads (updating with new loans only) as well as full portfolio loads with users having the ability to map data points to SecureHub table structures without the need to build store procedures.

Defining Constraints and Objectives: Thereafter, users set up the business rules and goals for the optimization scenario. This is done through an intuitive configuration UI (or via importing a rules template for recurring tasks). Users specify asset-level criteria (e.g. "exclude loans in arrears or with FICO < 600"), pool-level concentration limits (e.g. "max 10% of pool in any single region" or any covenant from term sheets), and any regulatory requirements (for SRT and Central Bank Repurchase Facilities). Multiple rule sets can be configured and saved for different programs. The user also defines the objective – common objectives include minimizing the weighted average cost of the pool, maximizing total assets funded, or hitting a target pool size with minimum variance. Sculpt allows combining objectives (with priorities) if, for example, one wants to maximize balance first, then minimize cost second, etc. This flexible rule input system means Sculpt can mimic virtually any deal criteria or optimization strategy.

Optimization Run: With data and constraints in place, the user initiates the solver run. Sculpt's engine translates the rules and data into a mathematical model and invokes the solver to search for the optimal solution. Thanks to the advanced optimizations, even very complex scenarios are solved quickly. During the run, Sculpt will automatically apply its heuristics for efficiency. The heavy lifting is done on the server side, often completing in seconds for moderate scenarios and a few minutes for very large ones. Sculpt uses state-of-the-art solvers optimized for both speed and cost efficiency, delivering accurate results in minimal time.

Reviewing Results: Once the solver finds an optimal (or near-optimal) solution, Sculpt presents the results in a user-friendly dashboard. The output includes the Optimal Pool Composition – essentially the list of selected assets and their assignment (to facilities or deal tranches, depending on the use case). Alongside this, Sculpt generates Constraint Adherence Reports, showing each constraint and how the solution measures up (e.g. “Max LTV 80% – Satisfied, highest LTV = 78.2%”). Any constraints that ended up binding (tight) are highlighted, as well as any that weren’t binding (perhaps indicating room to adjust the structure). Key performance metrics are also displayed – for example, total pool balance, weighted-average coupon, expected loss rate, funding cost saved, capital freed, etc., tailored to the scenario. The dashboard often includes interactive charts, such as a breakdown of the pool by asset type or region, comparison of pre- vs. post-optimization metrics, and scenario analysis.

User Adjustments and Reruns: Sculpt recognizes that executives may want to apply expert judgment or test alternative hypotheses. Users can tweak the scenario and rerun easily. For instance, after reviewing results, one might say: “What if we exclude these 2 loans manually?” or “Let’s add a constraint that at least 5% of the pool must be green assets.” Sculpt lets the user make such adjustments (via the UI or simply editing the pool selection and marking it as fixed) and then re-optimize with one click. The new solution will respect the overrides and adjust the rest optimally. This iterative capability means Sculpt can be used not just for one-off optimization, but as a planning tool – exploring various deal structures, comparing outcomes, and converging on the one that best fits both quantitative criteria and qualitative preferences. This process is particularly useful when cutting pools for proposed term transactions and having to top-up / refine the pool for the actual issuance.

Integration and Export: Finally, Sculpt makes it easy to integrate the results. The optimized asset list and all related analytics can be exported to Excel, PDF reports, or even fed back via API into the user’s systems (e.g. to automatically populate offering documents or upload into a deal management system). Because Sculpt operates within TAO’s SecureHub platform, it can also feed downstream processes – for example, automatically generating the necessary documentation to move the selected loans from a warehouse to a securitization SPV, or updating facility utilization figures. This end-to-end integration ensures that the insights from Sculpt flow immediately into action.

Throughout this process, security and auditability are paramount. Every change or run is logged with user, timestamp, and a record of input parameters. Senior management and auditors can later review what was done and why, which is often a requirement for risk governance. The SecureHub environment means data and user activities are traceable and auditable – unlike manual processes that might see data floating through email or spreadsheets, Sculpt keeps everything in one controlled location. User permissions can be set so that, for example, analysts can run optimizations, but only senior managers can finalize a

solution. This way, Sculpt fits naturally into the organization's control framework.

From an implementation standpoint, Sculpt can be delivered as a cloud-based service or installed on-premises if required. TAO Solutions provides support to configure the initial use cases and tailor the rule templates to the institution's needs. Most clients are up and running with their first optimizations in a matter of months. The system is designed to be business-user-friendly, so after initial setup, analysts and managers can use Sculpt with minimal IT involvement.

In summary, Sculpt's workflow integration ensures that adopting the tool is smooth and immediately productive. It complements your team's expertise with automation and optimization, fitting into your existing processes and then elevating them to new levels of efficiency and effectiveness.

Analytics and Reporting: In addition to Sculpt, users have ability to leverage SecureHub's analytics and reporting engine that enables dashboard, user-specific reporting to be introduced. Importantly, SecureHub also has a Microsoft Excel plug-in that enables customers to ingest workbooks that rely on results generated by SecureHub to assist with related structuring and reporting activities.

Conclusion: Transforming Structured Finance Decisions

The world of structured finance now demands a level of precision, compliance, risk management and foresight that traditional manual methods find difficult to accommodate. Sculpt by TAO Solutions represents the future of how financial institutions will approach asset selection, funding optimization, and pool structuring. By combining the rigorous mathematical power of linear programming with the adaptive intelligence of AI heuristics, Sculpt delivers solutions that are highly accurate, lightning-fast, and tailored to the institution's unique needs.

Adopting Sculpt is more than a technology upgrade – it's a strategic shift. Firms that leverage such cutting-edge optimization will outmaneuver those relying on labor-intensive processes. The ability to automate intricate pooling decisions, ensure real-time compliance, and optimize outcomes in seconds provides an undeniable competitive edge. It frees up human talent to focus on strategy and relationships, while the machine handles the complexity.

Sculpt has been developed together with industry participants to solve the exact problems structured finance teams face. It's like having a dedicated quant specialist on your team 24/7, relentlessly searching for the best solution within given parameters. Whether it's lowering all-in funding costs, mitigating operational risk, accelerating deal execution, or confidently meeting regulatory hurdles, Sculpt empowers institutions to achieve more.

In conclusion, Sculpt is not just a tool, but a transformation in how decisions are made in structured finance. It enables financial leaders to make informed, optimal choices with unprecedented efficiency, turning what was once a cumbersome process into a source of strategic advantage. By embracing Sculpt, institutions can redefine what's possible in their structured finance operations – achieving better outcomes for the business and its stakeholders in a fraction of the time. The message is clear: those who Sculpt their strategies with advanced optimization will shape the future of finance.