



PREScribing RISK To Aid HUD's OPERATIONS

HUD's Office of Community Planning and Development (CPD) seeks to develop viable communities by promoting integrated approaches that provide decent housing, a suitable living environment, and expand economic opportunities for low- and moderate-income persons. The primary means towards this end is the development of partnerships among all levels of government and the private sector, including for-profit and non-profit organizations. To support these objectives, CPD provides numerous grants to various States, local governments, and non-profit organizations to support a range of activities such as municipal infrastructure projects, housing rehabilitation, rental assistance and supportive services to homeless or formerly homeless persons, public services, and disaster recovery.

In order to ensure taxpayer dollars are efficiently spent and to prevent fraud and abuse, programs within CPD are responsible for assessing the risk of their grantees. This not only helps provide assurance of the proper use of funds, it also informs CPD's monitoring strategy. CPD, with collaboration from the OCFO, is in the process of improving its risk process by developing the CPD Risk Management Platform.

What was the challenge?

The current risk assessment process is complex, time-consuming, and labor-intensive, requiring both objective and subjective inputs from numerous data sources and significant manual involvement. Risk scoring approaches and factors vary by program and, for the many grantees that receive funding from multiple CPD programs, there lacks a simple and cohesive way to review risks for those grantees across programs. Further, the current risk assessment reports make it difficult to analyze trends and patterns in grantee performance across CPD programs. Additionally, visualization capabilities that enable HUD employees at all levels to easily view and interact with grantee risk data are limited.

What was the solution?

HUD's Office of the Chief Financial Officer (OCFO), under the direction of the Chief Risk Officer (CRO), has engaged with CPD to develop a CPD Risk Management Platform. The first phase of work, completed on September 30, 2019, was a "proof of concept" using Metabase to enhance risk scoring and develop user-friendly visualizations to assist CPD employees with their grant monitoring objectives. The proof of concept will serve as the foundation for ongoing development, to be conducted during Fiscal Year 2020, that will operationalize analytic functionality and enhance risk scoring and visualization.

Features of the CPD Risk Management Platform include:

Innovative Risk Scoring Using Natural Language Processing (NLP) and Machine Learning: The CPD Risk Management Platform includes a new risk metric created by applying NLP and machine learning to Single Audit reports. This innovative methodology, designed and applied by OCFO, enables automated, objective, and consistent risk scores to be generated from a grantee's Single Audit Reports. Additionally, this capability highlights key terms in the Single Audit report to enable users to quickly identify relevant text and gain an understanding of the factors driving the risk score for each grantee.

- **CPD-wide Risk Scores for Grantees:** The CPD Risk Management Platform includes statistical modeling methods for combining and scaling program-level risk scores into a single, national CPD grantee risk score, enabling CPD to have a comprehensive view into the risk associated with its

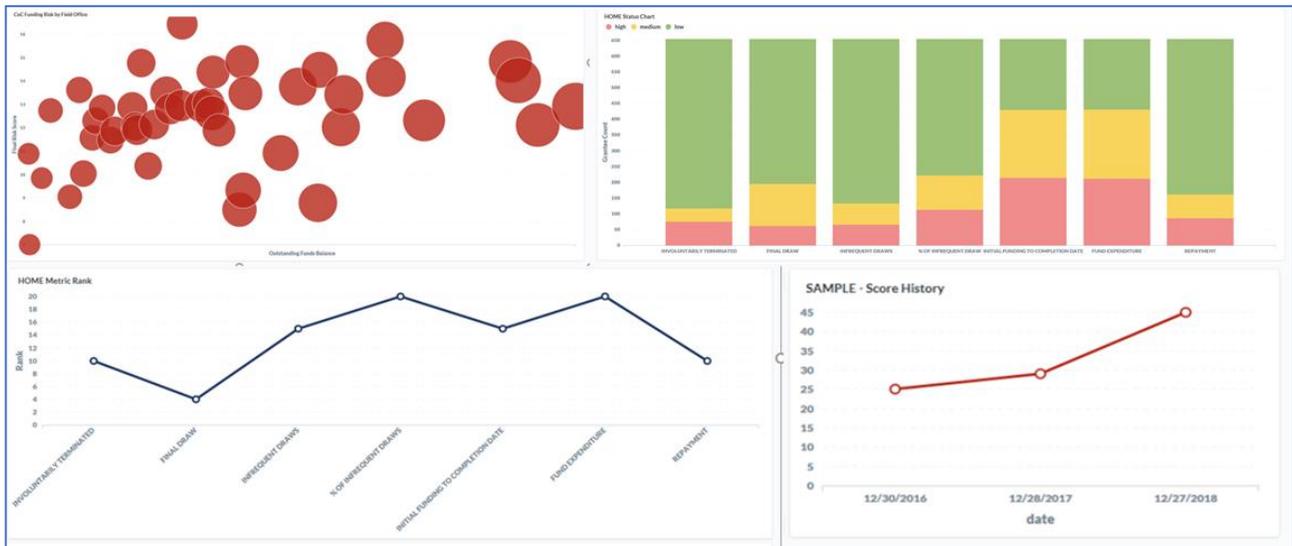


grantees. An example of this CPD-wide risk score is shown below. In this example, the program scores are collectively considered when calculating a grantee's total risk.

Grantees List											Total Risk - Average	Total Risk - AveragePlus	Total Risk - DeMorgan
id	GranteeName	FieldOffice	CDBG	CoC	ESG	HOME	HOPWA-C	HOPWA-F	SingleAudit				
680	ARECIBO	CARIBBEAN	38	-	-	71	-	-	99		69	81	93
2,228	AIDS RESOURCE CENTER OF WI (WI)	MILWAUKEE	-	-	-	-	40	-	93		67	77	80
2,872	CALIFORNIA VETERANS ASSISTANCE FOUN	COLUMBUS	-	33	-	-	-	-	88		61	72	72
341	INDIANA	INDIANAPOLIS	23	-	-	75	-	43	97		60	75	93
683	TOA ALTA	CARIBBEAN	38	-	-	-	-	-	81		60	68	64
897	RICHMOND	SAN FRANCISCO	23	-	-	61	-	-	89		58	70	81
3,257	W CENTRAL WIS COMM ACTION ANCY, INC	MINNEAPOLIS	-	28	-	-	-	-	87		38	69	69
3,275	THE GUEST HOUSE OF MILWAUKEE	MINNEAPOLIS	-	17	-	-	-	-	96		57	72	81
1,909	MERCER COUNTY CONSORTIUM	NEWARK	-	-	-	44	-	-	69		57	62	53
2,639	ISAIAH HOUSE	PHILADELPHIA	-	11	-	-	-	-	100		56	73	87

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- **Customized Interactive Visualizations:** The CPD Risk Management Platform provides interactive, user-friendly visualizations. These visualizations are designed to be a part of an integrated business solution powered by technology and analytics, serving to enhance transparency, efficiency and productivity at all levels of the organization—from headquarters through the field offices and during monitoring reviews.
- The below graphic shows some of the data visualizations that the platform offers:



What was the result?

While it is still in its beginning phases, the enhanced risk scoring and interactive visualizations that the CPD Risk Management Platform provides will improve the efficiency and productivity of risk monitoring activities. The fusion of these two components will enable improvements to risk scoring, workforce planning, and grantee



monitoring. This platform provides an objective view of CPD's grantee landscape and provides CPD with the ability to identify emerging issues, target monitoring and enhance its deployment of resources.

Without the CPD Risk Management Platform, the CPD office spends 4.5 staff hours on average to complete a single grantee risk assessment. CPD has approximately 5,777 grantee risk assessments outstanding, which requires approximately 26,000 staff hours and \$1.88 million to complete. However, with the implementation of the CPD Risk Management Platform, CPD can reduce the total staff hours to complete these risk assessments from 26,000 to 5,777 (1 hour per risk assessment), which has the potential to save HUD and the American taxpayers over \$1.46 million annually!

Future Steps

Major development and operational progress for the CPD Risk Management Platform is planned for FY20. Key activities include:

- **Data-Driven Scoring Enhancements:** The CPD Risk Management Platform will include the integration of additional data and the application of advanced analytic techniques such as machine learning and artificial intelligence to drive enhancements to the risk scoring process. The exploration of additional data, both internal and external to HUD, will provide a more comprehensive view of the risks associated with grantees. By rapidly integrating data from monitoring outcomes and observations will enable continuous improvement of risk scoring and monitoring. Applying machine learning and artificial intelligence to risk scoring will maximize the value of HUD's data, elevating the accuracy, precision, and effectiveness of risk scoring.
- **Operationalization of Visualizations:** Collaborating with CPD systems owners, CPD/OCFO will design and implement an approach for automating data extraction from existing source systems onto the platform. It will also establish a method for collecting and incorporating new risk factors and data into the overall risk score.
- **Design of new Visualizations:** Working closely with representatives from all CPD stakeholder groups, OCFO will create and design additional imagery that are tailored to end-user needs.
- **Analytic Enhancements to Risk Scoring:** Data from CPD, other HUD programs, and external sources will be integrated to create an entity risk score that provides a holistic view of a grantee's performance in comparison to its peers and gain insight into the overall performance of CPD grantees.

The visualizations in the CPD Risk Management Platform will be rolled out to end-users in CPD in two phases. First, OCFO will gather feedback to identify areas for refinement from a small group of users. Then, OCFO will use the feedback received to implement system improvements prior to a larger roll-out within the CPD office. These activities will result in a technology-powered platform that enhances all aspects of the CPD risk scoring and monitoring process and will serve as a foundation for ongoing technology and analytics development throughout HUD going forward.