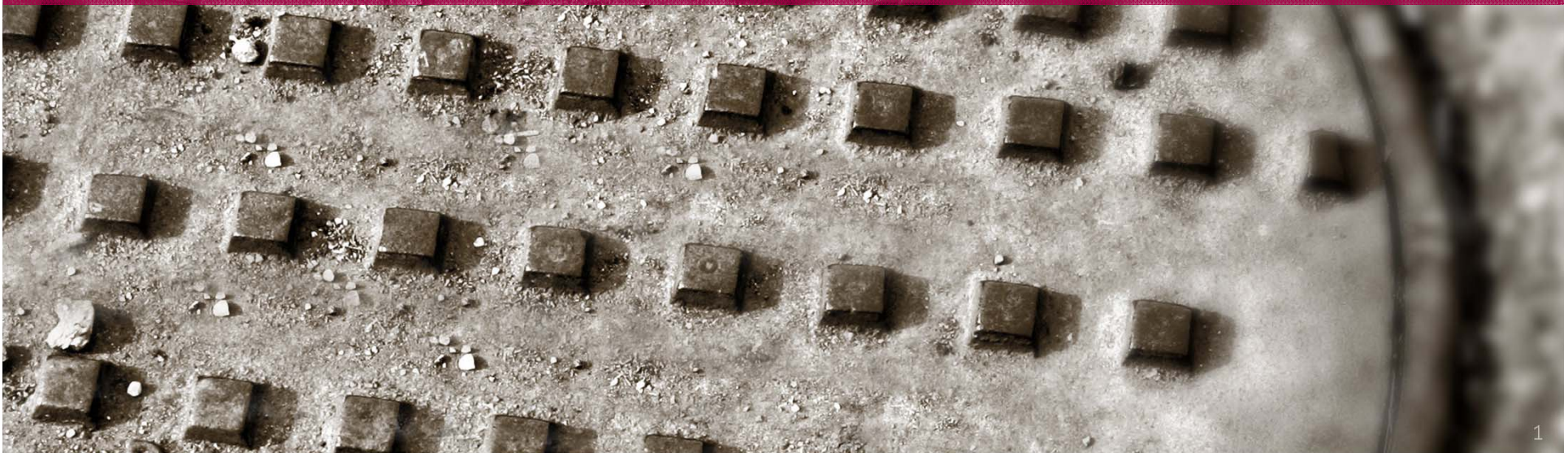


MRAT

A solution to integrating future
climate data into modeling

Robert Tremblay | Director of Research | June 12, 2014



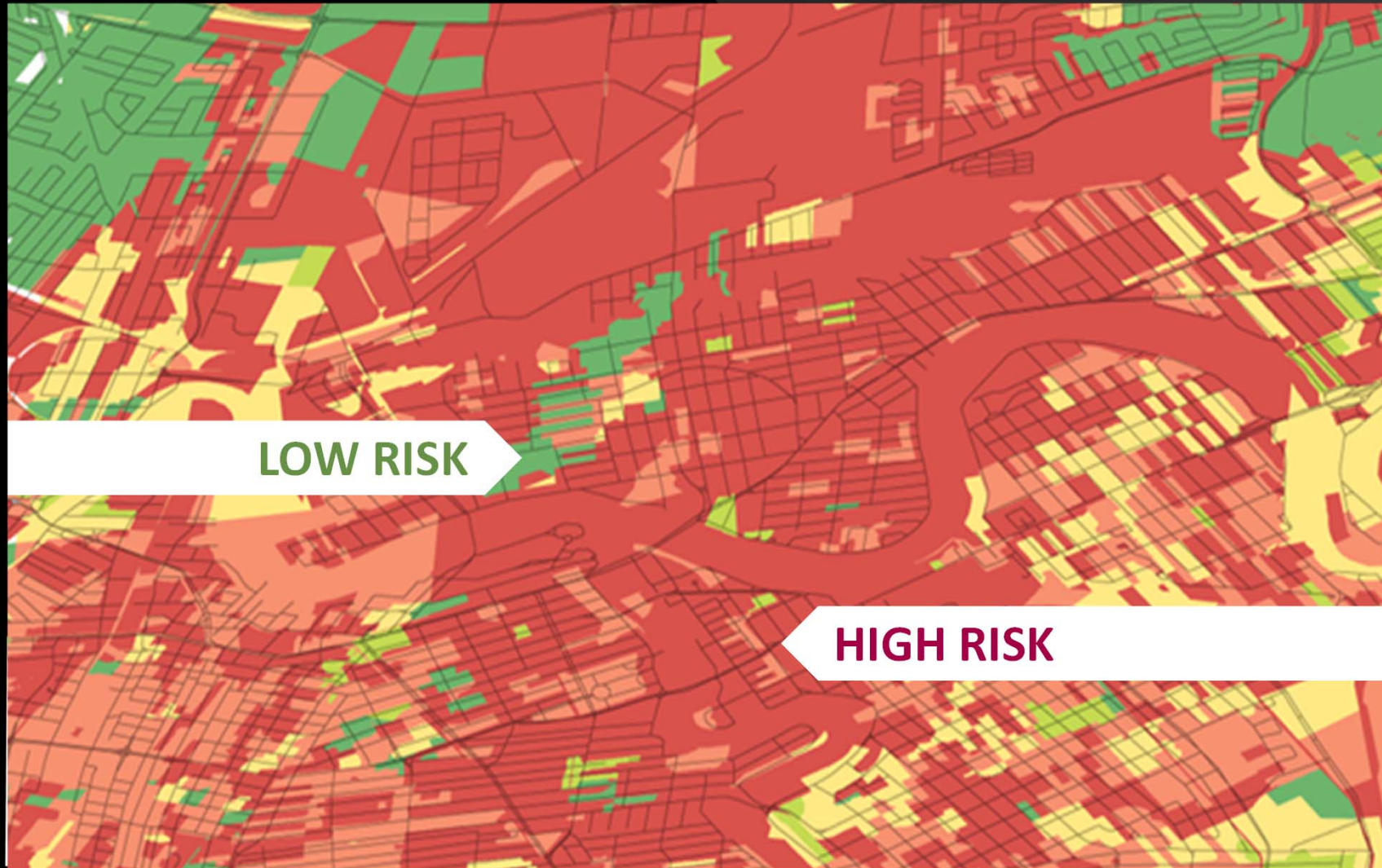


Hamilton



Hamilton

Population: 519,949

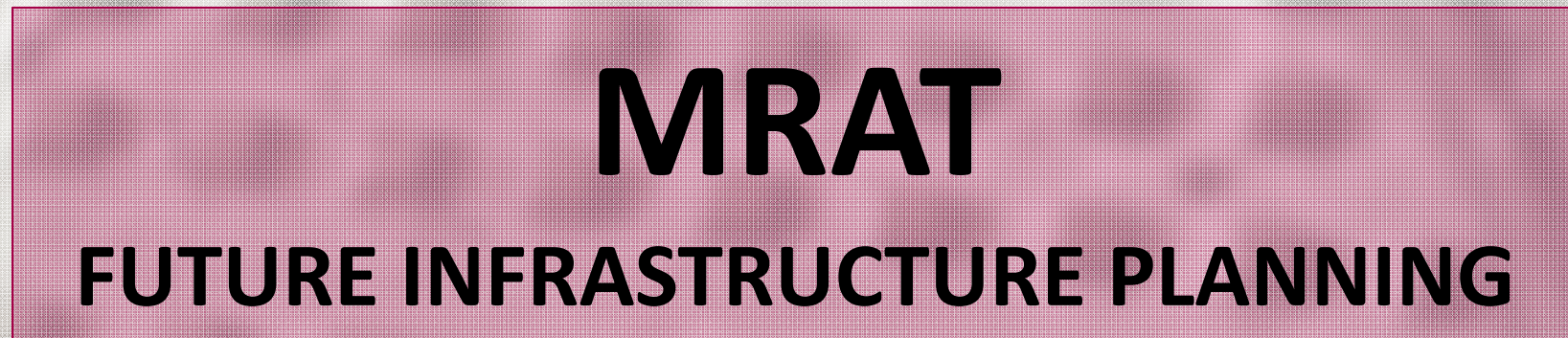


- Overland flood coverage not available for personal lines
- Sewer backup coverage available
 - Claims increasing
 - Coverage restrictions emerging
- Increase in extreme rain events
- \$55 billion deficit in sewer and stormwater infrastructure

Storm Event Response Group Focus Areas
and Impact of the
July 26th 2009 Storm

**THE LOSSES OF THE
PAST ARE NO LONGER
AN INDICATION OF THE
LOSSES OF THE FUTURE**

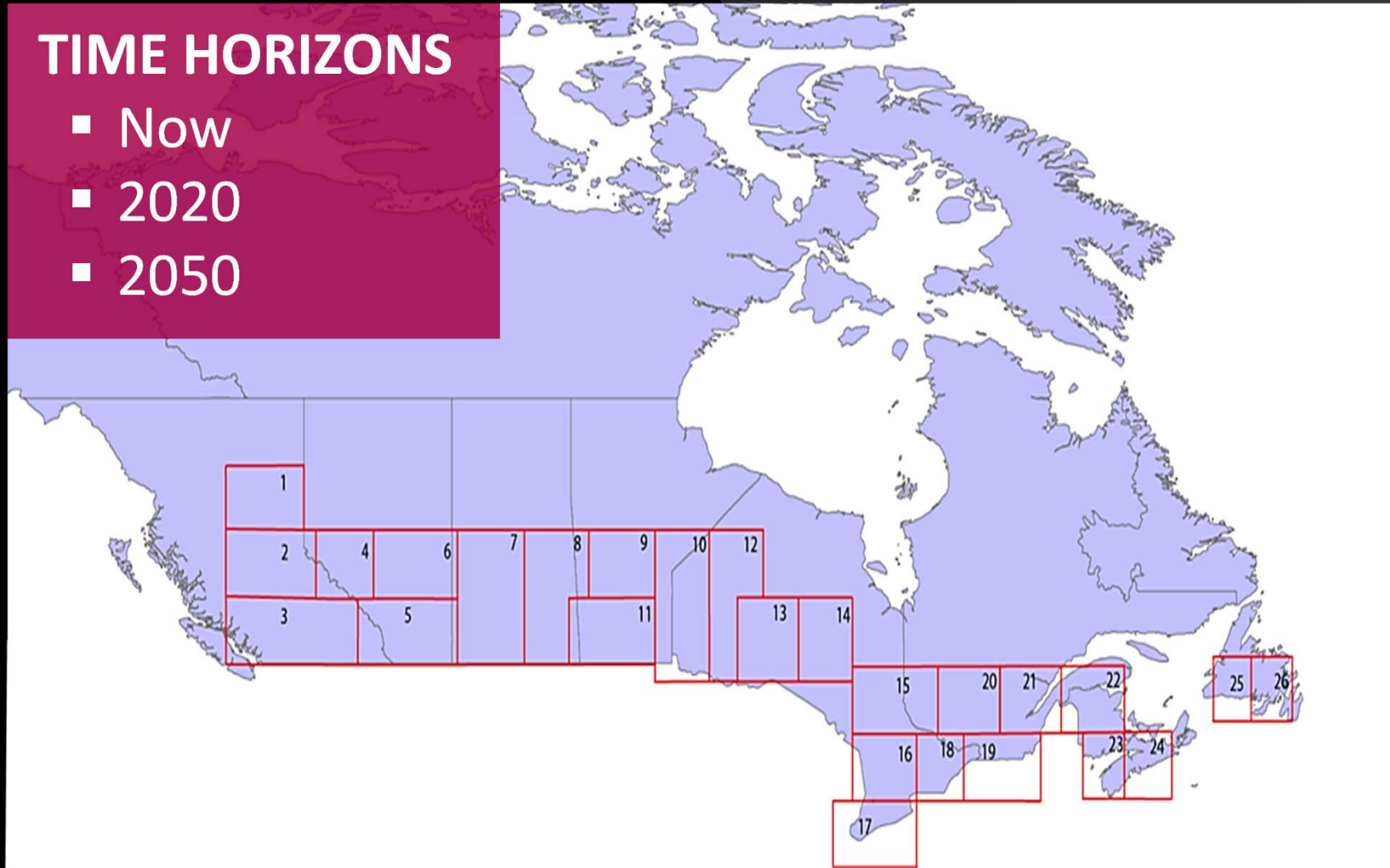
— Historical trouble spots
○ 2009 sewer backups





TIME HORIZONS

- Now
- 2020
- 2050



MRAT:

is a tool to quantify failure risk of municipal sewer and stormwater infrastructure resulting in losses for both current and future risk

$$\text{RISK} = \text{PROBABILITY} \times \text{VULNERABILITY} \times \text{EXPOSURE}$$

VULNERABILITY

Land use
Age of sewer

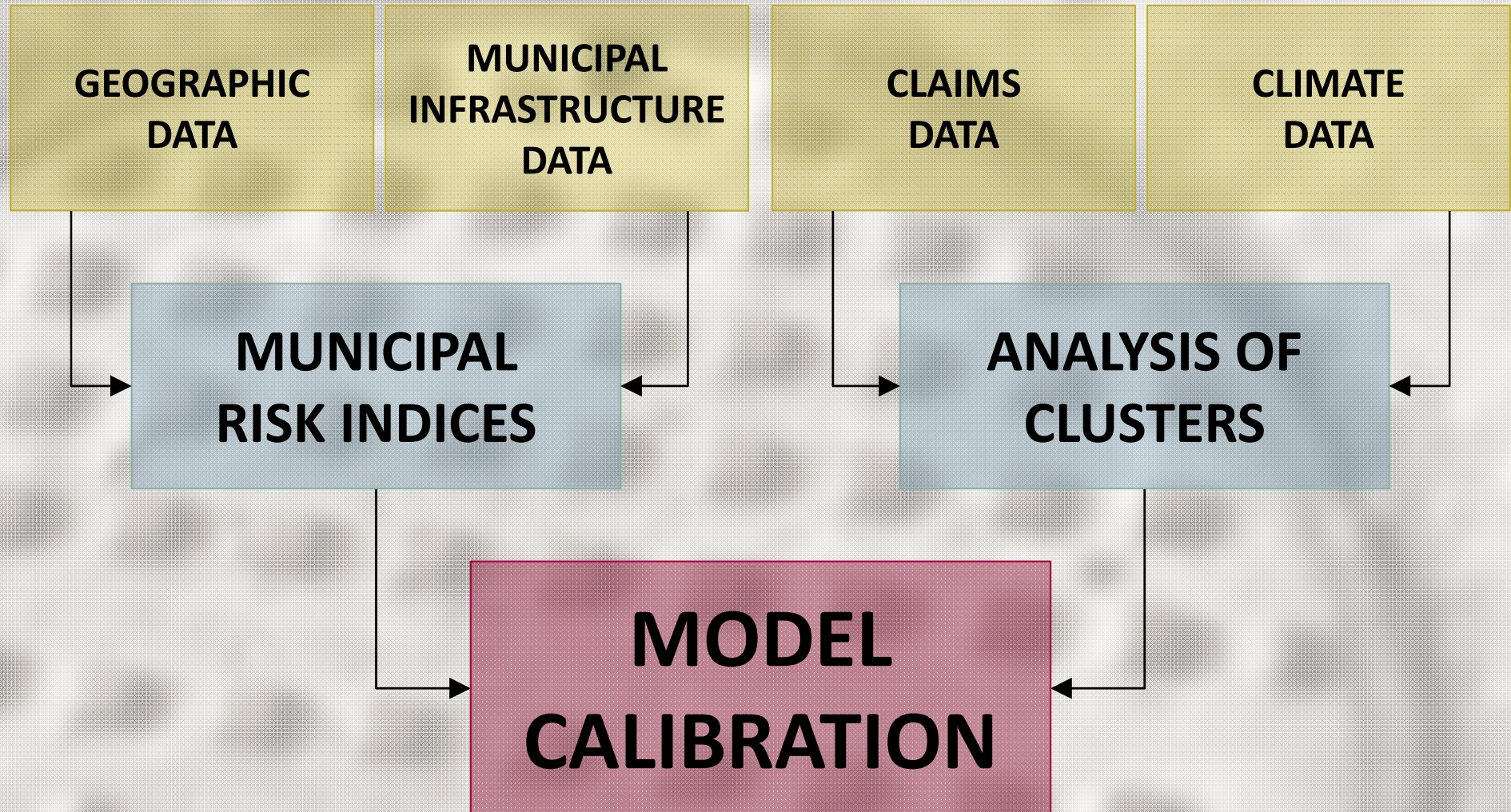
EXPOSURE

Topography
Building count
Proximity to
water

MITIGATION

Emergency response
plan
Maintenance
schedule
Capital spending





Demo City: Current risk of sewer backup

Municipal Risk Assessment Tool



IBC MRAT Risk Indicators

Municipality: Demo Druid: 180258578 Postal Code:

Indicator	Current 	2020 Lower 	2020 Upper 	2050 Lower 	2050 Upper 
Druid	0.15	0.26	0.47	0.21	0.53
PC Avg.	0.2	0.32	0.52	0.26	0.52
PC Min	0.15	0.26	0.47	0.21	0.53
PC Max	0.45	0.63	0.8	0.55	0.84

Municipal Risk Assessment Tool



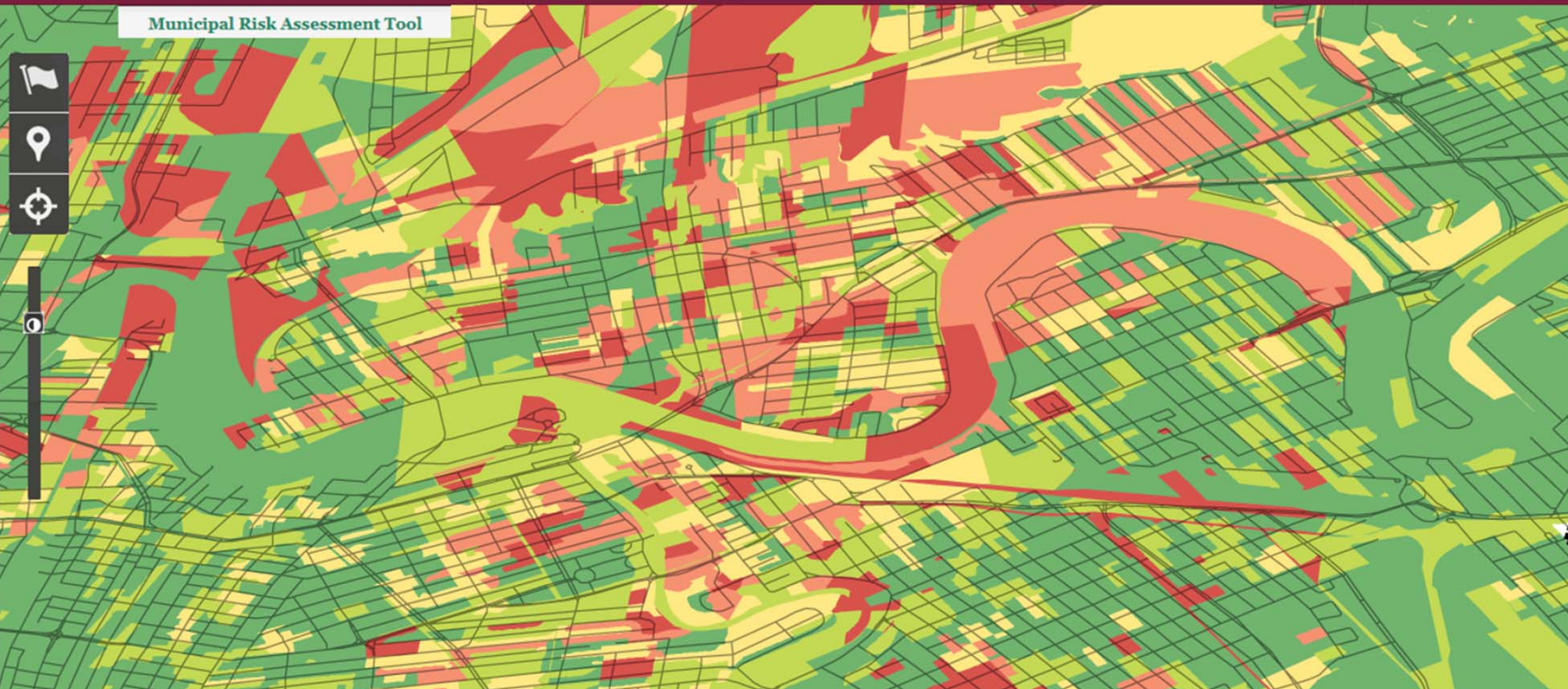
	2020 Lower	2050 Lower	2050 Upper
	0.26	0.21	0.53
	0.32	0.26	0.52
	0.26	0.21	0.53
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Municipal Risk Assessment Tool



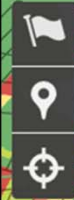
IBC MRAT Risk Indicators

Municipality: Demo

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Municipal Risk Assessment Tool



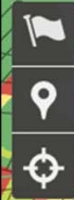
IBC MRAT Risk Indicators

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Municipal Risk Assessment Tool



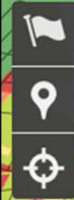
IBC MRAT Risk Indicators

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Municipal Risk Assessment Tool



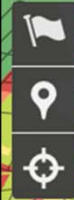
IBC MRAT Risk Indicators

Municipality: Demo

Druid: 180258578 Postal Code:

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Municipal Risk Assessment Tool



IBC MRAT Risk Indicators

Municipality: Demo

Druid: 180258578 Postal Code:

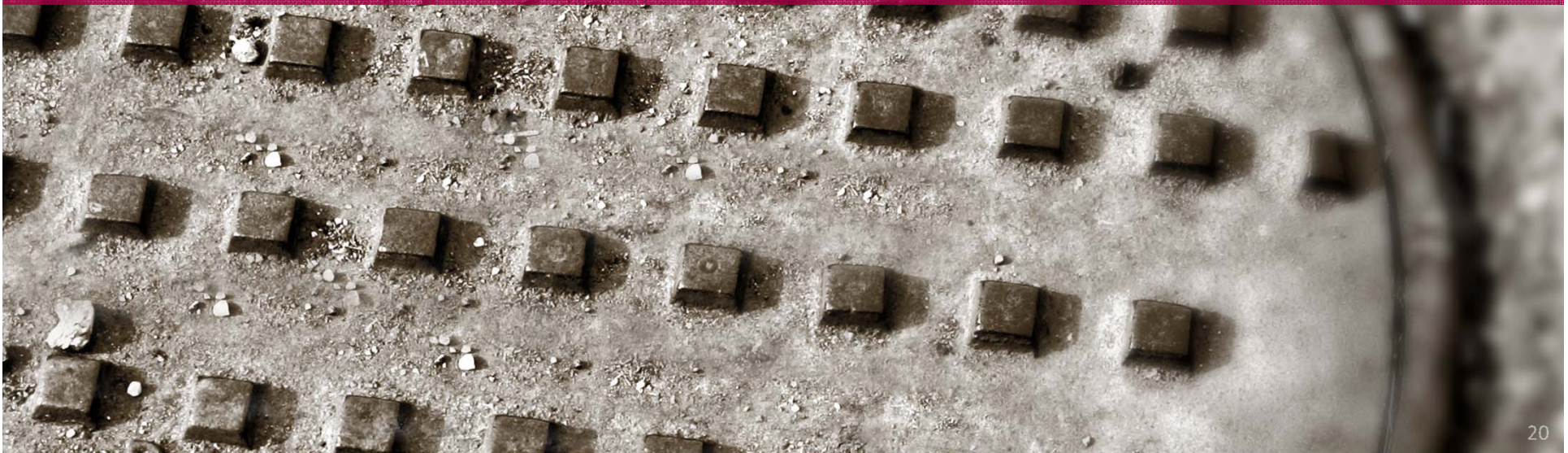
Indicator	Current	2020 Lower	2020 Upper	2050 Lower	2050 Upper
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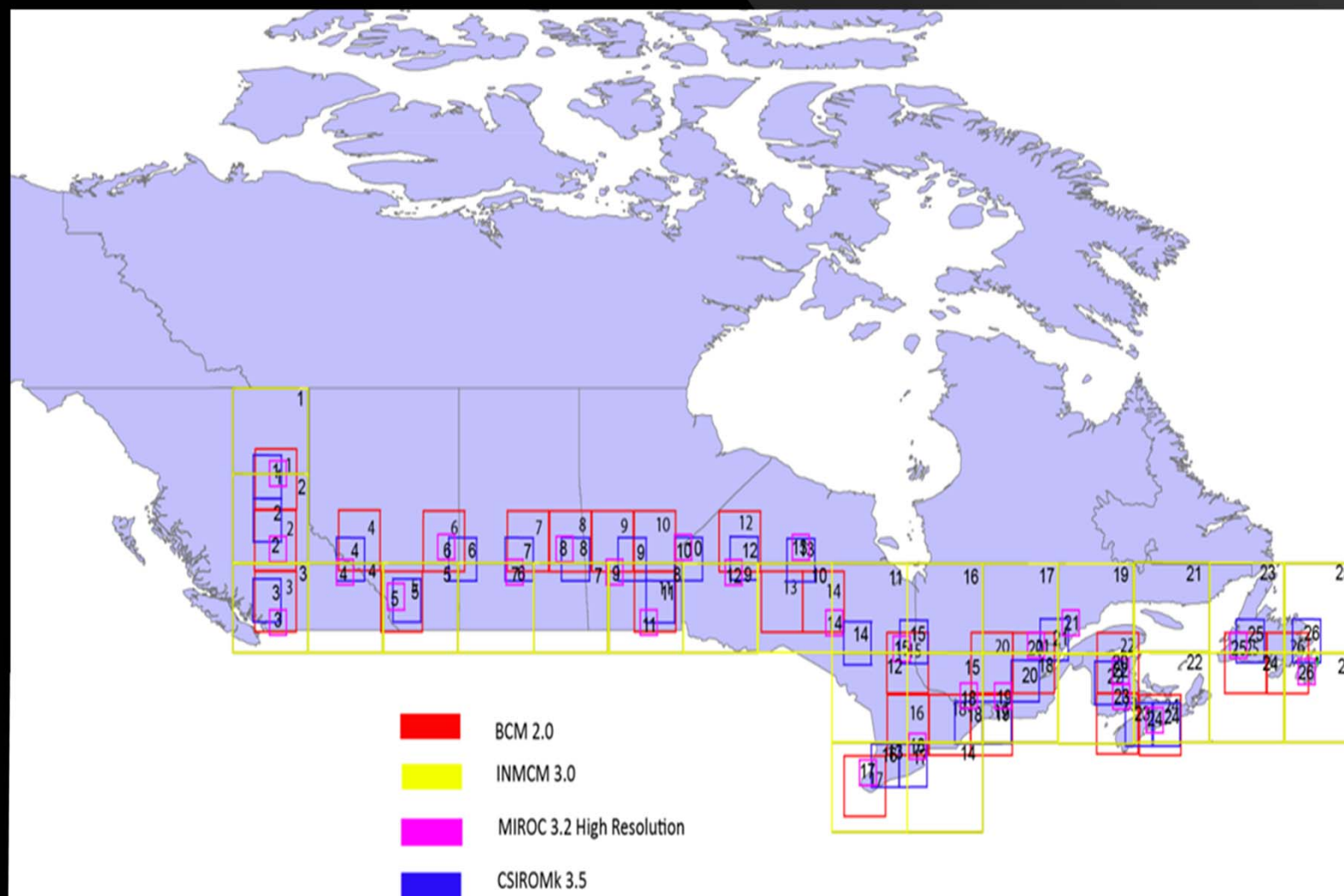
- Wider applications for other assets
- Helps municipalities plan and prioritize
- The “gold standard” for funding
- Win-win for insurers and municipalities

MRAT

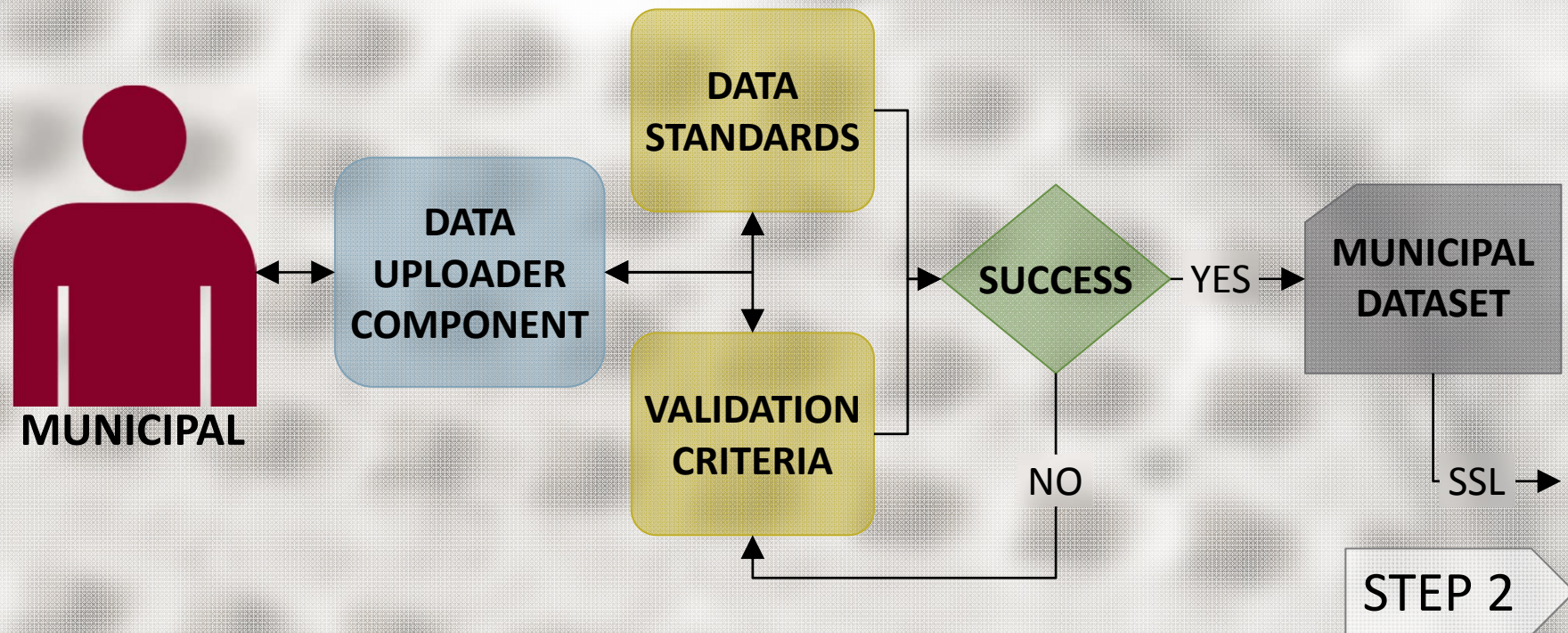
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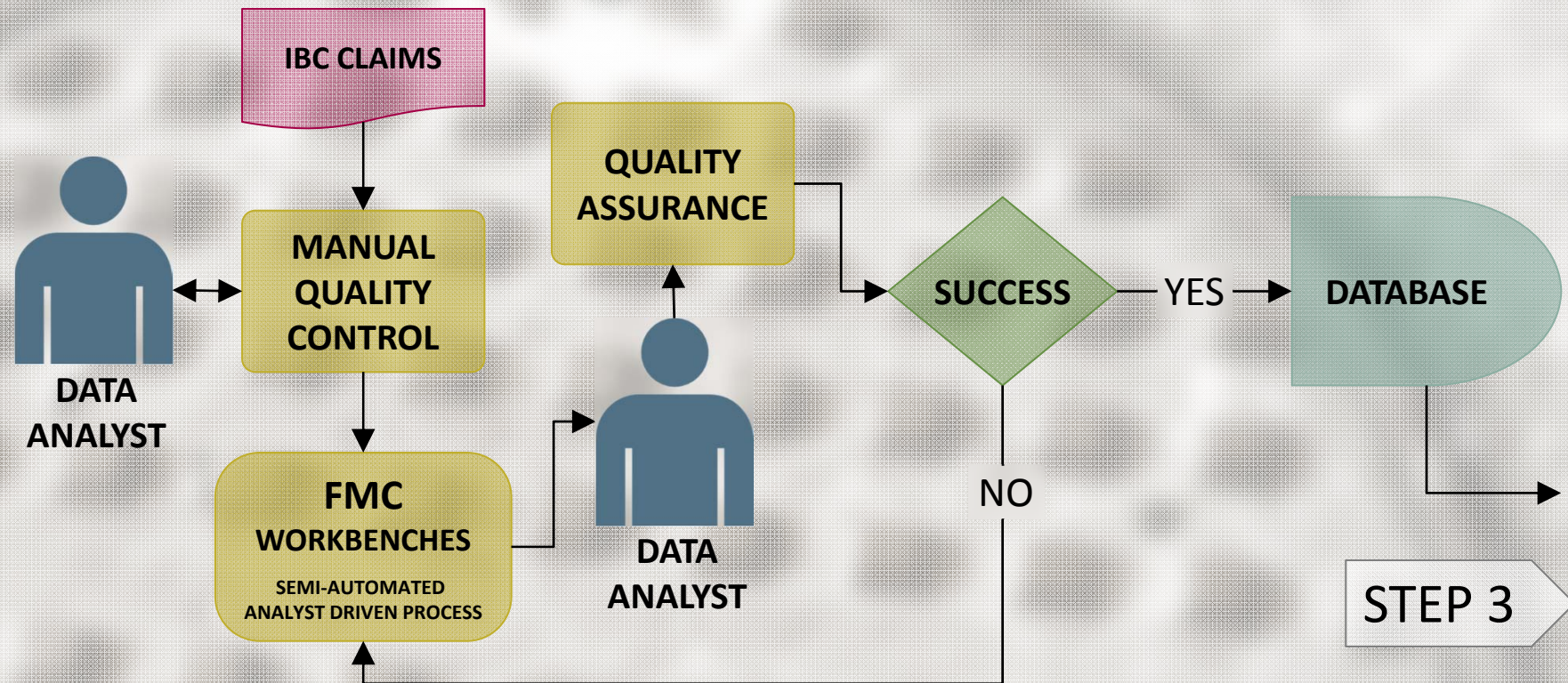


DATA ACQUISITION



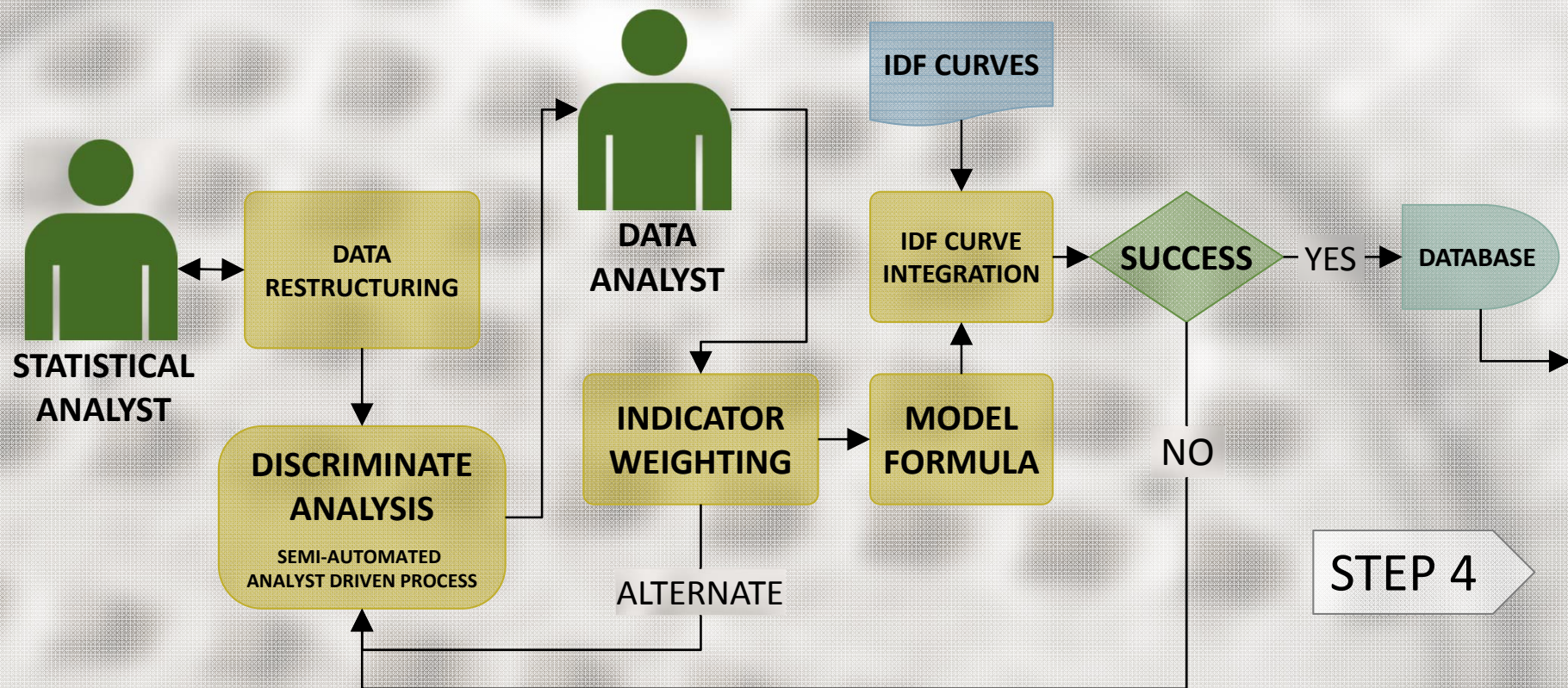
DATA UPLOADER

DATA MANAGEMENT AND PROCESSING



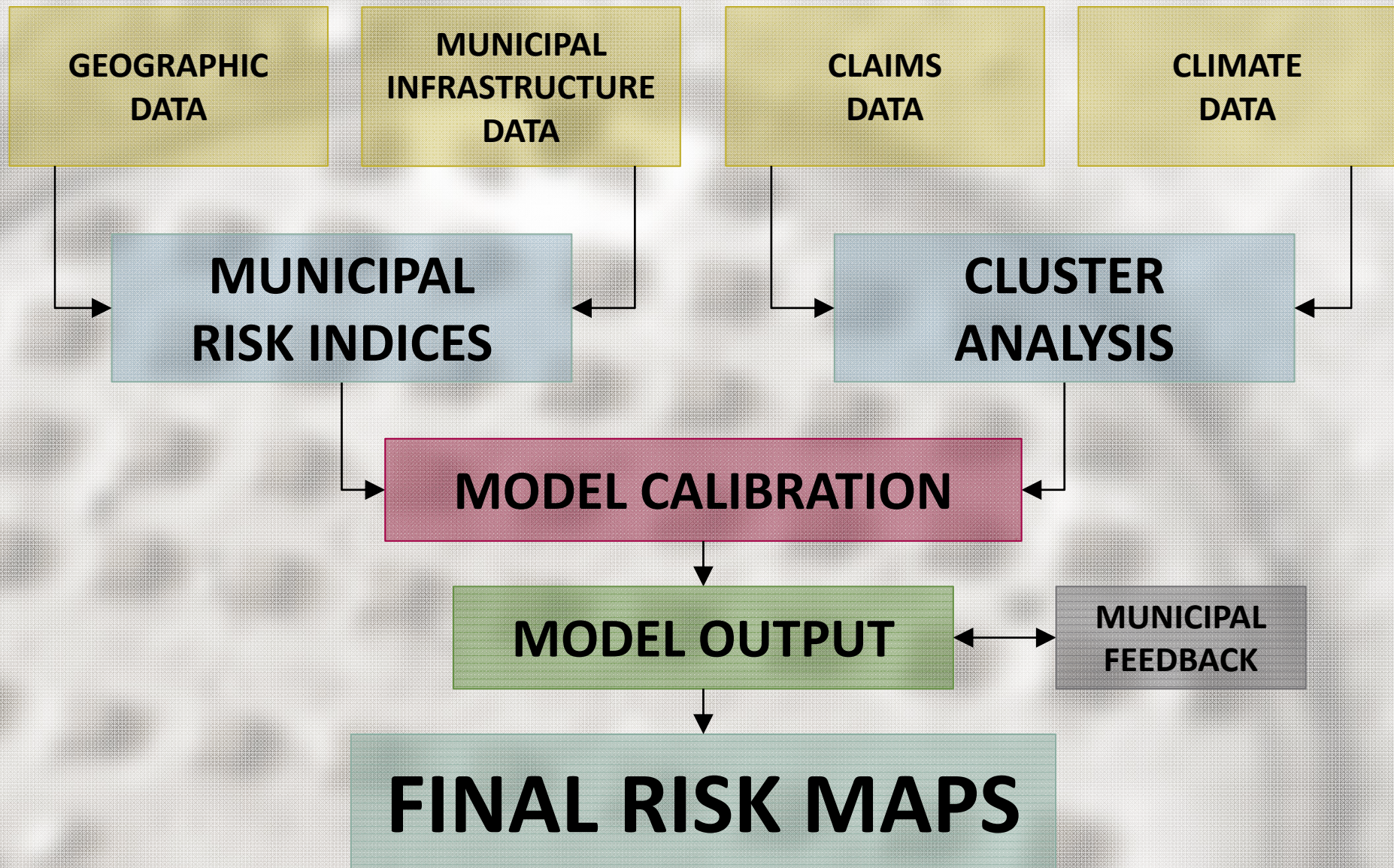
INDICATOR DEVELOPMENT

DATA MANAGEMENT AND PROCESSING



MRAT MODELING

STEP 4



Indicator	Description	Influence	RW
AGE_SAN123	The proportion of total sewer pipe (length) in a spatial unit that is classified as SANITARY in age classes 1, 2 & 3 (i.e. 0-25 years old)	+	0.32
DEN_BLD	The density of buildings in a spatial unit (i.e. building count)	-	0.40
PCNT_COM	The proportion of spatial unit area in commercial land use class	-	0.42
PCNT_INS	The proportion of spatial area in institutional land use class.	-	0.39

RISK =

$$\begin{aligned} &0.32*AGE_SAN123 - 0.40*DEN_BLD - \\ &0.42*PCNT_COM - 0.39*PCNT_INS - \\ &0.35*PSLWT_500 - 0.31*DEN_ROAD \\ &+ 0.29*PLLAK_500 \end{aligned}$$