

Ranking Formula for Use in Tiered Implementation Approach

August 29, 2017

Advisory Committee Meeting

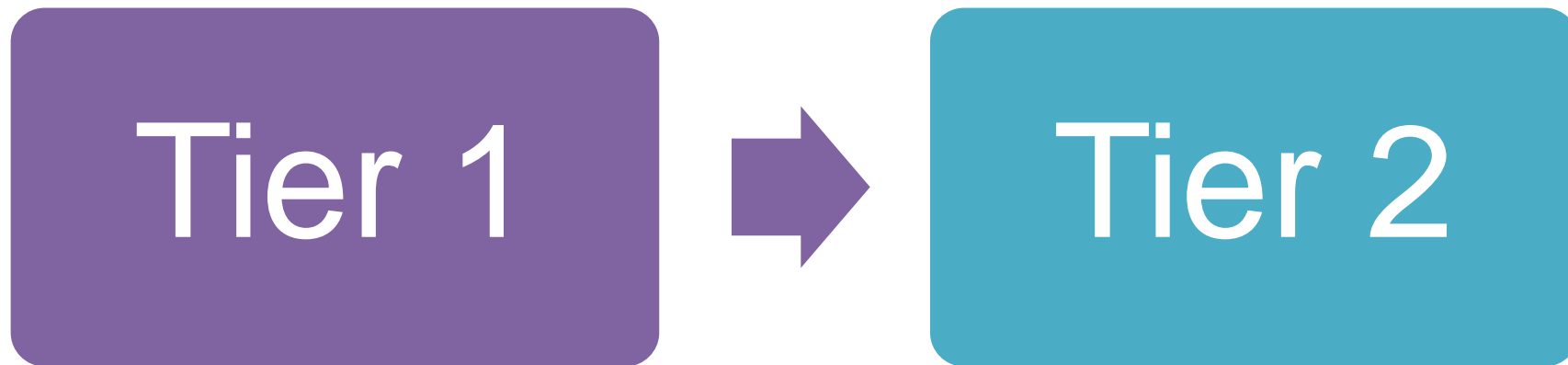
Overview

- Tiered implementation review
- Proposed ranking factors (update)
- Proposed ranking formula

Tiering Implementation

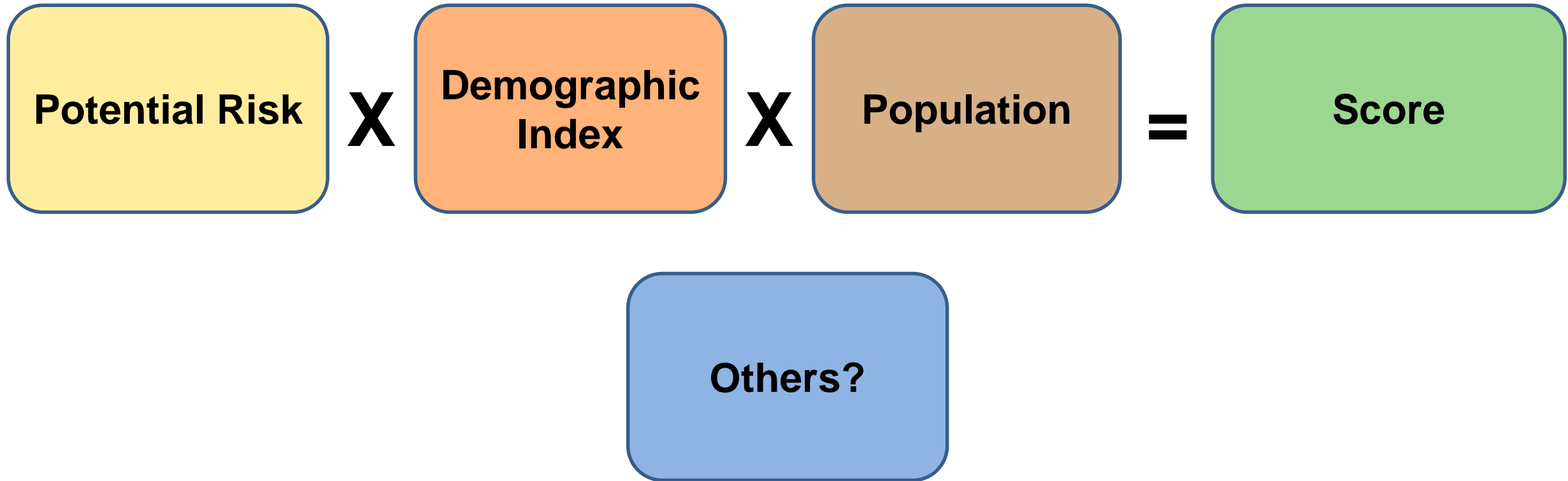
Two Tiers:

- Tier 1 to take ~5 years
- Report to EQC every year
- Tier 2 starts after Tier 1

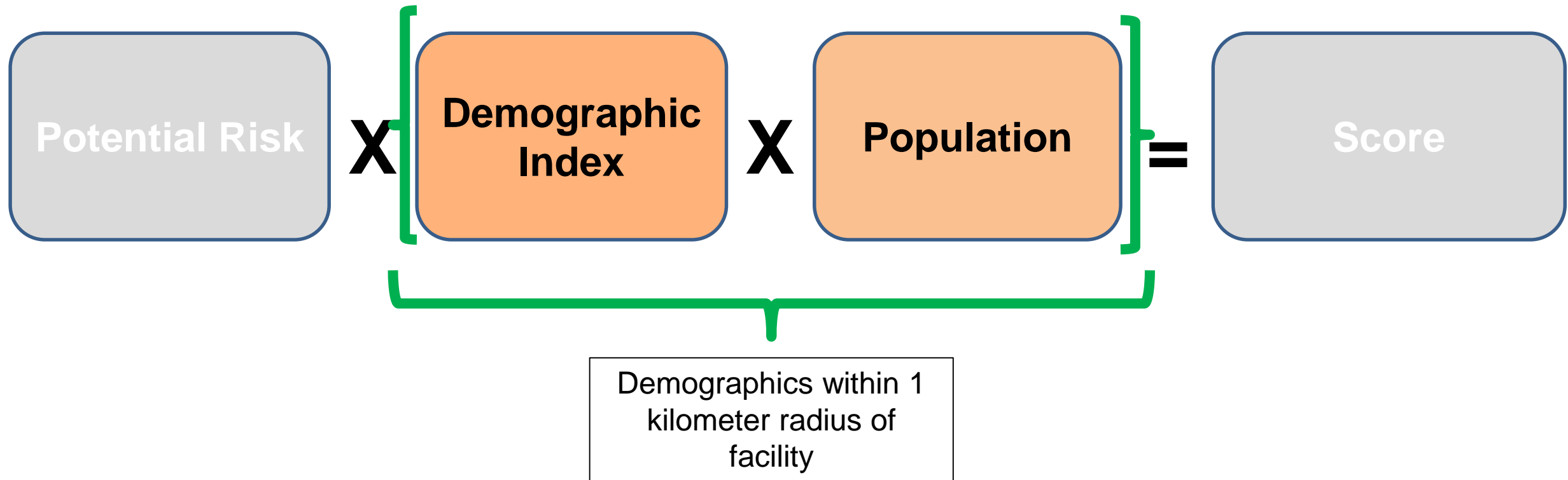


Individual Source Ranking Process

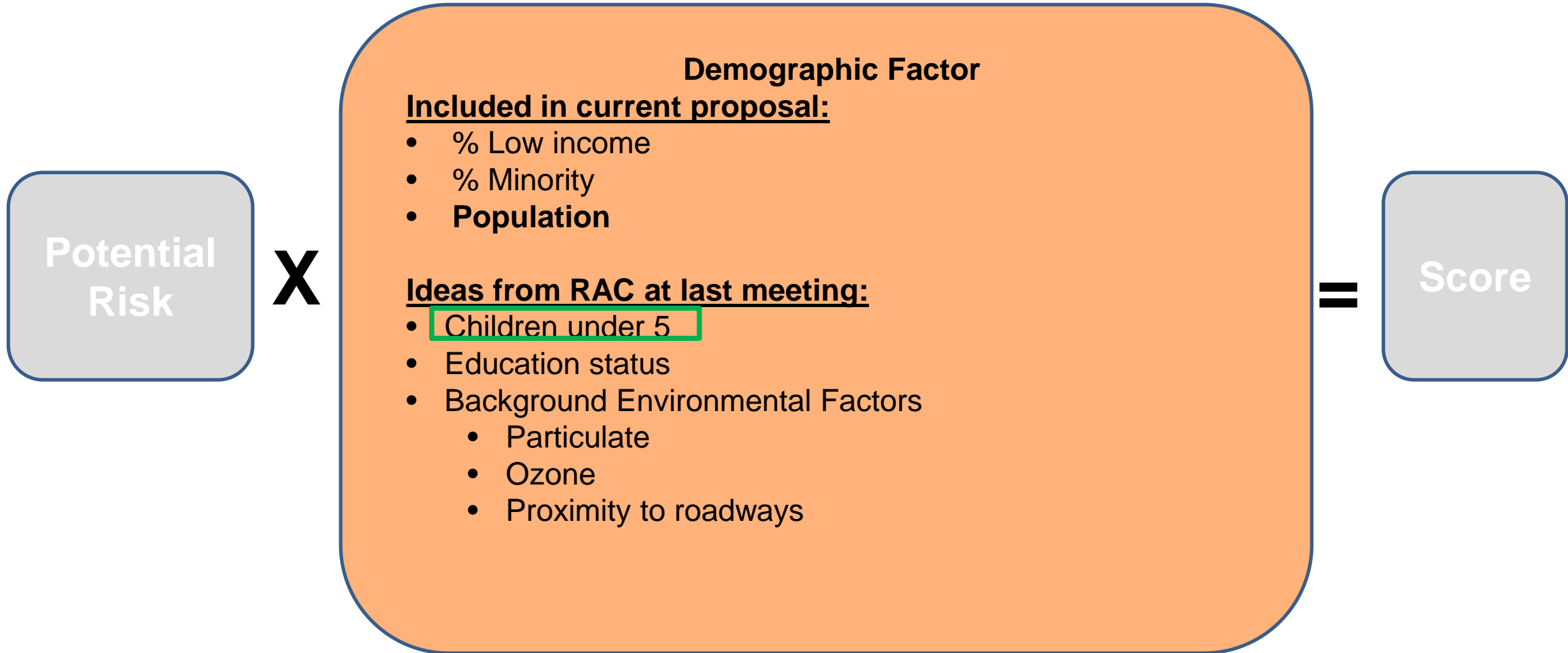
Potential Ranking Formula



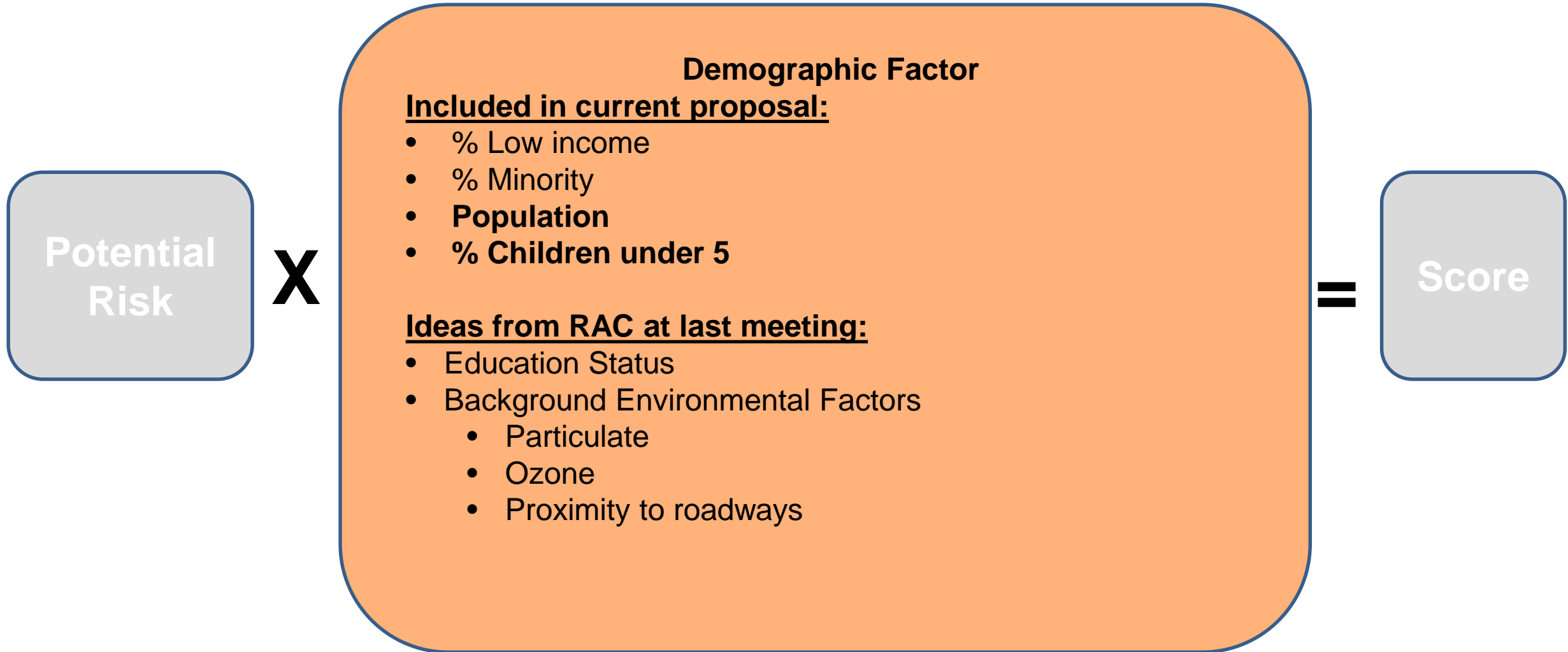
New: Combined Demographics criterion



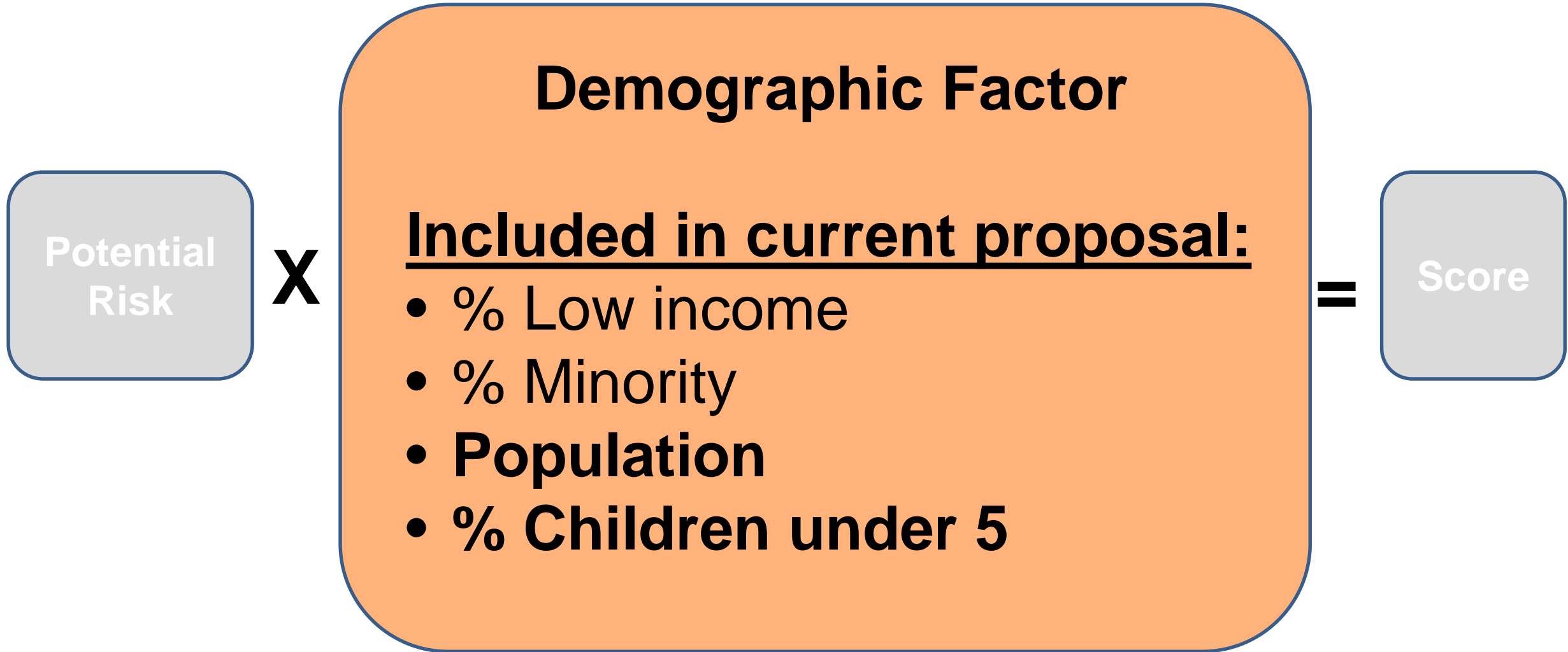
Demographic Factor: Components



Demographic Factor: Components



Demographic Factor: Components



Correction to Discussion Draft Rules

Current Language (OAR 340-245-0040(1)(a)(C)(ii) pg. 17)

...demographic statistics that include percentile ranking of the **number** of low income, minority, children under the age of 5 years old,...

Proposed Language (OAR 340-245-0040(1)(a)(C)(ii) pg. 17)

...demographic statistics that include percentile ranking of the **percentage** of low income, minority, children under the age of 5 years old,...

Reason for Correction to Discussion Draft Rules

Facility A

Facility B

Population: 10,000

Population: 3,000

Number of low income people: 2,300

Number low income people: 1,800

Current

Percent low income: 23%

Percent low income: 60%

Proposed

State-wide Percent Low Income : 36%

Proposed Facility Score Equation

$$Score = Risk^{0.75} \times \left(\frac{low\ income + minority + children < 5 + population}{4} \right)^{0.25}$$

*All terms are percentile rank within distribution of all facilities being evaluated

Weighting Options and Test Runs

		Risk Weight	0.75	Proposed
		Demo. Weight	0.25	Proposed
Facility	Risk	Demographics	Score	Rank
A	0.9	0.1	0.52	2
B	0.7	0.3	0.57	1
C	0.5	0.5	0.50	3
D	0.3	0.7	0.37	4
E	0.1	0.9	0.17	5

Weighting Options and Test Runs

		Risk Weight	0.75	Proposed	0.5	
		Demo. Weight	0.25	Proposed	0.5	
Facility	Risk	Demographics	Score	Rank	Score	Rank
A	0.9	0.1	0.52	2	0.30	4
B	0.7	0.3	0.57	1	0.46	2
C	0.5	0.5	0.50	3	0.50	1
D	0.3	0.7	0.37	4	0.46	2
E	0.1	0.9	0.17	5	0.30	4

Proposed Facility Score Equation

$$Score = \boxed{Risk}^{0.75} \times \left(\frac{low\ income + minority + children < 5 + population}{4} \right)^{0.25}$$

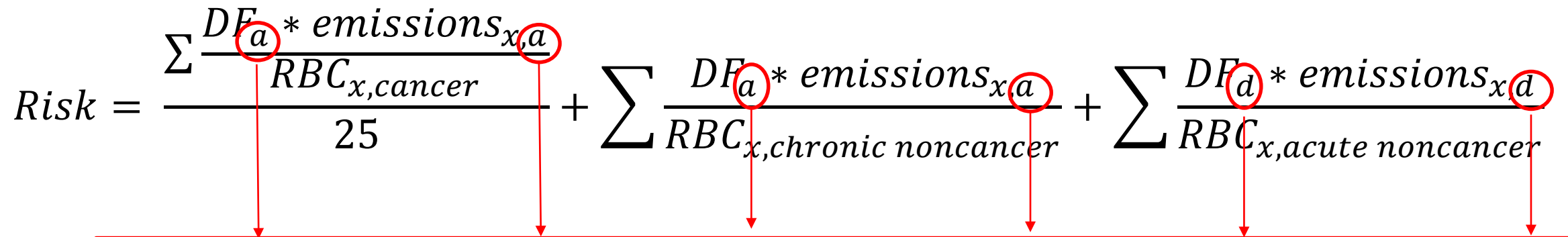
*All terms are percentile rank within distribution of all facilities being evaluated

Equation to Get Risk Factor for Ranking

$$Risk = \frac{\sum \frac{DF_a * emissions_{x,a}}{RBC_{x,cancer}}}{25} + \sum \frac{DF_a * emissions_{x,a}}{RBC_{x,chronic\ noncancer}} + \sum \frac{DF_d * emissions_{x,d}}{RBC_{x,acute\ noncancer}}$$

DF = Dispersion Factor. Converts emissions into an estimated ambient air concentration. These come from Table 6 in Discussion Draft Rules.

Equation to Get Risk Factor for Ranking

$$Risk = \frac{\sum \frac{DF_a * emissions_{x,a}}{RBC_{x,cancer}}}{25} + \sum \frac{DF_a * emissions_{x,a}}{RBC_{x,chronic\ noncancer}} + \sum \frac{DF_d * emissions_{x,d}}{RBC_{x,acute\ noncancer}}$$


“a” means “annual” and “d” means “daily”. Table 6 is split into annual and daily dispersion factors and we will have annual and daily emissions data from facilities.

Equation to Get Risk Factor for Ranking

$$Risk = \frac{\sum \frac{DF_a * \text{emissions}_{x,a}}{RBC_{x,cancer}}}{25} + \sum \frac{DF_a * \text{emissions}_{x,a}}{RBC_{x,chronic\ noncancer}} + \sum \frac{DF_d * \text{emissions}_{x,d}}{RBC_{x,acute\ noncancer}}$$

Emissions of each air toxic for which we have RBCs for the facility; from emissions inventory

Equation to Get Risk Factor for Ranking

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Risk Based Concentration (from Table 5 in draft rules).
Emissions converted to air concentrations for each air toxic that a facility emits are divided by the RBC for that air toxic to create a ratio.

Equation to Get Risk Factor for Ranking

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Means sum of these ratios for all air toxics that a facility emits

Equation to Get Risk Factor for Ranking

$$Risk = \frac{\sum \frac{DF_a * emissions_{x,a}}{RBC_{x,cancer}}}{25} + \sum \frac{DF_a * emissions_{x,a}}{RBC_{x,chronic\ noncancer}} + \sum \frac{DF_d * emissions_{x,d}}{RBC_{x,acute\ noncancer}}$$

The same air toxic may have an RBC for up to 3 categories of risk: cancer, chronic noncancer, and acute noncancer. The sums of ratios for each category are summed to generate the overall risk term for the scoring/ranking equation.

Equation to Get Risk Factor for Ranking

$$Risk = \frac{\sum \frac{DF_a * emissions_{x,a}}{RBC_{x,cancer}}}{25} + \sum \frac{DF_a * emissions_{x,a}}{RBC_{x,chronic\ noncancer}} + \sum \frac{DF_d * emissions_{x,d}}{RBC_{x,acute\ noncancer}}$$

For implementation ranking purposes we are interested in times above the source Risk Action Level (RAL) as opposed to total cancer risk. Since cancer-based RBCs for individual air toxics are set at 1 in 1 million risk and the RAL is proposed at 25 in 1 million for a source, this adjustments converts cancer risk to times above RAL to avoid giving cancer risk more weight than noncancer health risks.

Equation to Get Risk Factor for Ranking

$$\text{Risk} = \frac{\sum \frac{DF_a * emissions_{x,a}}{RBC_{x,cancer}}}{25} + \sum \frac{DF_a * emissions_{x,a}}{RBC_{x,chronic\ noncancer}} + \sum \frac{DF_d * emissions_{x,d}}{RBC_{x,acute\ noncancer}}$$

This value for each facility is converted into a percentile based on its risk level relative to that of all other facilities being evaluated. For ranking purposes all facilities will have some risk factor between 0 and 1.

RAC Discussion

