



MaRIA: Mobile Radiation Intensity Mapper



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11th Congress of the Portuguese Committee for URSI

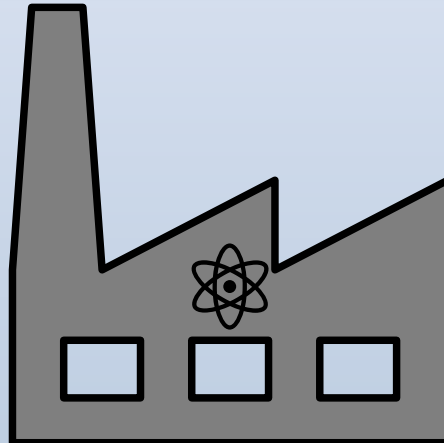
24 November 2017

Motivation

Urban Safety
Inspection



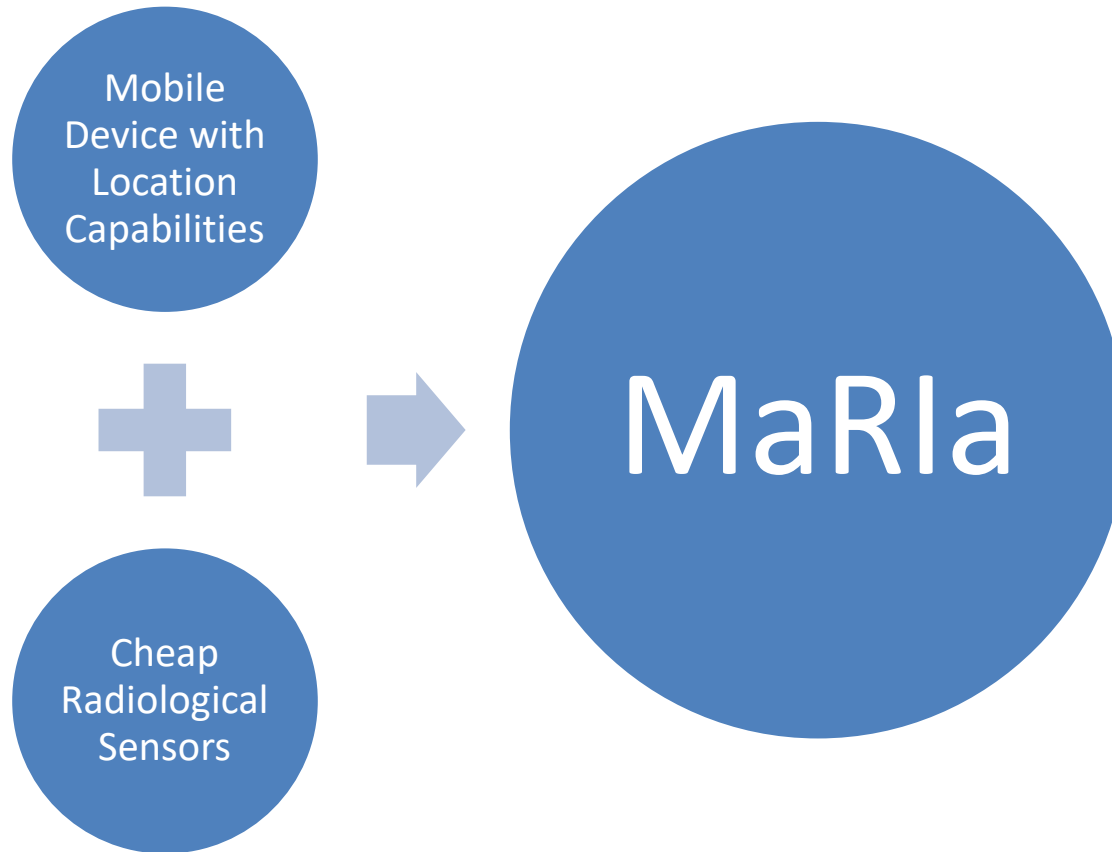
Research Facilities
or
Nuclear Power Plants



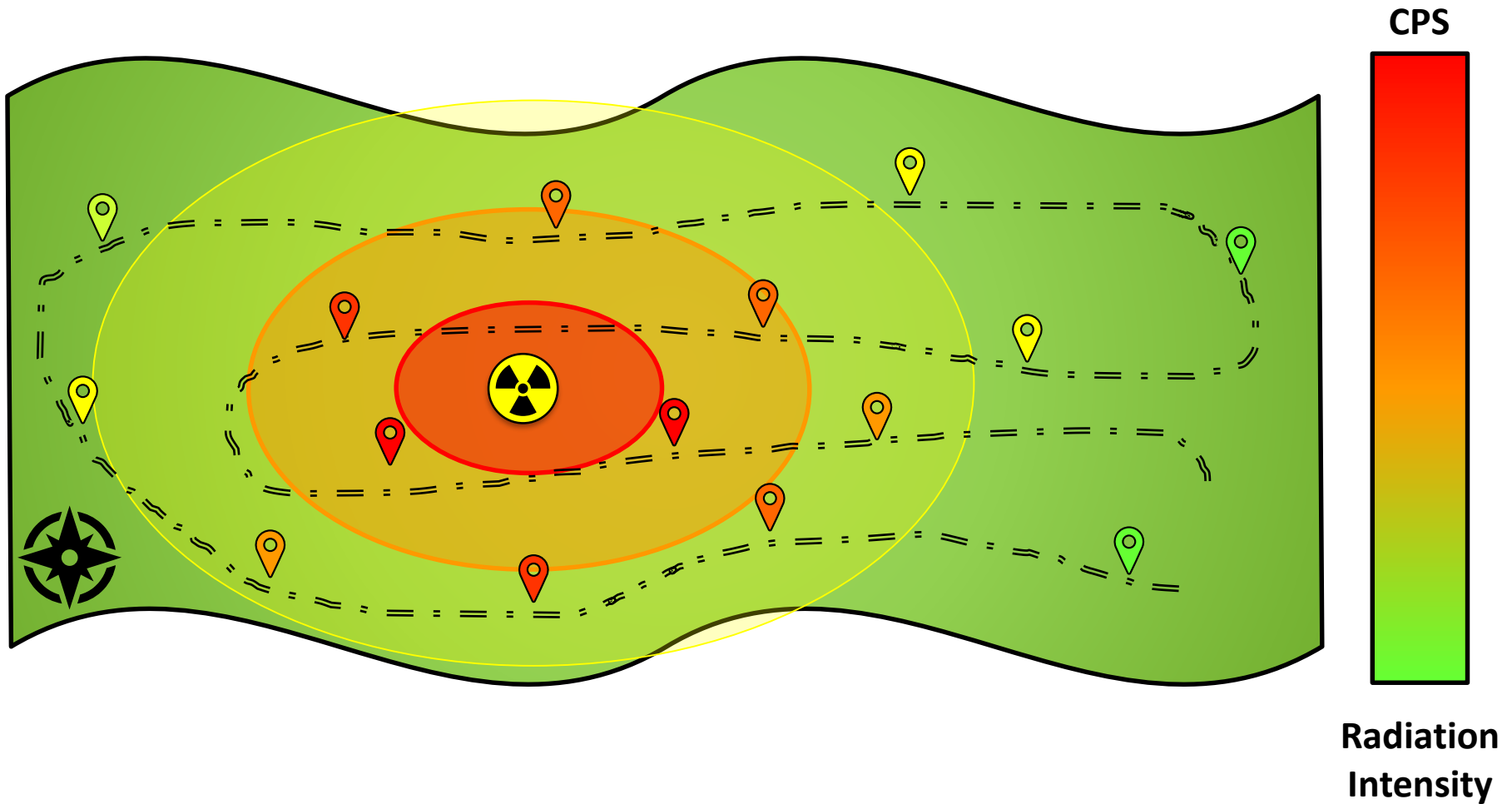
Nuclear Weapons



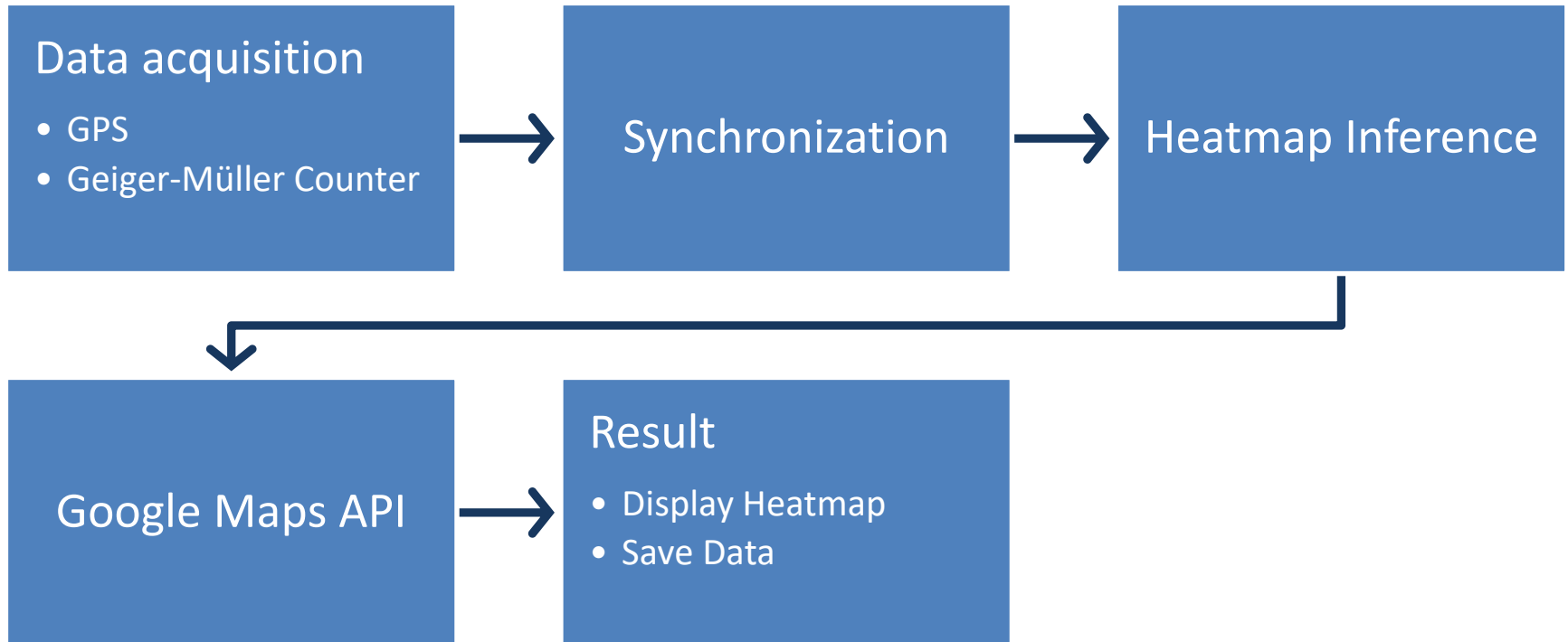
Proposed Solution



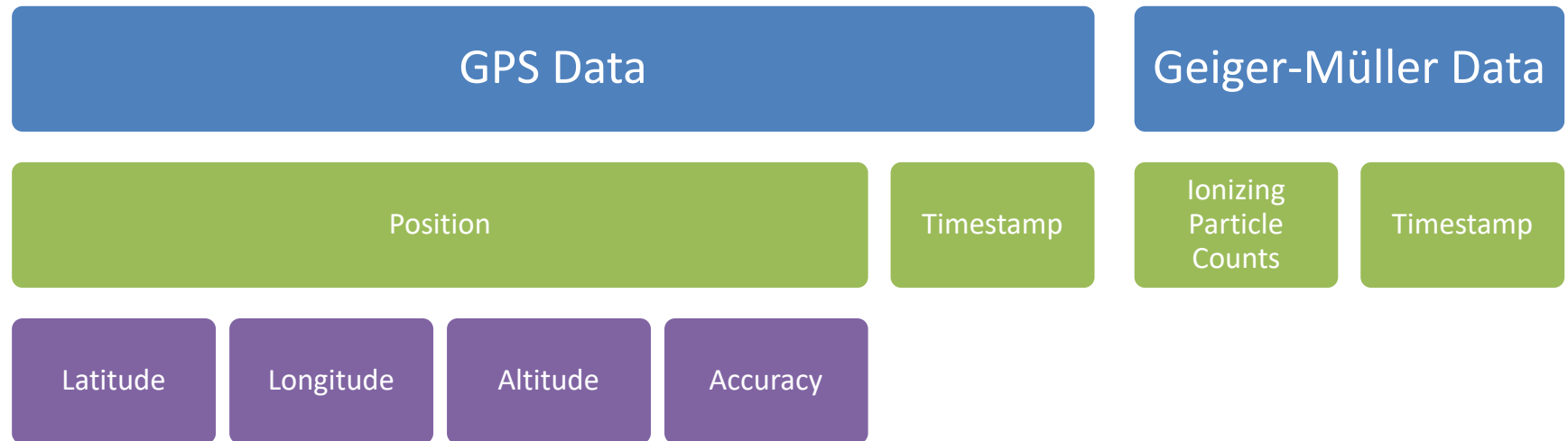
Result: Heatmap



From Sensors to Heatmap



From Sensors to Heatmap



From Sensors to Heatmap

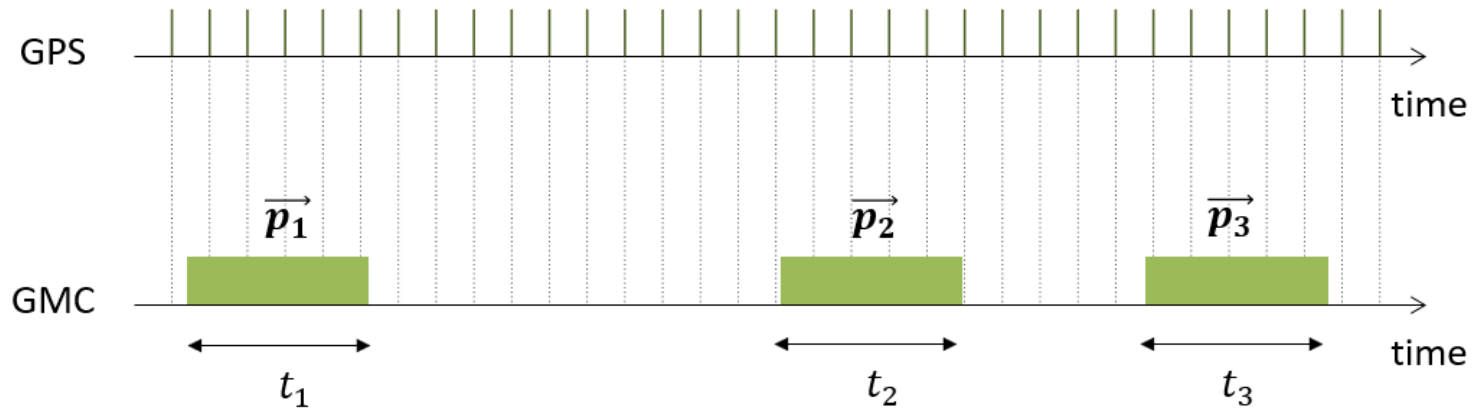


Position

$$w_j = \frac{r_j^{-2}}{\sum_{j=1}^n r_j^{-2}} \quad \vec{p}_k = \sum_{j=1}^n w_j \vec{o}_j \quad r_k = \left(\sum_{j=1}^n r_j^{-2} \right)^{-1/2}$$

Intensity

$$\alpha_{\vec{p}_k} = \frac{1}{t_k} \sum_{j=1}^n \alpha_j$$



From Sensors to Heatmap

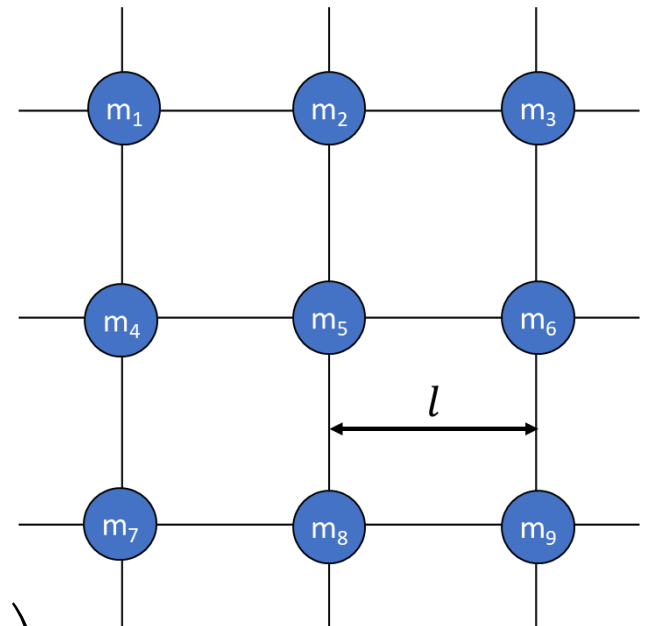


$$\mathbf{M} = \{\vec{m}_1, \vec{m}_2, \dots, \vec{m}_N\}$$

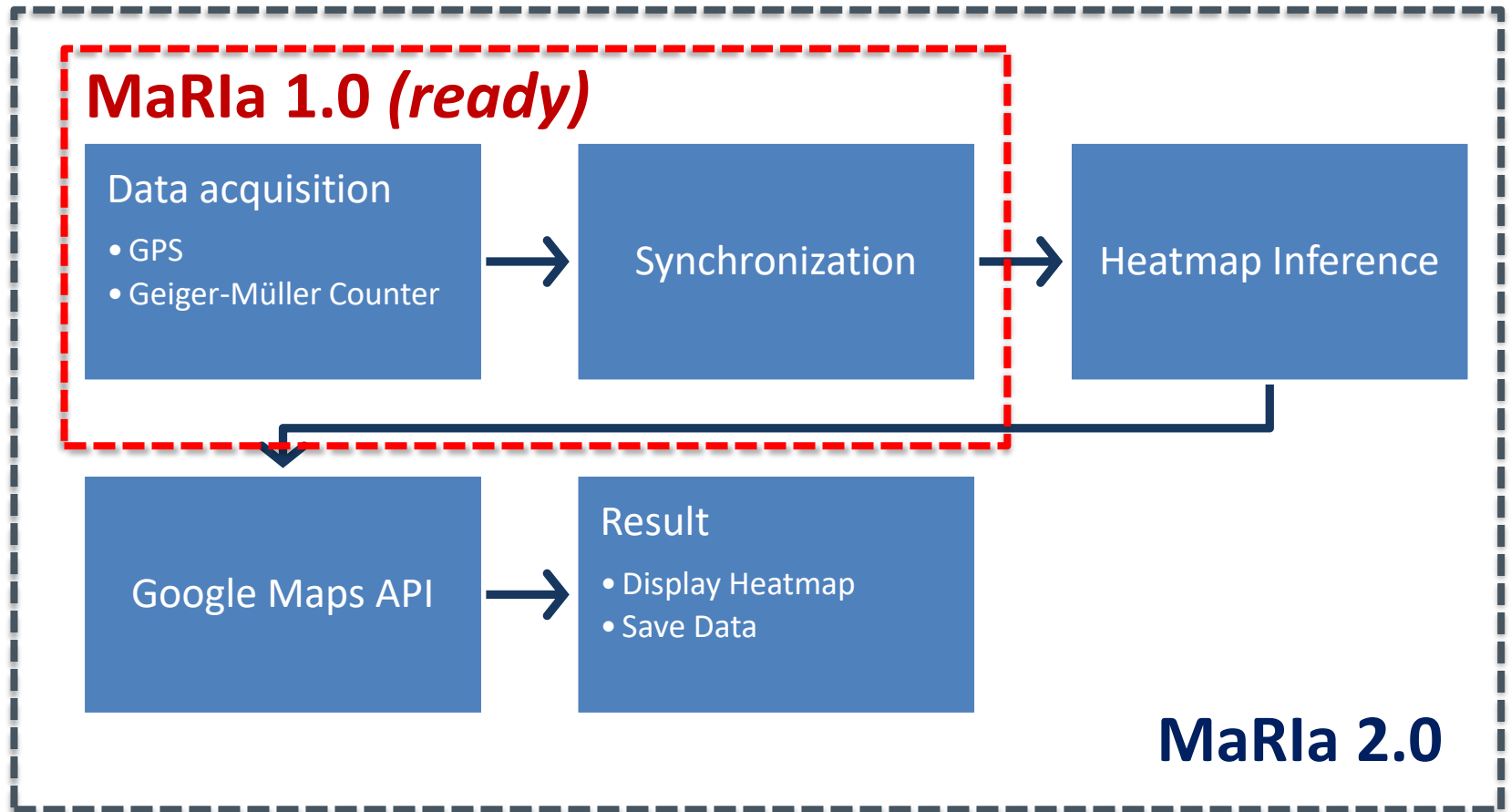
$$\vec{m}_i = [l \cdot a_i, l \cdot b_i, h]^T$$

$$I = \{I_{\vec{m}_1}, I_{\vec{m}_2}, \dots, I_{\vec{m}_N}\}$$

$$I_{\vec{m}_i} = \frac{1}{K} \left(\sum_{\substack{k=1 \\ \|\vec{p}_k - \vec{m}_i\| \leq R}}^K \alpha_{\vec{p}_k} + \sum_{\substack{k=1 \\ \|\vec{p}_k - \vec{m}_i\| > R}}^K \frac{\alpha_{\vec{p}_k}}{\|\vec{p}_k - \vec{m}_i\|^2} \right)$$



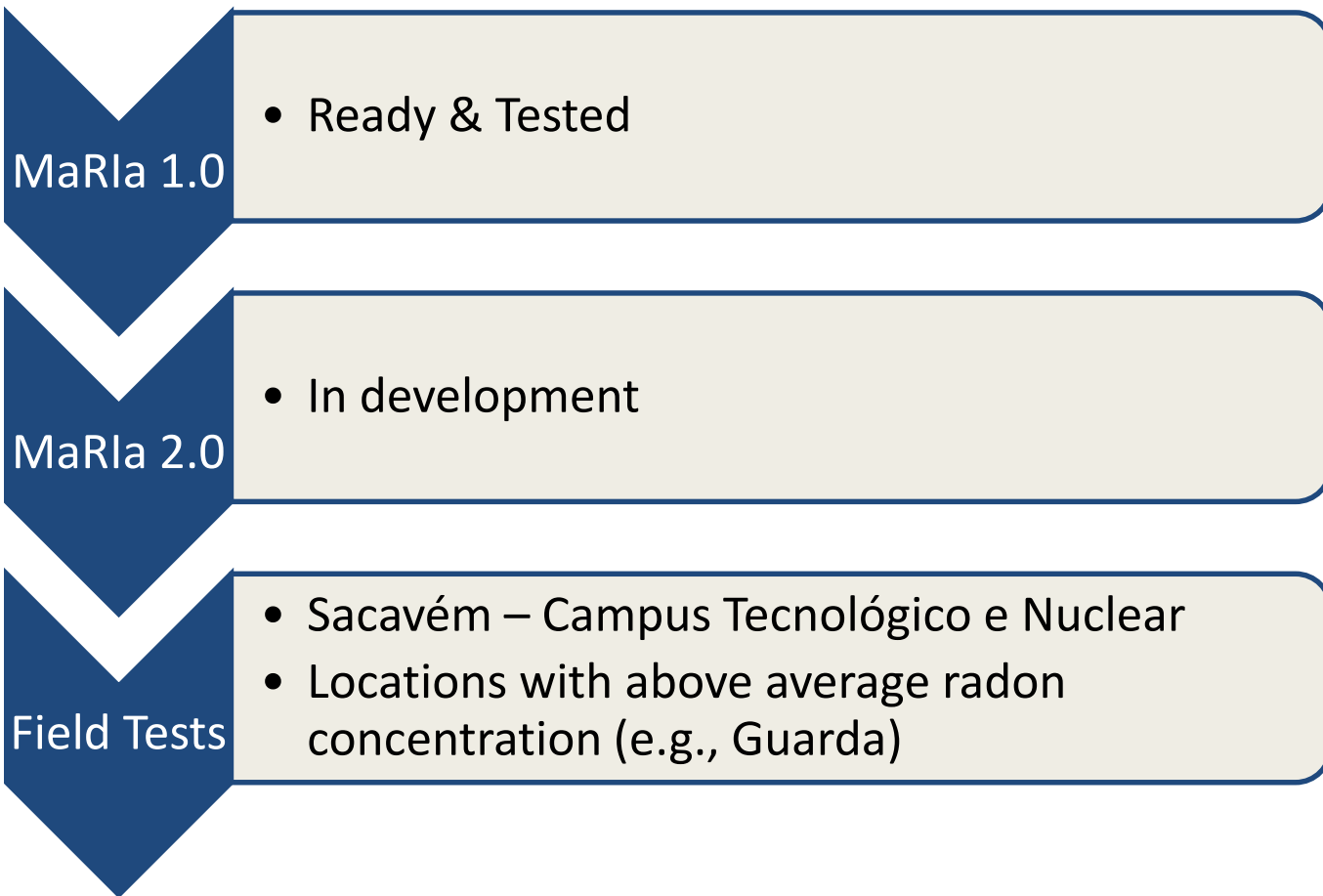
Software Application



MaRIa 1.0

MaRIa V1.0 Demo

Conclusions and Future Work



NOVAS
TECNOLOGIAS PARA A
MOBILIDADE

24 de novembro de 2017

11º CONGRESSO
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Thank You!

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