Implementation of City Information Modeling (CIM) concepts in the process of management of the sewage system in Piumhi, Brazil

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 642384.

Creating innovation in Brazil

Surveying sewage network

Inserting data in BIM and GIS to achieve CIM concepts

Aiming to model the information of the city

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Why does this research matter for circular economy?

- ✓ Can help to improve designs
- ✓ Contributes to BIM and digitalization towards high potential reuse and circular economy
- ✓ Can help to reuse materials during the maintenance of the system
- ✓ Has the potential to cut down on cost to urban infrastructure management
- ✓ Contributes to a dynamic and a circular built environment in cities
- ✓ Contributes to innovative business models around circularity of resources in the construction sector

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A process involving digital representation of physical and functional features of buildings [Xu *et al*, 2014]

Based on objects

Allows a systemized data, attribute and parameter association [Brigitte and Ruschel, 2016]

Hardware, software and people dedicated to insert, to analise and to represent spacial information and its atributes [McCormac, 2016]

Allows linking data to specific positions on the Earth

Very used computational tool to manage information in public infrastructure management [Almeida and Andrade, 2015].

Analog to BIM in urbanism

A system of urbans components represented by symbols in a 2D space and inside a 3D space

This is also designed from the expansion of GIS 3D improved with views in several levels and multiple scales, design toolbox and inventory of 3D components with their relationship [Amorim, 2015]

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Methodology

literature review → survey → diagnosis → as built of the sewage network

Figure 1. Survey

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Results and discussions

Table 1. Survey conditions of the wells

	Occurrences
Wells in sewage interceptor	**56**
Wells in sewage network	**1,291**
Unseen wells in sewage interceptors	**4**
Unseen wells in sewage network	**316**
Non-precision wells in the sewage network	**64**
TOTAL	**1,731**

77.8% HIGH PRECISION

18.5% COVERED by ASPHALT, SAND or others

3.7% LOW QUALITY of GPS/RTK COMMUNICATION

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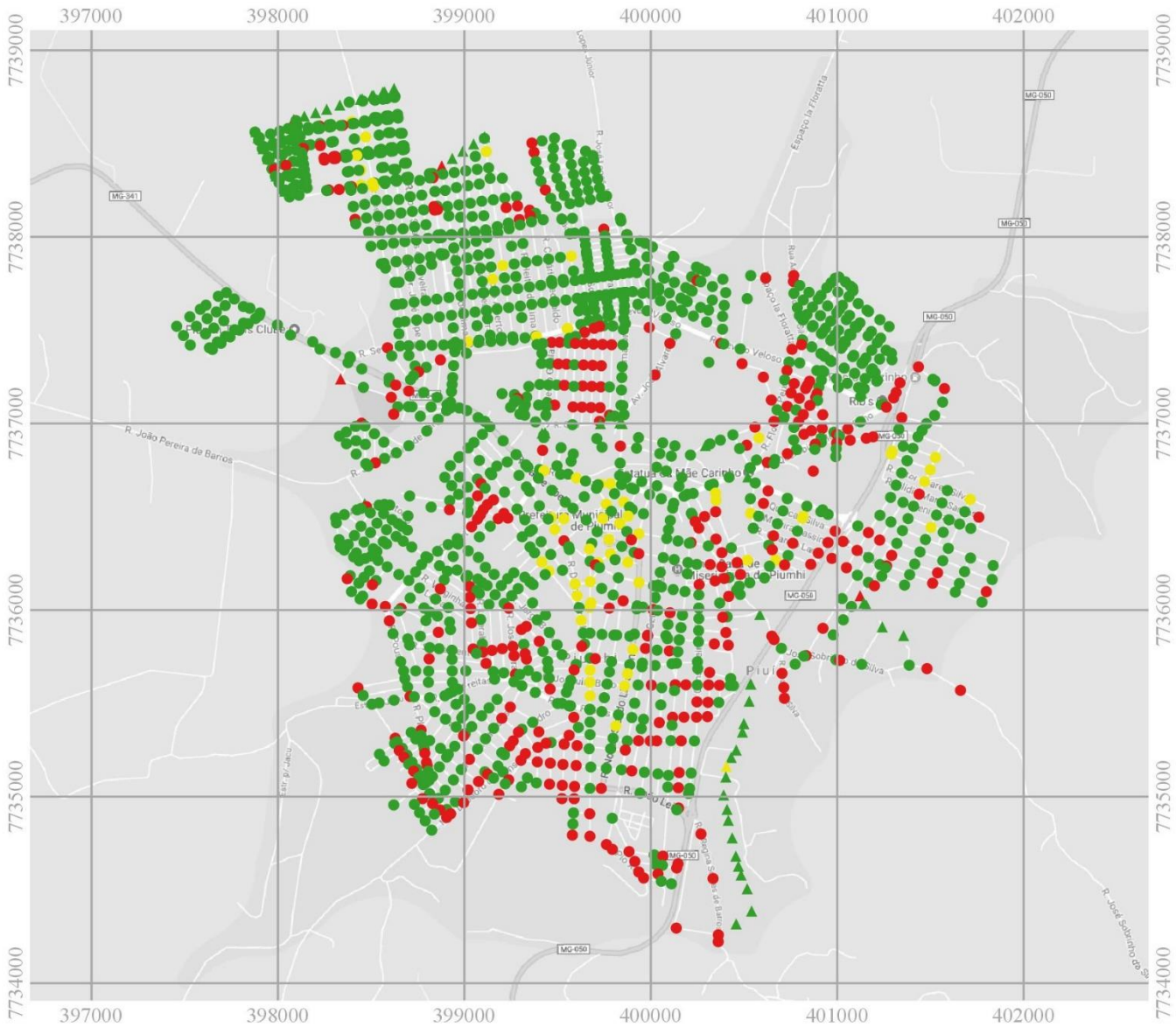

Figure 2. Wells survey

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Figure 3. Free flow

Figure 4. Clogged flow

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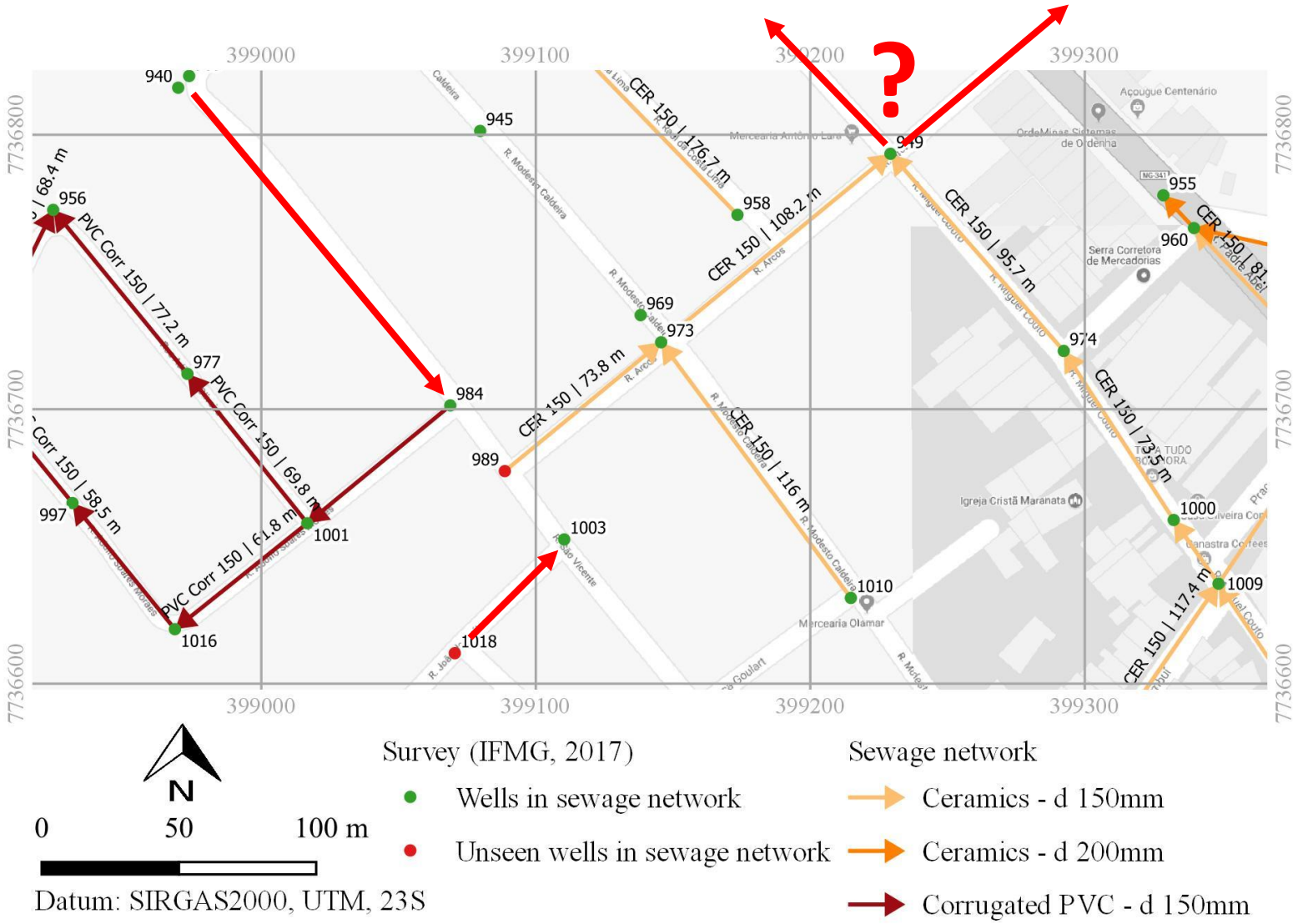

Figure 5. Lack of information of the sewage network

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Conclusions

Survey and As Built	The Survey provided data to start modeling the sewage network.
	The As Built will contribute to supply the public managers with good information.
	The As Built must be frequently updated.
	The access to the sewage network is impaired, which causes inaccuracies.
CIM = BIM + GIS	Implementing CIM concepts seems to be feasible.
	We need accurate information to develop the model and its drivers.
	The model can be limited by imprecise data.
	There are several challenges related to staff, softwares, hardware, survey and others.
Low quality of the data implies	Problems for urban infrastructure maintenance planning.
	Limitation for designing the system to attend new demands.
	Lack of pro-active actions.

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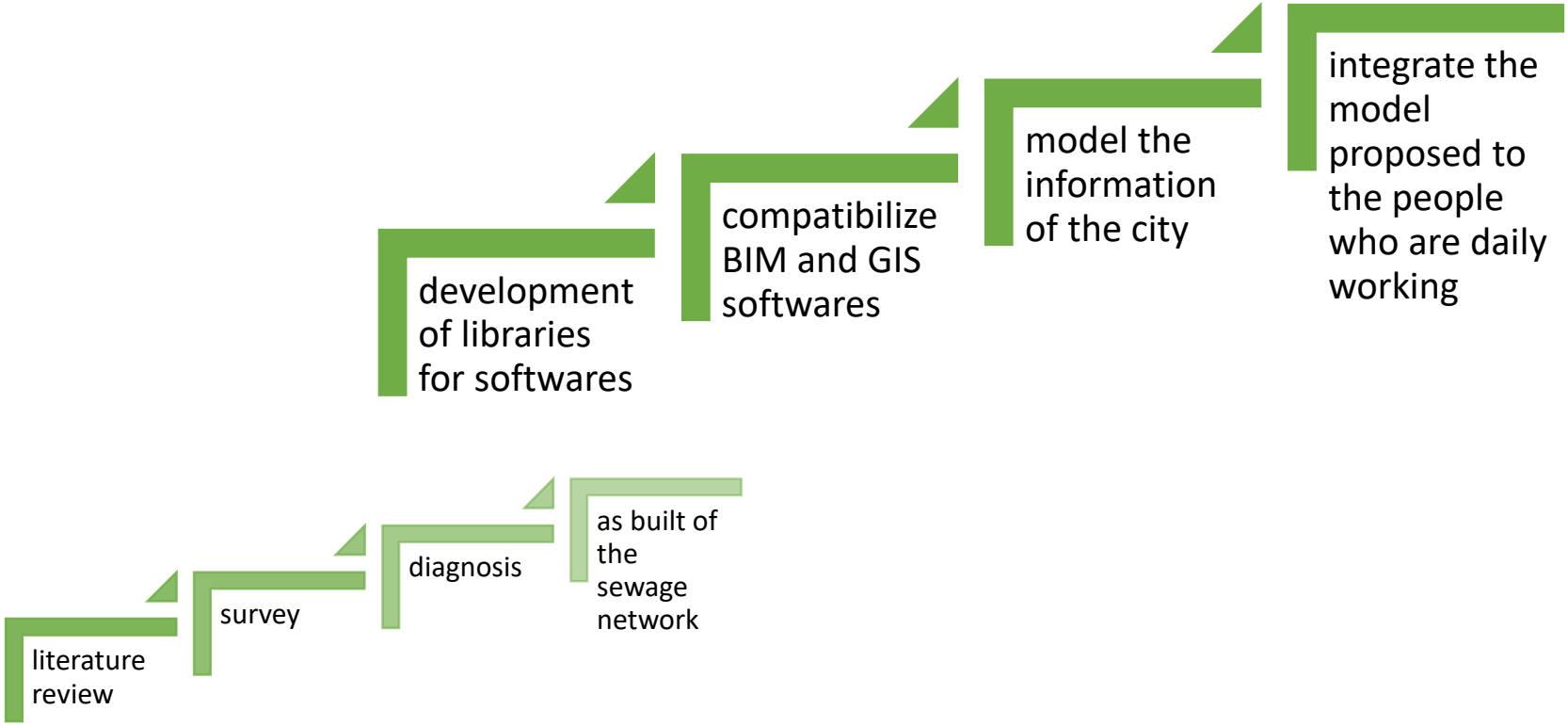
Further steps



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Mercie beaucoup!

Vielen dank!

Thank you very much!

Muito obrigado!

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