



## **Executive Summary of *Deliverable D 3.1* *Work Package 3***

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author/s: Paulo Pinho, Sara Santos Cruz, Vítor Oliveira, Magda Barbosa, Mafalda Silva (FEUP)



## Executive summary

The *Manual of Evaluation Methodologies* is the first of three deliverables provided by SUME's Work Package 3 (WP3) focused on the impacts of urban forms and structures on resource use. The manual is divided in three parts, an introduction to evaluation, an evaluation-oriented review on four fields of knowledge, and the presentation of the Metabolic Impact Analysis (MIA).

The first part of the report introduces the theme of evaluation. After a discussion around evaluation as an activity underlying many different fields of knowledge and professional practices, it outlines an overview on the emergence and consolidation of evaluation and on its main developments and trends throughout the twentieth century. It then moves to a reflection on the complex relationships between evaluation theory, research and professional practice, and on the interaction between evaluation and the specific activity under assessment. The analysis of the different timings of evaluation – mainly expressed in three different stages, ex-ante, on-going and ex-post – constitutes the fifth part of this section. It then moves to an analysis of the nature of the relations between the evaluator and the design team, and to a discussion around the conception of evaluation methodologies and the definition of a number of key elements – evaluation questions, criteria and indicators. The last part of this section focuses on the issue of the presentation of evaluation results and on their subsequent use.

The second part of the report is oriented to the identification and characterization of evaluation methods and techniques for planning practice that relate urban form and urban development with urban metabolism – focusing on the consumption of land, energy and materials. Four fields of knowledge are examined in detail. In the field of urban planning, ex-ante and ex-post approaches – conformance-based, performance-based and integrated methods – are thoroughly analysed. In urban form and urban development, we first focus on macro level approaches, moving then to micro level approaches, including the historico-geographical (Conzenian School), the process typological (Muratorian School), spatial analysis, and Space Syntax. In the impact assessment field we start with classic environmental impact assessment, moving then to social-, strategic-, and sustainability-assessment. The last part of this section moves from a number of methods on environmental accounting and energy to the specificities of urban metabolism.

The third part of the report presents the Metabolic Impact Analysis, the main output of this report, starting with the definition of general principles for evaluating the urban development process, moving to the identification of the main differences between MIA and EIA, and then to the description of the evaluation procedure.

Six principles frame the design of this methodology: MIA evaluates the urban development process, from a metabolic perspective; it focuses on plans and projects as fundamental drivers of the urban development process; it assesses the city wide metabolic impact of the proposals included in plans and projects; it explores the spatial dimension of alternative development processes; it is suited to short-term assessments (although it may address different temporal scales); and finally, it deals with the environment in an integrated way.

## The Metabolic Impact Analysis (MIA) - main purposes

The potentials of the urban metabolism approach to diagnose, to plan and to manage our cities and metropolis are explained and justified in the full text of this report. Similarly, the wide

ranging evaluation methodologies developed, so far, in both the planning and the environment fields are introduced in the first chapters of the WP3 report.

The main purpose of the deliverable is to present the general features of a novel methodology, so called Metabolic Impact Analysis, MIA for short. This methodology provides an operational instrument to assess the overall impact of a particular development proposal on the existing urban metabolism performance of a given city, metropolis or city region.

The Metabolic Impact Analysis' procedure involves six different stages:

- 1- The definition of the study area, the scoping, and the intervention area. The first stage is the study's preliminaries and requires a set of data collection and decision making in order to define the work's general framework.
- 2- The metabolic characterization of the study area. This stage consists of a baseline characterization (land use, energy, water and material consumption) of the study area, from a metabolic point of view.
- 3- The metabolic characterization of the planning proposal. The planning proposal – the object of analysis – shall also be characterised from a metabolic perspective and on the basis of the intervention area previously defined.
- 4- The identification and characterization of the metabolic impacts. In order to identify and characterize the metabolic impacts of the planning proposal under analysis the two sub-models developed in stages 2, study area, and 3, planning proposal (intervention area) have to come together.
- 5- The evaluation of the proposal and alternative scenarios. The metabolic impact of the proposal and/or alternatives, positive or negative, have now to be considered in a wider perspective of the general dynamics and transformation goals set before for the city.
- 6- The potentiating of the metabolic efficiency. These final results are likely to incorporate a number of recommendations to change and/or adapt the development proposals, plans or urban projects to the corresponding city context.

## **Evaluation process**

The application of MIA in a given city requires the previous availability of an overall urban metabolic model, sufficiently updated to provide an accurate picture of the most important metabolic processes, covering the energy, the land use, the water and materials matrixes. A comprehensive GIS database including land use, natural and built environment as well as transport variables is also needed.

MIA is expected to contribute to both the urban metabolism field and to the evaluation field. In the context of urban metabolism, MIA seems able to provide the spatial dimension that is absent from current urban metabolism models. This spatial dimension is essential to urban planning purposes. In addition, MIA provides an operational tool designed to analyse changes and transformations occurring in our cities rather than, simply, their overall metabolic performance. As such, its application may provide a deeper understanding of the nature of different and contrasting development processes, in particular when it comes to their contribution to the existing stocks and flows of energy, land and materials.



With obvious influences in EIA, MIA is able to provide a more integrated analysis taking advantage of the potentials of the urban metabolism concept to provide a comprehensive perspective of the consequences of current urban development processes. Finally, it is important to emphasize that the design of the MIA methodology is fairly open to public scrutiny and public participation.

The report was written with two objectives in mind: a selection and a brief presentation of the most important evaluation methodologies from an environmental planning and an urban metabolism point of view; the development of an innovative methodology based on the urban metabolism concept and designed to assess specific planning proposals.

Under the first objective about fifty methodologies were outlined grouped under four main fields: Planning, Urban form, Impact assessment and Environmental accounting and energy related methods.

Under the second objective, the MIA (Metabolic Impact Analysis) was presented and justified, considering the links with other evaluation methodologies, the possible field of application, and the main methodological steps. A reference was also made to the similarities and differences between the traditional EIA (Environmental Impact Assessment) and the proposed MIA.

A practical application of MIA will be carried out, taking the city of Oporto as a truly test-bed for this methodology. As a result, the present format of MIA is likely to suffer some adjustments and improvements provided by the insights and lessons learned from a real first application of this methodology. Subsequently, three other applications of MIA will be carried out to the cities of Vienna, Stockholm and Newcastle-upon-Tyne. At this point, MIA would aim at assessing the impact of a chosen planning proposal or project in the existing urban context of the above outlined cities.