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METAMORPHOSIS

Transformation of neighbourhoods in a child-friendly way
to increase the quality of life for all citizens



Deliverable 2.1

First Publication



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**Transformation of neighbourhoods in a child-friendly way
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Executive Summary

The purpose of this report is to provide a general analysis of the main themes that are being explored and developed by the EU Horizon 2020 Metamorphosis project consortium. This consortium consists of seven partner cities, which possess a wide variety of different demographic and location characteristics, who are working in conjunction with six further coordinating enterprise and academic partners. The seven cities are (1) Alba Iulia, Romania; (2) Graz, Austria; (3) Meran, Italy; (4) Munich, Germany; (5) Southampton, UK; (6) Tilburg, Netherlands; and (7) Zurich, Switzerland. The aim of the project is to transform designated neighbourhoods in these cities away from being car-oriented places, through a focus on the needs of its children, to improve the physical and mental health, and quality of life for all its citizens. This is enabled through the premise that when an urban neighbourhood has many children in its public spaces, this is a major indicator that it is well designed as a people-oriented and sustainable neighbourhood. The concept of 'sustainability' is associated with the endurance and continuity of ecosystems necessary for ongoing survival, and is therefore inseparably combined with children as it implies being designed for the next generations, i.e. for the benefit of the community long term, instead of the largely negative top down and car-orientated approach that exists up to the present day.

The partner cities will therefore implement a series of intervention trials to encourage more 'child friendly neighbourhoods', to show what can be achieved, and build on the availability of shared space, play streets, living laboratories, crystallisation points and other public spaces that (i) safeguards children against vehicles and traffic by providing a relatively safe environment with supervised and unsupervised activities and events; and (ii) are designed and operated in a participatory manner, where integrated programming, including play and recreation that involve other adults as well as children, can be delivered. This includes encouraging integrated planning that promotes walking and cycling, or sustainable mobility generally instead of using the car, and developing innovative approaches to local urban design, that engages both children and adults as stakeholders and participants in the development and building process, as well as simplifying public sector procedures for the planning and implementation of child friendly neighbourhood measures and activities.

The concepts behind these ideas, as well as the indicative plans for the project, are described in this report, which consists of six chapters. These chapters provide a description of (1) the background to the project, including detailed aim and objectives; (2) a definition and the typical characteristics associated with child friendly neighbourhoods; (3) the needs of children and their development relative to the environment, including how their abilities vary through different developmental stages, the effects of child-adult mutual influences, and how they may be activated to participate authentically in the project; (4) the steps being undertaken by the partner cities in implementation planning, including visioning and the approaches for engaging children as both stakeholders and participants in the project; (5) the potential best practice and innovative implementation measures and activities which may be used by the consortium cities to create child friendly neighbourhoods; and (6) the approaches being undertaken for the monitoring and evaluation of the cities' interventions, including how targets and key performance indicators may be set.

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1 Introduction

The purpose of this document is to provide a general analysis of the main themes that are being explored and developed by the EU Horizon 2020 Metamorphosis project consortium. As such, this chapter provides a background to the context of the project (section 1.1), which is followed by a summary of the Metamorphosis objectives (section 1.2), and a short description of the approach the consortium is taking to progress the project (section 1.3). This is followed by five further chapters, which describe the definition and characteristics of child friendly neighbourhoods (chapter 2), the needs of children through different ages and the effects of their and child-parent relationships relative to the environment (chapter 3), suggested implementation planning ideas, including approaches for the engagement of children as both stakeholders and participants in the project (chapter 4), prospective implementation measures and activities to create the Metamorphosis child friendly neighbourhood trials (chapter 5), and advice on the monitoring and evaluation of interventions, including how targets and performance indicators may be set (chapter 6).

1.1 Background

Social and economic research suggest that land use and urban transport planning are heavily intertwined, e.g. see Edwards (1992) and Marshall and Banister (2007). Local spatial usage decisions made by urban planners affect the travel choices and location decisions made by citizens, while access to safe and effective transportation can have an impact on the attractiveness and economic development of local neighbourhoods, if not entire cities. For example, the policy to develop out-of-town shopping centres in the UK during the 1970s led to increased car use and a general decline in city-centre based retail outlets, particularly in small towns (Bromley and Thomas, 1995). This in turn had an impact on the accessibility, social well-being and economic prosperity of urban citizens, with a disproportionate draw from those who were of disadvantaged backgrounds. In contrast, experience from the Netherlands and Belgium during the 1970s to 1990s suggests that fundamental changes to functioning urban design (Beatley, 2012), such as introducing more people-oriented 'woonerf' or home zones, with shared spaces for all modes of travel including walking and cycling, in conjunction with effective location policy and spatial usage, for example by siting new developments around public transport hubs (Verhetsel and Vanelslander, 2010), leads to increased sustainable mobility (reduced car usage, greater use of public transport and less overall distance travelled) as well as improved quality of life for citizens, through reduced traffic congestion, lower air and noise pollution resulting from vehicles, and more active and healthier personal and social lifestyles.

Unfortunately, evidence from the second half of the last century suggests that the development of land use and sustainable travel policies have not been as inter-connected as best practice theory would suggest (see chapter 2). This is attributed to many reasons, including the separation of economic versus environmental or sustainable drivers, the different disciplines required between architects, urban planners and transport providers (and therefore difficulty in adopting a multidisciplinary approach), and the lack of engagement of local people in urban/transport policy and decision-making. Historically, city planning tended to adopt a top-down 'modernism' architectural approach (Gehl, 2013), with car accessibility and usage often seen as a sign of developing economic prosperity - and therefore it prevailed over other travel modes, which do not take hold among the general population unless there is significant local investment and/or integrated sustainable transport policies that acted to the contrary (Hiblin et al, 2016).

Indeed, integrated urban planning has historically been found wanting (Appleyard, 1980), and there is a long-standing argument for city neighbourhoods to be protected, to create streets that are liveable for people, that not only provide a focus for socialisation and community, but is also protected from the dangers of traffic. Instead, the strongly-oriented focus towards motorised traffic instead of people has led to some disastrous results: unpleasant, non-human-scale design of most streets and squares, reduced life quality, and increased accidents, noise and pollution. The EU has already highlighted these problems and possible solutions (see Metamorphosis grant agreement). However, the vast majority of city districts and neighbourhoods in Europe still have a very car oriented design (see chapter 2), and as a consequence few children play on the streets and there is generally a low level of street life. A change towards integrating urban design with transport planning, with a focus on designing for people and sustainable travel, can therefore make city neighbourhoods much more vibrant, accessible and beneficial for its local citizens. The aim of Metamorphosis is therefore to transform from car- to people-oriented neighbourhoods through a focus on the needs of its children, as children can help to develop positive emotions for the neighbourhood, and their behaviour and decisions are mostly determined by emotions, and to a much lesser degree by rational arguments such as cost versus benefit (these child attitudes are discussed further in chapter 3). Metamorphosis starts from the premise that when a neighbourhood has many children in its public spaces (Gehl, 2013), this is a major indicator that it is well designed as a people-oriented and sustainable neighbourhood. The word 'sustainable' itself is associated with the endurance and continuity of ecosystems necessary for ongoing survival. It is therefore inseparably combined with children as it

implies being designed for the next generations. In addition, children can easily find a direct way to their parent's hearts; and to be against children's needs and demands is generally not socially well accepted, and these factors help to support, as well as direct the behaviour changes that are required by everyone in order to develop child friendly neighbourhoods.

1.2 Objectives

With this background in mind, Metamorphosis has seven objectives, to:

1. Transform car-oriented neighbourhoods into children-friendly neighbourhoods achieving behavioural change and increase in the quality of life;
2. Build the vision needed for such transformations;
3. Answer basic research questions related to neighbourhood transformation;
4. Achieve creative breakthrough innovations - in development, in design, in governance and in planning procedures - for public spaces in neighbourhoods and urban districts;
5. Through the above described mechanisms, develop and implement children friendly mobility solutions;
6. Evaluate take-up, involvement, process and impacts using innovative evaluation methodologies; and
7. Develop and implement innovative transfer instruments to transfer Metamorphosis-innovations from city to city and country to country, also beyond the duration of the project.

Thus Metamorphosis seeks to address some of the key challenges of EU Horizon 2020 Topic 4.5, for new ways of supporting development and implementation of neighbourhood-level and urban-district-level transport innovations, while at the same time helping to improve the quality of life for the residents in these communities, by especially recognising the needs and rights of children in public space, and implementing processes, measures and activities which will benefit them, and by association all citizens.

Metamorphosis will include seven trial implementation cities that form the consortium, with a wide mix of different neighbourhoods and demographic characteristics, i.e.:

- Alba Iulia in Romania (city population 63,000);
- Graz in Austria (280,000);
- Meran in Italy (39,000);
- Munich in Germany (1,500,000);
- Southampton in the UK (240,000);
- Tilburg in the Netherlands (210,000); and
- Zurich in Switzerland (400,000).

Each city will participate with up to four different neighbourhoods, selected to provide a wide variety of size, demographic structure, population density and diversity. Further information about the cities involved, as well as aims and objectives, may be found in the Metamorphosis Grant Agreement, with details of the neighbourhoods where trials will take place stated in the Implementation Plans which are being developed in the subsequent stages of this project.

1.3 Approach

In addition to overall Management (Work Package 1), this study starts with a General Analysis Report (D2.1, this report), being the first Deliverable of Work Package 2, which provides a desktop ‘state-of-art’ review that sets the scene and provides the basis for the subsequent Work Packages (WP) of this project, including WP3 (Innovative Concepts), 4 (Implementation Trials), 5 (Capacity Building) and 6 (Monitoring and Evaluation). As such, in addition to presenting a general literature review, this report and initial work package will provide:

- a definition of child-friendly neighbourhoods, i.e. the potential scope of the project, including typically attributes and characteristics which may be found in their public spaces (see chapter 2);
- a summary of children’s needs and abilities at different ages through childhood, including potential issues and the background theory to children-parent mutual influences, as well as potential strategies for the activation of children as essential stakeholders and participants (chapter 3);
- suggested approaches to the planning of implementation trials, including methods for engaging children in the visioning, design and evaluation of intervention measures and activities (chapter 4);
- prospective implementation options, including further concepts, tools and methods for developing child-friendly neighbourhoods, as well as an initial summary of innovative and best practice interventions (chapter 5), which will be considered by the cities in developing their implementation plans and trials, i.e. for WP3 and WP4;
- advice for monitoring and evaluation in each city, i.e. the preparation for WP6, including goal setting and example target indicators which could be used, which is based on the best practice experience gained from other major EU projects (chapter 6).

It should be noted that this document also provides the template and some of the themes that will be taken forward into WP7, i.e. for Communication, Dissemination and Exploitation. However more information about this WP will be found in the Dissemination, Exploitation and

Communications Plan (D7.1) which will follow, the work for which is being coordinated by Öki (Ökoinstitut Südtirol - Alto Adige, Participant number 8) in conjunction with the Metamorphosis partners.

This General Analysis Report (D2.1) will also be followed by further Deliverables from this Work Package 2, including a more comprehensive 'case study'-type catalogue of potential best practice intervention measures and activities which could be deployed for Metamorphosis (D2.2), and the Local Analysis Report being produced by each of the seven partner cities (D2.3), which will consider the specific situation of each city where neighbourhood trials are planned, including who needs to be involved, what they wish to implement, the local operating framework, and how the initiatives will be evaluated. These reports, in conjunction with the other two deliverables from WP2, therefore sets the groundwork leading to WP3, where each of the partner cities further develops some of the innovative concepts suggested in WP2, and prepares their individual Metamorphosis implementation plans (D3.2), including the use of 'Vision Building' workshops (D3.1) that will engage local partners and stakeholders in developing their measures and activities, and more importantly, will include the participation of children as both contributors and stakeholders. This in turn will then set the specific requirements, goals and targets required for the implementation trials in each city, and the interventions will be implemented as part of the work for WP4. Finally, as well as monitoring and evaluating the success of the trials (WP6), and project communication, dissemination and exploitation activities (WP7), partner cities will also be supported in building their capabilities as part of the project (WP5), and these WPs all have further deliverables that will be published.

The next chapter will now provide a working definition of child friendly neighbourhoods, which may be applied by the partner cities to set the initial scope for their Metamorphosis initiatives.

2 Child friendly neighbourhoods

This chapter is divided into two parts. First, there is a broad definition of child friendly neighbourhood to be applied for the purposes of Metamorphosis. Then, some of the typical characteristics of child friendly neighbourhoods are given, including positive and negative indicators, and why reducing car use and developing spaces for people to enjoy are both important requirements in creating environments that are beneficial for children.

2.1 Definition of child friendly neighbourhood

There is no universal or general definition of 'child friendly neighbourhood'. However the literature, e.g. Chawla (1997) and Malone (2006), suggests that the United Nations (UN) has for many decades been a key player in the global drive towards child friendly cities, with a focus on sustainable development and children's rights, i.e. that the achievement of environmental, social and economic goals meets the need of the present generation without compromising future generations. In particular, through the United Nations International Children's Emergency Fund (UNICEF, 1989), the 'Convention on the Rights of the Child' was established to impose this responsibility on member states. This Convention has 54 articles that uphold, among others, a child's right to live in a safe, clean and healthy environment (Articles 21 and 24), and be able to 'relax, play and take part in a wide range of cultural and artistic activities' (Article 31). The Convention also defines a child as 'everyone under the age of 18' (Article 1) and more crucially, suggests that 'every child has the right to express their views, feelings and wishes in all matters affecting them, and to have their views considered and taken seriously' (Article 12). Through these founding rights and various Conferences on Human Settlements (United Nations, 1996), the need to develop 'Child Friendly Cities' emerged, particularly to involve children as both participants and stakeholders in shaping cities, towns and neighbourhoods, as well as the need for adults to act as stewards to act on their behalf, i.e. recognising the capacity for children and youth to be *authentic participants* (Malone, 2006) in planning, development and implementation processes. A Child Friendly City was thus defined (UNICEF, 2004) as 'a system of good local governance committed to the fullest implementation of the Convention on the Rights of the Child', and 'large cities, medium-size towns as well as smaller communities - even in rural settings - are all called to ensure that their governance gives priority to children and involves them in decision-making processes'.

Subsequently, further guidance was provided by UNICEF (2009) for establishing and operating 'child friendly spaces' (CFS) in emergency situations, which has been widely used. This constituted six fundamental principles, where CFS:

- (1) are safe and secure environments for children;
- (2) provide a stimulating and supportive environment;
- (3) are built on existing structures and capacities;
- (4) use a participatory approach for their design and implementation;
- (5) provide or support integrated programmes and services; and
- (6) are inclusive and non-discriminatory.

Understandably, the UN/UNICEF policies and guidance cater for a wide variety of human situations, some of which are only applicable in extreme or emergency scenarios, such as the 'right to life' in war-torn countries. For the purpose of this project, which focuses on seven partner cities in Europe, a narrower definition of child friendly cities or spaces may be adopted, which inherently assumes a certain level of basic human rights conferred on its citizens, including children, and that there are existing governmental policies which address children's rights to, for example, nationality, education, clean water and healthcare, i.e. a basic quality of life can be assumed. In such cases, the UNICEF definitions may be streamlined to cover cities, neighbourhoods or spaces that:

- (1) *protect or safeguard children by providing a secluded place with supervised and/or unsupervised activities; and*
- (2) *are designed and operated in a participatory manner, where integrated programming including play and recreation can be delivered.*

In adopting this approach, Metamorphosis recognises the contrasting evidence (Valentine & Mckendrick, 1997) over the nature of children, what constitutes 'childhood', and how this varies or is perceived to vary widely between continents and countries, from one which is concerned with basic survival, to establishing westernised concepts of childhood experiences and 'being free of adult responsibilities'. Although these concepts are interesting, the *range* of possible childhood experiences is not in itself central to the theme of Metamorphosis, as all the demonstrator partner cities are set in contemporary western cultures, so a specific focus on play or recreation and safety for child friendly neighbourhoods, with the associated implications for childhood development and its important role in helping to build communities, is a practical approach which can be adopted by the project, and some European countries have already adopted similar definitions for providing child friendly-type neighbourhoods.

For example in the UK, the aim of developing ‘child friendly communities’ (DCSF, 2008) is to develop built areas which are ‘safe’ and ‘welcoming for children’, ‘inclusive of all abilities/ages’, with spaces for ‘supervised’ and ‘unsupervised play’, and provide routes to play areas that are safe, and which should ‘involve children’ in their design/development, and recognise their ‘clear stake in public space’.

In addition, it should also be noted that UNICEF (2009)’s original definition of child friendly spaces generally refers to a ‘relatively short-to-medium term programme response, and are very often operated from tents and/or temporary structures, i.e. in schools, under a tree or in a vacant building’, and the purpose is to ‘raise awareness of the risks to children, and to mobilise communities to begin the process of creating a protective environment’. Therefore, it is with this approach in mind that the Metamorphosis project sets out to transform car-orientated neighbourhoods into child-friendly places, to achieve behavioural change and increase quality of life, and some of the trial implementation initiatives embarked on will, by their nature, be temporary - although others could become permanent or semi-permanent (e.g. occurring regularly), which are decisions that will be taken on a case-by-case basis by the local authority in conjunction with the community and other stakeholders, most importantly children.

It is also important to recognise that neighbourhoods should provide thriving urban communities, as well as the development of child friendly spaces. However the definition of what constitutes a ‘neighbourhood’ can be problematic (Lee, 1968), being perceived as both a piece of territory or area within a city, and the social communities that dwell within it. Therefore, as such, it has both spatial and socio properties, although interestingly, it is said that behaviour changes of neighbourhoods tend to evolve more rapidly than the physical environment, i.e. that you can change people’s behaviour in an area (or use of space) quicker than it takes to change the main physical surroundings. The point of Metamorphosis is therefore not to define explicitly what constitutes a neighbourhood, or more specifically what the *boundaries* of a neighbourhood might be, but simply to recognise that these are urban areas, which are typically residential (although not limited to), with spaces for people to engage potentially with, or interact with each other, and which may vary in size, demographics and social or economic needs. Such neighbourhood characteristics will vary from partner city to city, and indeed between areas of a city, and this is important, because a person’s collection of experiences and actions even within a single neighbourhood may be unique, as different people perceive, organise and react to the same physical and social environments differently. As will be seen later, the point of Metamorphosis is to encourage

collective changes in social and mobility behaviour, which is related to space, but not defined explicitly by an area of it. In many ways, the scale of the impact will be associated with the nature of the interventions to be implemented, and it is therefore more important to define who might or should be affected by the various schemes (i.e. target groups); and this research into which target groups will be performed by the partner cities as part of the work for WP3. In addition, the urban areas which are affected by the Metamorphosis schemes will be described in the Local Analysis Report being developed by the partner cities (Task 2.3).

Nonetheless, the definition of 'neighbourhoods' can be stated in broad terms for the purpose of Metamorphosis, ranging from a few connected streets to a wide urban area, i.e. in measurable location terms such as structure, buildings and community functions. This locational context is separate to the individual, household, residential community, commercial and environmental characteristics that may typify local neighbourhoods, and the people-orientated view advocated by Appleyard (1980) and previously Jacobs (1961). This separation is purely for convenience of description, for example in order to describe the effects of neighbourhood design on social attitudes and public health, as well as the scale of the implementation measures being planned for Metamorphosis - it does not affect the underlying ethos of the project, which is to encourage changes in both human behaviours and urban design.

As a whole, Metamorphosis seeks to transform neighbourhoods in a child friendly way, and as a consequence, also increase social mobility and accessibility, and provide greater opportunities for children to increase their personal impact, both to develop their confidence, place in society, as well as physical, educational and personal development; and equip them with greater capability to contribute to society in future (see chapter 3 for a discussion on the needs of children and how the use of space can affect their development and social interactions). However, previous experience suggests these consequences are difficult to evaluate within the timescales of the project, and it is harder still to attribute their causation or nudge effects through the initiatives that are planned for Metamorphosis. Therefore, while the 'improved communities' and 'increased quality of life' intentions are also implicit within the aims of Metamorphosis, the consortium partners will focus on measurable indicators and characteristics of child friendly neighbourhoods that are more directly associated with the concepts of safe places to play, and related to this, sustainable mobility and urban planning. In addition, it may be possible for some cities to compile chronological life cycle data on when (and the proportion of) people who reached certain key stages in their lives, such as when they started school, began work, are permitted to vote, drink alcohol, etc., which could

provide useful wider indicators of social inclusion, and the wellbeing and development of children, although again, these are not considered pre-requisites for the evaluation of the Metamorphosis project, although the implicit social benefits should be recognised (see chapter 6 for a guide on how the project may be monitored and evaluated).

2.2 Characteristics of Child Friendly Neighbourhoods

An initial workshop to help define child friendly neighbourhoods and their characteristics was conducted by the Metamorphosis partners in Meran in June 2017, which included experts from the Municipal Councils of the partner cities who have experience in dealing with children, for example as part of a wider young people’s public health agenda to create an environment and culture that champions active and healthy lifestyles. At this workshop, child friendly neighbourhoods were said to comprise the key attributes as summarised in Figure 2.1, which are largely self-explanatory:

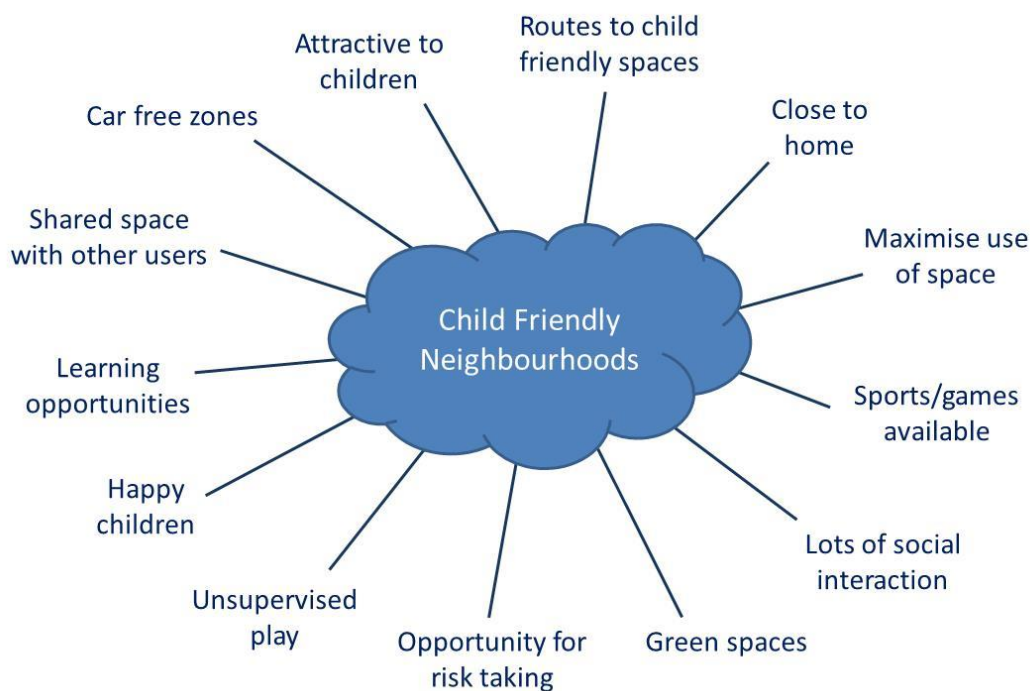


Figure 2.1 Key attributes of child friendly neighbourhoods

In addition, ‘Good’ and ‘Bad’ neighbourhoods, i.e. those that were considered to be child friendly versus those which were not, are said to possess the characteristics as given in Table 2.1 below.

Table 2.1 Perceived 'good' and 'bad' characteristics of child friendly neighbourhoods

'Good' Characteristics	'Bad' Characteristics
People centred, with mixed use and/or shared space (ideally no cars)	Cars dominate landscape (on roads, with parking, etc.)
Space for people to linger & meet / spend quality time and/or stay for a long time	Unfair space division / no space for people to linger
Uncrowded / space for children to play	Little space for children
Safe to cycle & walk	Bad surfaces for walking & cycling
Provision of drinking water	High noise levels
Inviting for people, with many benches / places to sit down	Attractive for car driving (e.g. segregated paving, wide straight lanes that encourage speeding)
Green areas	Little or no green spaces
Easy to cross roads / routes to / no barriers to walking & cycling	No interconnection of districts, subdivided by roads/cars
Lots of activities for children, at many levels (e.g. ground level play space, climbing frames, tree houses)	Playground 'islands', surrounded by roads / no variety of things for children to play
Lots of cycles / easy for people to walk around, priority at junctions given to pedestrians / cycles	Cars & cycles in conflict / priority given to cars

These perceived attributes and characteristics are based on the working experiences of the different Metamorphosis project partners, which reflect both good and bad examples found in neighbourhoods within their own cities. However, although these descriptions can provide good initial indicators of what the Metamorphosis project aspires to achieve, the literature suggests that children can perceive their surroundings and the associated impact differently. This occurs for many reasons, including different cognitive and psychological states of development (Vygotsky, 1980), non-physiological social and cultural factors in the diversity of children's lives, which is shaped by geography, wealth and poverty, social organisation, family patterns, and economic opportunities (Woodhead, 1998), as well as potential errors in research methods (Punch, 2002), which means children do not always evaluate their communities and neighbourhoods according to the same economic and social indicators to measure well-being that adults use (Malone, 2001). It is therefore essential that children are

engaged in developing and assessing the measures and activities that will be implemented in the Metamorphosis neighbourhoods (see chapters 3 & 4 below for activation strategies and engagement methods). Having said that, the findings from the second 'Growing Up in Cities' project (Chawla, 1997), one of the largest multi-site, multi-disciplinary research studies involving interviews with children in nine countries and six continents, suggest that they do indeed value similar attributes and characteristics in child friendly neighbourhoods to those identified by the Metamorphosis partners. The indicators from that project are summarised in Table 2.2, and other studies are said (Malone, 2001) to show similar indicators.

Table 2.2 Positive and negative indicators of child friendly neighbourhoods

	<i>Positive indicators</i>	<i>Negative indicators</i>
<i>Social Qualities:</i>	<i>Social integration</i> : Children feel welcome and valued in their community.	<i>Social exclusion or harassment</i> : Children feel unwelcome and/or harassed in their community.
	<i>Cohesive community identity</i> : The community has clear geographic boundaries, and a positive identity that is expressed through activities such as art and festivals.	<i>Sense of political powerlessness</i> : Children and their families feel powerless to improve conditions. <i>Boredom</i> : Children express high levels of boredom and alienation.
	<i>Tradition of community self-help</i> : Residents are building their community through mutual aid organisations and progressive local improvements.	<i>Fear of violence and crime</i> : Owing to community violence and crime, children are afraid to move about outdoors.
<i>Physical Qualities:</i>	<i>Green areas</i> : Safe, clean, green spaces, with trees, whether formal or wild, real or artificial, extensive or small, are highly valued when available.	<i>Heavy traffic and geographic isolation</i> : The streets are taken over by heavy or dangerous traffic, which separates or isolates different parts of the neighbourhood.
	<i>Peer gathering places</i> : There are safe and accessible places where friends can meet.	<i>Lack of gathering places</i> : Children lack places where they can safely meet and play with friends.
	<i>Varied activity settings</i> : Children can shop, explore, play sports and follow up other personal interests in the environment.	<i>Lack of varied activity settings</i> : The environment is barren and isolating, with a lack of interesting places to visit and things to do.
	<i>Provision of basic services</i> : Basic needs are provided for, such as food, water and sanitation (as appropriate to use).	<i>Lack of basic services</i> : When basic services like clean water and sanitation are lacking, children feel these deprivations keenly.
	<i>Safety and freedom of movement</i> : Children feel that they can count on adult protection, and can range safely within their local area, with minimal physical dangers.	<i>Trash and litter</i> : Children read trash and litter in their environment as signs of adult neglect for where they live.
Source: adapted from Chawla and Malone (2003)		

The table above ignores other, wider indicators associated with basic human rights (referred to in section 2.1 previously), such as the security of tenure or housing, and potential stigmatisation for living in a place associated with poverty and discrimination, which are wider social issues beyond the scope of Metamorphosis, which starts with the tenet of designing spaces around children and people, and not cars (see further below). The attributes and characteristics of child friendly neighbourhood as given in Tables 2.1 and 2.2 will be refined through work planned in the subsequent stages of this project, which will engage target

stakeholder groups that include children, their parents, schools and teachers, and also use innovative interactive techniques such as *Appreciative Inquiry* (chapter 4). These attributes and characteristics will also help to develop additional key performance criteria for assessing the effectiveness of different Metamorphosis implementation schemes in each of the participating cities (as part of Work Package 6), for which a suggested approach is given in chapter 6.

Of course, Metamorphosis is not about creating *generic* child friendly neighbourhoods - it seeks specifically to address the issue of interlocking sustainable mobility with urban planning, or true *möbilat* in German, i.e. improving accessibility and social community for the child friendly neighbourhoods as well. As indicated in chapter 1, this essential aspect of social construct has rarely been practiced in urban planning history through the second half of the last century. Historically, improving 'mobility' for neighbourhoods has tended to be associated with improving car access, typically seen as an indicator of widening wealth and economic prosperity, yet the growth in car use has led to severe congestion and air quality issues in major cities, particularly at peak periods, even though further road construction or increasing car capacity is now known to induce latent demand (e.g. Noland, 2001), which further exacerbates the traffic and air pollution (as well as noise) problems. In contrast, walking already accounts for a large proportion of personal journeys, for example one in three for the UK (e.g. Tolley, 1990) and one in five in Germany (e.g. Brög et al., 2003), which is even higher when trip-chaining is accounted for, such as when walking to the bus stop or from a car park is included. However, aside from certain parts of Europe, it has historically not been taken seriously as a form of transport, with infrastructure and facilities being treated as incidental to car travel (Methorst et al., 2010). As a consequence, impediments can be imposed on the free flow of people to facilitate the free flow of traffic (Tolley, 1990), with knock-on social consequences including a restricted sense of territory, diminishing privacy and a shrinking network of acquaintances or social interactions for people (e.g. Appleyard & Lintell, 1972; Hart & Parkhurst, 2011). Cycling has similarly been subservient to the car, and several factors contribute to it being perceived as a dangerous activity (e.g. Horton, 2007), particularly when unsegregated from road traffic, and which acts as a barrier for large-scale uptake, especially among younger age groups (e.g. Parkin et al., 2007). Indeed, improving sustainable mobility, particularly walking and cycling, and including access to public transport, needs to form an integral part of creating child-friendly spaces and neighbourhoods for Metamorphosis. This has never been more important, given the detrimental effects of cars on air quality and public health. Air pollution, in particular airborne particulate matter (PM), nitric oxide (NO), nitrogen dioxide (NO₂), as well as associated

ozone, has long been known to affect human health negatively (Brunekreef and Holgate, 2002), even at low levels of exposure, and both in the short and long-term, particularly in causing respiratory illnesses such as asthma and chronic obstructive pulmonary disease, as well as cardiovascular deaths. In urban areas, much of this modern air pollution problem emanates directly from road traffic (e.g. Kelly, 2017). While certain types of air pollutants, such as carbon monoxide and non-methane volatile organic compounds, have reduced significantly for road transport in Europe over the past 20 years (EEV, 2016), air pollution from vehicles continues to persist, and is attributed to the growth in car use and the increased use of diesel engines over this period, which produces higher concentrations of PM and NO_x (i.e. NO and NO₂). Indeed, tailpipe emissions from traffic and associated contaminants and poor air quality have been shown to be particularly harmful to children, due to the relative height of the exhaust to the breathing zone of the child (e.g. see Kumar et al, 2017; Nakashima et al, 2014; Winchester, 1991), as well as the proximity to streets (e.g. van Vliet et al., 1997; Ciccone et al., 1998; Venn et al., 2001), and as a result of prenatal exposure (Kelly and Fussell, 2007). However, the focus of the toxic exhaust effects has changed over the years, for example from lead pollutants being the main source of concern prior to the 1990s, to other particulate matter effects through the new millennium, when the emphasis also included greenhouse gases (CO₂ equivalents), as well as the impact of NO_x, and there is now emerging evidence (Hamilton et al., 2017) that the volatile organic compounds (VOCs) emitted from engine tailpipes are also harmful to humans. Yet this problem of toxic exhaust emissions seems to have been addressed on a piecemeal basis historically, with the current focus on diesel engines being a case-in-point, rather than recognising the fundamental issue, i.e. that vehicles and traffic are generally harmful to people, particularly children, and their use should therefore be discouraged, *especially for unnecessary journeys*, and where alternatives are available. This is particularly since the harmful effects from traffic will not be eliminated through the adoption of more fuel-efficient or shared and autonomous vehicles, nor the migration to electric, hybrid, solar or alternative-fuel cars, as tyre and brake-wear still account for a significant proportion of transport emissions - for example, they account for 16 to 27 % of PM emissions from road transport in Europe in 2014 (EEA, 2016). There is also some concern (Jones, 2017) that the wider adoption of autonomous vehicles, compounded by the population growth experienced in many cities, could lead to an increase in the number of vehicles on the roads in future, although the arguments for and against the notion of 'peak car' demand continues to be debated (e.g. see Goodwin & Van Dender, 2013; Millard-Ball & Schipper, 2011). Regardless of this, the health problems associated with motor vehicles, especially for children, are further compounded by the much higher risks of death and serious injury caused to children by

being hit by motor vehicles (Roberts et al., 1995), particularly in high volumes of traffic, and where there is high density of kerb parking; and these problems are in addition to the impediment, social segregation, and lower quality of life consequence issues caused by flowing traffic referred to previously.

The detrimental effects of motor vehicles and traffic on children (our future generations) are therefore widespread and very well established. However, it is less clear what collective steps are being undertaken by us as a society, and by local and national governments, to define, develop and advance towards more child friendly neighbourhoods that are not geared around the car.

In contrast, previous EU research (GOAL, 2013) established that both walking and cycling provide a wide variety of health benefits, especially where pedestrian zones, shared streets (or home zones) and traffic calming measures are introduced, as well as being accessible and free (or relatively inexpensive) for most people. In addition, walking in particular can be considered a leisure activity in its own right, which is often associated or combined with other social events or activities where people interact. As such, urban areas need to be understood as 'sojourning' spaces (Methorst et al., 2010), where people can congregate and/or socialise, and conflicts between pedestrians and traffic must be prevented, because human beings (including children) will sojourn in areas that appeal to them, such as parks and market-places, and that are considered safe. In turn, walking **must** be considered an integral part of both mobility and sojourning in public space, and initiatives to promoting walking on its own (e.g. to highlight the fun of walking) have historically failed (ibid) because they do not sufficiently recognise and provide for this basic need of human beings for everyday walking in residential suburbs and peri-urban areas, i.e. they do not improve the system as a whole for people to interact.

*Therefore, as well as seeking to improve the play and recreational rights of the child, there is a compelling argument that an inherent characteristic of creating child friendly neighbourhoods must also be to improve sustainable mobility (in particular walking and cycling) for **all** its citizens and **reduce** (if not eliminate) **car use**, thereby protecting children from the potentially harmful effects of motor vehicles, while promoting the health effects of active travel, as well as improving the accessibility to sojourn space.*

This is an important tenet for Metamorphosis, since sustainable transport policy has often not been integrated into urban planning, in spite of the theory and for the reasons highlighted

further above. In addition, a top down approach to urban design, even with the guidance provided by UNICEF, does not go far enough to focus on or address sufficiently on the inherent needs of human beings for both mobility and sojourn. Indeed, only by increasing sustainable mobility (or reducing car use), as well as increasing human community and local self-sufficiency (so the need for car travel is greatly reduced), will a true child friendly environment be created. Therefore, increased use of active and sustainable modes of travel, in particular walking and cycling, and conversely, reductions in car travel, as well as an increase in community activities (that are associated with the sustainable travel modes), can provide further useful indicators in the development of child friendly neighbourhoods - and this is reflected in the good/bad characteristics that were initially suggested by the Metamorphosis partners (Table 2.1).

In addition, the effective design and usage of local spaces and the associated transportation choices given for providing access and to enjoy such spaces can play a pivotal role in developing neighbourhoods that are child-friendly (and that are not oriented around cars). This is reflected to some extent in previous research (e.g. Aditjandra et al., 2012; Veitch et al., 2011; Timperio et al., 2010), where positive neighbourhood characteristics for urban design (i.e. positive locational aspects) include:

- good safety provision, for example with bright lighting, security cameras and/or other neighbourhood crime prevention measures (for example in The Netherlands, neighbourhood residents can choose to become part of a WhatsApp group where they warn each other of when unsafe situations occur, e.g. when they see suspicious persons walking around at night);
- short distances to, and large numbers of ‘crystallization points’ (see chapter 5), including schools, parks, and social, sporting and other recreational facilities;
- extensive provision of sustainable travel infrastructure and accessibility, with level and even walking spaces and paths, dedicated cycleways, and accessible bus stops;
- attractive neighbourhood features and utility provision, for example with lots of recreational spaces, trees providing shade/shelter, accessibility to water, and benches for seating; and
- where sustainable and community-focused household characteristics are prevalent, such as low car ownership, high cycle ownership, high levels of social interaction, etc.

The next chapter will discuss further the specific needs of children, and their development in terms of their local space.

3 Needs of children and their development in terms of space

From the previous chapter, it is clear that the focus of Metamorphosis is to encourage community play and recreation, particularly for children, and as part of the process provide a safer neighbourhood environment that is not dominated by cars and which encourages sustainable mobility. In developing the Metamorphosis project, it is therefore important to discuss the concepts of play and recreation (or simply ‘play’ for the purposes of this document), and in particular how this relates to children in terms of their needs and childhood development. This is especially as children can form emotional attachments to their surroundings (see below), and their emotive decision making can in turn be influential in the development of child friendly neighbourhoods.

3.1 Children’s need to play

The literature suggests that play is integral to children’s enjoyment of their lives, their health and their development. The value of play (Play England, 2009) is that children are able to create their own culture, develop their abilities, exploring their creativity and learning about themselves, other people and the world around them. It is said that children need and want to stretch and challenge themselves when they play, and play provision and creating play spaces that are stimulating and exciting allow children to encounter and learn about risk, which helps them to build confidence, learn skills and develop resilience at their own pace. Play can therefore be defined (DCMS, 2004) as

‘what children and young people do when they follow their own ideas and interests, in their own way and for their own reasons’

This is a generic term applied to a wide range of activities and behaviours that are satisfying and creative to the child, and which is freely chosen by the child. It is therefore essential that local children are consulted over the Metamorphosis measures that are being planned to encourage play in their neighbourhoods, and that they are subsequently given opportunities to participate in play opportunities without direction or restriction from adults. This does not detract from the need for children to have access to a choice of staffed facilities where their rights to play are the first priority, such as ‘adventure playgrounds, play centres, holiday play schemes, after-school play clubs, breakfast play clubs, toy and reading libraries, play buses and play ranger services’ (Play England, 2009), although these should already be part of the existing provision of children’s services by local councils. Planned Metamorphosis measures and activities should therefore be seen as additional or complementary to these facilities, and

indeed may build on them, recognising different play needs of different children, to extend more widely into residential neighbourhoods, perhaps under a 'Charter for Children's Play' (as defined in the UK) for:

'Children to have the same right to use and enjoy public space as others. Local streets, estates, green spaces, parks and town centres should be accessible for children and young people to move around in safety and offer places where they can play freely, experience nature, explore their environment and be with their friends.'

The benefits of play and associated physical activity for children are well established. As well as the personal well-being and social development reasons for play discussed above, participation in physical activity that is characterised by active forms of play is said to provide psychological health benefits for children aged 5 to 17 (WHO, 2011), by helping them to improve their control over symptoms of anxiety and depression, and contributing to their social skills and self-esteem. These benefits are said to derive through 60 minutes of vigorous activity per day, but they can also be accumulated through multiple, shorter bouts spread throughout the day. Active play or physical activity is also said to reduce the risks of certain cancers (Block et al, 2017), including colon, breast, endometrial, prostate and lung cancers, particularly as cellular damage from an inactive lifestyle are known to accumulate over time, hence promoting physical activity from childhood and embedding healthy behaviours early on is important for cancer prevention. However, physical activity may be accrued through several routes, including sport participation as well as active play. While the former is typically more strenuous and may be more effective at reducing the cancer risks, the latter is easier to promote, as it does not require a certain skill level or competency. Sport participation may also involve membership and/or travel costs, and could be limited by the availability of venues and facilities, whereas active play can be incorporated into daily life, with minimal cost to families.

Nonetheless, there are numerous benefits due to physical activity or any 'bodily movement produced by skeletal muscle that results in energy expenditure' (Caspersen et al., 1985) by children, and this will be further encouraged by the Metamorphosis trials. Children are up to three to five times more active during playing out sessions than they would be on a normal day after school, which also helps to tackle the problem of child obesity, as well as nurturing a sense of community correctness for children to grow into, due to greater interactions between neighbours. There will therefore be a tendency for the Metamorphosis implementations to focus on 'active' type measures and activities, including walking and cycling, as well as active play, instead of (for example) developing sustainable public

transport per se, as improving physical health and psychological well-being also form important aspects for meeting children's needs in creating child friendly neighbourhoods.

In addition, recent studies have also suggested that spending time outdoors and being active during the day and sleeping well at night is also beneficial for children in the development of good eyesight and preventing myopia. For example, the large cohort Avon Longitudinal Study of Parents and Children in the UK (Shah et al, 2017) showed that children aged 3 to 9 years who had reported more hours spent outdoors were associated with a reduced incidence of short-sightedness on reaching ages 10 to 15, which could be attributed to various factors, including the importance of vitamin D in modifying ciliary muscle tension, the enhanced secretion of dopamine in the retina in response to bright light, activeness in the open air improving circadian rhythms and preventing sleep disruptions, and the adverse effects of children's increased exposure to artificial light. The reduced risk was said to be independent of other risk factors, including time spent reading and the number of myopic parents, although the effect was not reproduced for children who were already short-sighted from an early age.

The increased ownership and use of smartphones, computers and other electronic devices also encouraged children to spend more time indoors (Beurat, 2016), with corresponding decline in time spent outdoors with other children and the number of trips being taken overall, as well as those made by walking or cycling, and this is related to further evidence of a decline in children's physical activity and an associated increase in child obesity. The importance of outdoor play, including walking and cycling as part of this, on children's physical and psychological/mental health as well as social well-being is therefore paramount. Their psychological-cognitive and social development is discussed further in section 3.3 and 3.4, while the next section looks at children's needs in the context of their environment.

3.2 Children's needs in terms of their environment

In addition to children's need for play generally, the literature (e.g. Tranter & Pawson, 2001) highlights the importance of the local environments for their development, and in particular their need for playful interaction with natural materials, as well as with people. Children were said (e.g. Jack, 2010) to have a profound attachment to place, developed (initially unconsciously) from an early age. However, place attachment exists in conjunction with social experiences, and ideal settings may not result in positive place attachment if they are the site of unhappy social events or interactions, and conversely, poor environments can be associated with positive memories or experiences. It is therefore important to recognise this

in developing child friendly neighbourhoods, and the psychological influences between children and adults, including their parents (see section 3.5 below). In addition, overall area accessibility, area mobility (level of travel in the area as a whole) and individual mobility (travel by individuals or groups) are inherently intertwined (Preston & Rajé, 2007), and these factors need to be considered holistically for addressing the issue of transport-driven social exclusion (section 2.1), in addition to the physical, emotional and other social-psychological factors that are important to children's development (section 3.3), and for their social well-being and inclusion (section 3.4).

As a result of biological evolution, people including children are naturally drawn to 'attraction points' (Don and Rennolls, 1983), which are associated with their home ranges (areas where they are most active). In a modern context, this may be (for example) local shops where they have to buy food and/or clothes, cultural or leisure centres where they socialise or participate in an activity, and schools attended by children. It is therefore important to recognise these inherent patterns of human behaviour, as their identification can help to provide useful indicators of where people are most likely to congregate naturally, and more importantly, the periodicity - for example, areas around schools are typically most busy for an hour before the school starts, and for an hour after it finishes - while they can be deserted at weekends. While some attraction points, such as schools or cafes/restaurants, are easy to recognise, others may not be so intuitive, such as outside banks and outside comic shops. In order to engage children effectively (see section 4.1 below), it is important first to ascertain places where they naturally congregate or visit regularly in neighbourhoods, as Metamorphosis measures can subsequently be more effectively targeted, and this builds on local assets and capacities.

It is also important that Metamorphosis neighbourhoods provide a safe and secure environment for children to use/play, and while the intention is to deter car use and provide alternative spaces for local community and young people's development, safeguards must also be put into place that protect the space users from harm. For example, while play provision must respond to the needs of children (Ball et al., 2008) by offering stimulating, challenging environments for exploring and developing their abilities, it must also aim 'to manage the level of risk so that children are not exposed to unacceptable risks of death or serious injury'. In this regard, good research (e.g. Laris, 2005) and guidance (e.g. KOMPAN, 2010) has originated from Australia, including the need for universal design that is both safe and provides access and inclusion for all, and guidance on safe play and equipment, as well as acknowledging the debate over how best to provide this, and that this is an evolutionary

process. Historically (Laris, 2005), safety standards tended to describe requirements in two dimensions, for example barrier railings heights. However, the challenge for Metamorphosis cities will be that safety design will be more spatially complex than (for example) in children's playgrounds, as they are likely to include in situ spaces which are constantly used. Added to this is that, even for playgrounds, safety standards can often not keep pace with new concepts and materials, so can date quickly. Therefore, when creating new play areas or environments for Metamorphosis, especially the temporary ones (i.e. that are not normally used as such), the suggested approach is to ensure that a safety specialist is also involved in the process from the start.

Laris (2005) also argues that being safe is about preventing hazards, not about preventing risk, for risk is always present; and when viewed as a fundamental part of children's development, it is essential that each child has the opportunity to experience situations where the risk level is appropriate to their skill level. This way, a child can evaluate the potential dangers and learn to manage similar situations as they occur. For example, he considers it wrong for parents or carers to follow their child around the playground at all times, as this can be overprotection, and if a child does not have the opportunity to tumble, fall, and experience accidents and occasional pain, they will miss an invaluable stage in their development, and the child might grow to be shy of physical activity, or clumsy, or possibly even accident prone, as they have not had this vital experience as a necessary part of growing up. He suggests that a challenging, yet hazard-free environment is the ideal 'safe haven' for children to test themselves, to learn about risk, and the limitations of their own abilities, both physically and socially; and with these skills in place, they have a foundation upon which to build, giving them the confidence to overcome all kinds of new challenges in future. This balancing of risk management versus the need for childhood development is particularly important in the context of encouraging children to play outside and for cycling. For example, results from a large cohort survey from the UK's Local Sustainable Transport Fund in 2015 found that 72% of respondents thought that cycling on roads was still unsafe (Preston et al., 2017), with most respondents being unwilling to do so. This contrasts with for example (Beurat, 2016) a trend where the number of children killed or seriously injured in traffic accidents over 10 years falling by nearly half, the majority being pedestrians, although there has also been a smaller corresponding fall in exposure rates, for example with the proportion of children walking and cycling to school on at least one day a week falling from 64% to 61% and 4 to 3% respectively over an eight year period (NHS, 2016). While the seriousness of even one accident cannot be underestimated, entrenched perceived attitudes to safety by adults over what is best for their children can be an influencing factor over why

many children are now driven to schools, e.g. 40% of all children in England do not walk to school at all (NHS, 2016), whereas the evidence presented further above shows walking and cycling is much better for their physical activity and social development, and it is therefore crucial that parents as well as children are engaged in Metamorphosis.

Having said this, the need for managing risk potentially means creating space designs or uses that guard child friendly neighbourhoods against the possibility of hostility and backlash from angry drivers and residents, and for extreme cases in the modern day, an increased exposure is being seen as inviting targets for being attacked by extremists, given the recent rise for 'soft targets' in high-pedestrian areas of Barcelona, Berlin, London and Nice. The balance of risk versus reward are further factors for Metamorphosis partners to consider in their implementation planning, particularly for the larger cities, although chapter 5 will describe some of the potential measures and best practice activities that could be introduced, and how some risks may be mitigated.

3.3 How children's needs and abilities vary through the ages of childhood

This section looks at the needs and abilities of children during the different stages of childhood, particular in terms of cognitive (or intellectual) development, and in the context of play and their association with the urban environment.

According to UNICEF (2014), the human brain is said to reach half its mature weight by about six months old, and 90 percent of its final weight by age eight. This rapid development is reflected in children's changing capabilities and what they do, and although every child is unique, it is suggested their development follows basic patterns and pace of development. The first widely-recognised theory of cognitive development was put forward by Piaget (e.g. 1952), which suggest children develop through four progressive stages, comprising:

- the 'Sensorimotor' period, from birth (i.e. infants) to about 2 years (i.e. toddlerhood);
- the 'Pre-operational' period, about 2 years to 6 or 7 years;
- the period of 'Concrete operations', age 7 to 11 or 12 years; and
- the period of 'Formal operations', from 11 or 12 through to adulthood.

According to Piaget (Shroff, 2015), although some children may pass through these stages at different ages, and others may pass through more than one stage simultaneously, the stages cannot be skipped, and each one is marked by new intellectual abilities and a more complex understanding of the world.

Sensorimotor Stage (from birth to toddlerhood)

At the early stages (Shroff, 2015), infants are only aware of what is in front of them, and they focus on what they see, do, and the physical interactions with their immediate environment. As they do not yet know how things react, they go through a phase of constantly experimentation and learning about the world through trial and error. However, between seven to nine months, they reach an important milestone where they begin to realise that an object exists even if it can no longer be seen, which suggests their memory is developing. As infants start to crawl, stand and walk, their increased mobility leads to further cognitive development, and by the end of the sensorimotor stage they show signs of early language development and some symbolic abilities.

Pre-operational Stage (from around 2 to 6 or 7 years)

At this stage (ibid), young children are able to think about things symbolically, and their language use becomes more mature. They also develop memory and imagination, which allows them to understand the difference between past and future, and engage in make-believe. However, their thinking is still based on intuition, and still not completely logical. They cannot yet grasp more complex concepts such as cause and effect and comparison.

Concrete Operational Stage (from 6 or 7 to 11 or 12 years)

Between primary-school age and pre-adolescent (ibid), children begin to demonstrate logical and sound reasoning. Their thoughts are less egocentric and they are increasingly aware of external events. They also realise their feelings are unique, and may not be shared by others, and they can have an active imagination. However, their ability to think abstractly or hypothetically may still be limited.

Formal Operational Stage (11 or 12 to adulthood)

At adolescent age (ibid), children are able to use symbols logically and are able to relate to abstract concepts. They can think about multiple variables in systematic ways, formulate hypotheses, and consider possibilities. They can also ponder abstract relationships and concepts such as justice.

Although Piaget (Shroff, 2015) believed in lifelong intellectual development, he insisted this last stage is the final phase of cognitive development, and that continued intellectual development in adults depends on the accumulation of knowledge.

Piaget (1952) also described children as ‘architects of their own understanding’. Therefore parents, teachers and other adults who engage them need to be **reactive** observers of children’s learning, particularly when they are very young, rather than try to set the agenda for them. This is particularly important if they are to be understood, and their opinions heard (i.e. particularly important for their engagement).

3.4 Implications for play and the environment

According to UNICEF (2014), the most important factor in early childhood development is the mothers’ health before birth, although the environment is also said to have an effect, i.e. if the brain does not receive the appropriate stimulation during this critical period, it is said to be difficult to rewire itself at a later time. This period is characterised by ‘psycho-social development’, which is largely dependent on love, physical and verbal stimulation, as well as play. However, children’s development in these early ages can be difficult to measure, because physical or tangible results are not necessarily produced, although they can manifest in the demonstration of certain skills. Nonetheless, infants and toddlers are particular receptive to play (Olds, 1987), and can be engrossed by it. It is said that even base things from the environment can fill them with wonder, indulging them to explore with their senses and new-found motor capacities. Infants and toddlers tend to live in the here-and-now, with largely sensory-driven experiences that account for the nuances of light, colour, sound, smell and touch, which is unencumbered by more adult demands such as responding to other people’s expectations, pursuing goals or using time well. Their responses to environments therefore tend to be immediate, and inseparable from the sources of stimulation around them. Effective play design for this group should therefore focus on qualities that stimulate their sensory inputs.

For children aged two to six (generally pre-school), physical development and coordination allows new kinds of physical or active play, such as riding a tricycle, running, climbing, scooting and riding a bicycle. Role play and imaginative play, which involve storylines (such as the car going to the garage for repairs or being sold, and acting out ‘good guys and bad guys’), and imitations of behaviours exemplified by their parents also feature much more during the pre-operational stage. This coincides naturally with social development, playing with peers, co-operative play and language development, e.g. Lillard (1993) and UNICEF (2017a). Social play may involve siblings, children at nursery, play groups or family friends, therefore development can be supported by access to community play areas and other children, or hampered by a lack of them. The establishment of game rules, nice behaviour

and fair play, developed alongside social play and active play, may pause for children to engage in negotiation of rules or planning things which happen next (Bergen, 2002). These social skills can be demonstrated during play, which may include adults, and taught in play which includes both adults and children. Example of negotiation include children playing together find they both want the same toy, or a pause in a more storyline based role play, which requires a certain development of language, and this behaviour requires space to play together and apart. A more sophisticated development of and representation of, real and not real behaviours is occurring, and that these demonstrated role play behaviours do not continue outside of the game, i.e. someone wounded, or dead, or stranded, is only those things during the course of the game. While social etiquette type rules are learned, to facilitate playing with others, rule based games such as many board games are still very difficult at the beginning of this stage, but start to develop towards the end of this stage (Berk, 2004), This highlights the need to still have parental interaction for teaching and learning of new skills in a more structured way, and for 'safe', nurturing and child-centred play, although new social skills are enjoyed, it can lead over competition, pushing, bangs on the head etc., and parental play provides a break, from this exciting and somewhat risky new social endeavour. Learning processes such as specific schemas (see section 3.6 below) develop more obviously in the early part of this phase and can frequently be associated with bad behaviour, so correct identification of the behaviour as a schema and supporting this learning is invaluable for meeting the needs of the child, and may reduce stress on the parent. Intellectually, basic picture and later basic word puzzles can be attempted, mazes, dot-to-dot and word searches, all of which require (and develop) fine motor skills.

Between ages 7-11, children can participate in games with more complex rules, from basic board games, to complex games such as Chess. The more complex rules of football are better understood, and more physically demanding challenging games and physical activities can be enjoyed, for example 'monkey bars' in playgrounds. Kitson (2002) describes four kinds of play that are relevant to this stage: **functional** in which children use their 'sensorimotor' skills to explore their physical abilities; **constructive** or creative play, where planning and organisation of materials occur as well as sensorimotor skills; **games with rules**, which could be table games or physical games; and **dramatic** or socio-dramatic play, where children experience human relationship through role playing social interactions. Children are also curious about and exploring their environment, climbing trees, interested in animals and insects, discovering what is going on around them and why.

This is also a key age when obesity can develop, although rates are usually low. In a study by Bartle (2013), only 2% of children were obese. However, children who were clinically obese and then lose weight (until they fall within the lesser 'overweight' range) is 1.3%, while the incidence of healthy children becoming overweight is 6%, i.e. the trend is increasing. Gender specific brain developments (Caviness et al., 1996) can also be seen at this stage, in the overall size, area specific size, and a difference in the relative amounts of white and grey matter compared to the final amounts in a mature brain, with boys showing more grey matter than adult male brains and females still to develop adult levels of central white matter. Although we know children continue to develop physically, emotionally and socially through play, few studies of play development in 7-11 years olds have taken place than the younger ages, adding to the importance of the Metamorphosis project.

From age 12 onwards, adolescence brings adult and gender specific physical maturation, with further developments in sports, both general and specific, and children's requirements and appetite for arts and culture. It is an age of developing individuality, e.g. outdoor skate parks provide an opportunity for adolescents to exercise through bikes and skateboards, to demonstrate their skills to their peers, or to observe and pass social time. 'Rough and tumble', as described by Pellegrini (2002), becomes more common among teenagers. It is specific, and different from aggression, including stages of running, chasing, fleeing, wrestling and open hand hits, which are counter to the aggressive behaviour of pushing, shoving, kicking and closed hand hits; children will continue to play with each other after rough and tumble, and facial expressions are indicative of fun. Rough and tumble therefore provide physical and social exercise, that helps children distinguish play signals from aggressive signals, and 'safe' open spaces can afford the opportunity to engage in this way. Music features largely in adolescent life. While arguably beneficial at all stages of development, for adolescents it provides an emotional outlet, and the development of individuality through the expression of an 'image'. Art is another form of expression, e.g. a dedicated space to produce street art and express themselves could be the difference between graffiti and criminal damage, and can be a healthy appropriate expression of normal, well-adjusted teenagers, the famous graffiti-artist Banksy being an example who later became famous. Allowing for street art has the added value of giving participants a feeling of ownership over the space, because they can interact with and change it.

In summary therefore, in terms of developing child friendly environments:

- for younger children (aged around 6 and under), it is more about creating a relatively protective, yet stimulating environment that nurtures them and helps them to develop, which engages all their senses, and offers lots of opportunity for them to play, explore, and start to use their imagination;
- for older children (around 11+ to 18), who are already at the formal operational stage and therefore able to understand complex concepts and abstract relationships, more needs to be done to engage them in the planning process, so they feel more connected, and their suggestions can also be taken forward into the design of their neighbourhoods which affects them, for they have a very real and active stake in the participation of social, cultural and artistic activities associated with their lives, because they are already thinking similarly to adults;
- for those children in between, from 6 to around 12 years old, or typically primary school age, the situation is more complex, as less research has been conducted in this area. However, they are at the concrete operational stage, so are increasingly aware of their external environments, which can spur their active imaginations, and they can also be empathetic to others. This group therefore not only provides the greatest opportunities for research, but also stands the most to gain in terms of having their views heard for planning purposes, and potentially also benefit from the planned initiatives in terms of effects and influence on their future development.

In addition, as a consequence of different physiological stages of development, children's perceptions of their space can differ greatly to adults, which changes as they grow and develop. In particular, the concept of 'eye level' will vary through the different ages of childhood, as indicated previously. Their other senses can also change, for example, increasingly heightened sense of smell, and their development may also mean their need more stimulus, which they can respond to (or a lack of it), which must be recognised as important considerations in planning and designing child friendly spaces and play environments. Even from an early age, human beings typically walk/run at round 3-5mph (5-8kph), and in environments that are conducive to walking or sojourning, all the senses of human beings are activated, and the scope for social interaction is potentially limitless. Conversely, dull and drab places will not attract people, especially children. Therefore, as children develop, it is important that they are given opportunities to play, as well as active social and physical activity, as the lack of this can lead to problems later in human life, for

example with inactivity, poor health, and obesity as discussed previously, which is attributed to being one of the leading cause of preventable deaths worldwide (WHO, 2013).

Play spaces should also be inclusive, not only in terms of e.g. gender, race, religion, age and height, but also to both individual and group needs, as well as disabled children, according the UN convention on the Rights of the Child, article 23 (UNICEF, 1989). Thought must be given to deaf, blind, autistic and long-term ill children, access and how to keep their play involved with other children's play, to help the creation of an inclusive community and normalise these things for those experiencing them as well as those interacting with those who are affected in this way. Ease of use and ease of access, should reflect actual use of facilities and frequency of use, tempered by the subjective perception of the users' assigned value to the space, and based on how rewarding the experience of accessing the space is.

This engagement of children and other stakeholders in the 'discovery' of what constitutes child-friendly neighbourhoods and how they may be developed forms an important aspect of the Metamorphosis project, which will be pursued by the partner cities in the subsequent phases (see chapter 4).

3.5 Additional child-parent and children-adults mutual influences on play and child friendly environments

In addition to the needs of children, child friendly neighbourhoods can also benefit parents, as they provide more opportunities for playing with their children, and for them to become more active as a family unit. Some parents also claim (Dare Hall, 2017) they allow greater opportunities for social get-togethers, with a chance to build relationships with other parents, particularly for those who work and/or are absent from the school runs. Such neighbourhoods therefore further endorse a sense of place, or focus for community life. In addition, the creation of child friendly neighbourhoods for adults may not just be about feeling part of a community, but also re-creating the freedom they had as children, going back to a time when traffic on the roads was less, and playing in the street reminds them of their own youth, usually in a positive way.

Conversely, children's use of local environments can also be subject to parental (and wider adult) influences and/or control, with previous research (Valentine & Mckendrick, 1997) suggesting there may be no direct link between children's play patterns and the level of public provision of play facilities within their neighbourhood, and the most significant influence on children's access to independent play could be parental anxieties about

children's safety and the changing nature of childhood. Parents concerns of space are likely to include pragmatic factors, such as (i) shelter from weather conditions (sun, cold, rain, etc.); (ii) safety, including fences and enclosures to prevent children from running off; and (iii) comfort, such as places to sit while children play. Proximity to home can also be a key factor, especially for parents with more than one child, and in this case, space should also provide for interests of children of different ages, as far as the parent is concerned. Facilities, such as toilets, baby changing space and affordable refreshments are further considerations for parents.

Children can also adopt patterns of behaviour which mirror the behaviour of their parents as part of their development (as discussed above), and there has been much debate over the dominate factor of nature versus nurture. Similarly, children can have an emotional and physiological influence over their parents from birth, for example a baby's cry can cause a breastfeeding mothers milk to leak (Jones, 1992), as a physical response to their child's expressed need. In addition, according to Horelli, (1994) children's urban planning designs are different to the choices made by adults, where their plans were compared to those of an architect, not only did it show they understood scale well, but they also chose a much greater variety of nature items, structures and routes, and this perhaps reflected their need for stimulation and how they see the world.

It is therefore important that the needs of both children and parents, as well as the interdependencies of parent-child and other similar adult-children relationships are considered in the context of developing child-friendly spaces. For example, Play England published a report (Kirby, 2004) which discusses the use of high quality manufacture play equipment, which caters to safe and fun play, but not to risk taking and challenges during play, views highlighted by Gill (2006), which parents may equally be concerned with from a child developmental perspective. Play England also highlight that 'Landscaping, planting and community art installations, for example, can offer children as much play value as apparatus' (Shakell et al., 2008), which is beneficial to both children and parents, so there is much to consider in designing child friendly or play spaces.

Issue of strangers versus socialisation

A dichotomy also exists between being sociable and safety around strangers, especially for children (including with each other). In countries which are more family orientated, for example those in the Mediterranean such as Spain and Italy (Jurado Guerrero & Naldini, 1996), experience suggests children are more social and comfortable making new friends as

well as talking to adults in social situations. However, variables in this extend to the child's upbringing, how social is the family in which they grow up, which are personal to the child, as well as how shy or outgoing they are as an individual. Amin (2008) suggests that the nature of social interaction is circumspect, and typically rarely involves transgressing developed attitudes and practices towards strangers, as interaction and familiarity come from childhood. It is therefore important that children are encouraged to socialise from an early age, in friendly environments that are conducive to this, and where implicit dangers from interacting with strangers may be minimised.

The attitudes and behaviours of children, their parents and other adults can therefore greatly influence each other, and it is important that all Metamorphosis partners are aware of this. This is particularly given the principal approach adopted by the cities in Metamorphosis, i.e. that while children will be engaged to ascertain their views and requirements for child friendly spaces, this will not be done in isolation to their parents or carers and other adults such as teachers who act '*in loco parentis*'. However, the next section will discuss some of the 'good practice' strategies for the activation of children for Metamorphosis. Specific methods and tools for the engagement of children as part of planning, design and implementation will be discussed in the next chapter (as part of implementation planning).

3.6 Strategies for the activation of children

The concept of involving children in urban planning is not new, particularly following the work by Hart (1987, and 1992) in the US. The European pioneers for holistic planning of child friendly neighbourhoods, e.g. see Haikkola & Horelli (2002), Haikkola et al. (2007), Horelli (2007) and Nordström (2009), suggested a base framework using 10 important 'normative dimensions', which links children's views to suggested area of applications ('abstract definitions'). The views were based on surveys with children conducted in Helsinki, Finland, and Rome, Italy, between ages 12 to 18. As such, they could provide useful pointers in activating and engaging children, although many of these are already known to the Metamorphosis partners or have been discussed previously. For example, in a previous Finnish study, children were involved in planning not only a play area (Horelli, 1994), but also identifying the traffic solutions, and subsequently there are many cases involving children in urban planning, where they have proved to be valuable contributors. In addition to this, through the experience from Finland, as well as in France and Switzerland (Horelli, 1998), the role of local government was found to be crucial in the activation of children in designing child friendly spaces. However, before suggesting specific activation approaches, it is important to summarise the special role that children can play in a research project, and

therefore for people to appreciate how they may be activated and engaged in Metamorphosis.

3.6.1 Role of children in Metamorphosis

The focus of Metamorphosis is on children, and the project already recognises they play many crucial roles (see grant agreement), which include:

- **being radical questioners**, in analysis and design, and to challenge the status quo of what future neighbourhood spaces should look like, as part of the visioning and implementation planning for WP3;
- **being facilitators** for the implementation trials for WP4, given adults will generally respond positively to the wishes of children, as well as try to protect them, and can also learn from them;
- **being motivators**, particular for those around them, as part of the work for WP5, provided they are empowered to do so, which should encourage both them and others, in the shift towards walking and cycling, and improving the community's longer-term capability for developing child friendly neighbourhoods;
- **being critical and honest judges**, in the evaluation of the implementation trials as part of WP6;
- **being disseminators**, particularly through digital media, which will be especially important for WP7.

These roles recognise the unique needs and qualities of children, as well their interactions with parents and other adults, as discussed in the previous sections. More importantly, they recognise children have the potential to be co-investigators, i.e. perform all the different research roles as listed above.

3.6.2 Children as co-investigators (questioners, facilitators, motivators, judges and disseminators)

Children may be activated to engage in the project through many ways, for example by:

- **Group enquiries**: where children will collect and analyse the needs, perceptions and priorities of inhabitants and visitors of the neighbourhood (e.g. in local shops). This can happen in specific communication environments created through the Metamorphosis interventions, for example at share points, in flea markets, at school parties. The interventions will be co-organised by the children, and to gather some of the information, they will also e.g. do interviews, use rating systems, and ask for quick sketches;

- **On site research:** where children (for example pupils in school setting) will carry out on-site visits throughout the neighbourhood to identify problematic areas. For example, they will gather the needs and perceptions of otherwise difficult to reach groups of the society, including senior citizens and migrants;
- **Conducting audits:** which brings together both on site research and group enquiries: first, the enquiries are used to develop awareness about the situation, and then on site research will help to complete the picture. If a group of adults (e.g consisting of e.g. parents, teachers, politicians, local businesspersons) also do the same audit process, the different outcomes and perceptions can then be compared. Similarly, older children can also be consulted with peers in their year group;
- **Using the child's perspective:** where various tools that children enjoy will be used to record and show the child's perspective. This can include video observations from a baby buggy (i.e. at children's eye-level); speedometers to assess dangerous speed levels (as children have difficulties to assess the speed of cars); or width measuring toys (e.g. to playfully measure too narrow sidewalks).

There are potentially several ways of activating children in these co-investigative roles, for example using reward motivators or cognitive dissonance (Festinger, 1962). Reward motivators can be used by parents to produce desired behaviours in children. It can also work the other way around, and the happiness, excitement and/or satisfaction of their child motivates parents to play and take trips to the park. However, for older children, being able to travel safely to the park alone can be the difference between going or not, hence it is important that rewards are selected appropriately, and this can differ between groups of children. Converse to this is that children can act as agents of change. Change can often result in cognitive dissonance, when people hold contradictory attitudes, beliefs or views, but they can also seek harmony in their opinions, which children can facilitate or help to bridge (e.g. 'for the sake of the children'), and thus attitudes and ideas among people can shift.

3.6.3 Ladder of participation

Although the other approaches may work, engaging children fully as co-creators and co-investigators is often the best approach. However, engaging them is more than merely involving them, but requires the responsible sharing of power (Hart, 1987), which is a process which can only be acquired through regular practice and engagement. This means children need to participate (Hart, 1992), which is defined as 'the process of sharing decisions which affect one's life and the life of the community in which one lives', i.e. it is the cornerstone of democracy and is a fundamental right of civilised citizenship. However, participation can be at many levels, i.e. there is a rising 'ladder of participation' (Figure 3.1),

which historically may also have been different between boys and girls (and that may need further exploration as part of Metamorphosis).

The 'ladder of participation' is said to have eight rungs, to represent the different levels of involvement from children, which are (from lowest to highest):

1. *Manipulation;*
2. *Decoration;*
3. *Tokenism;*
4. *Assigned but informed;*
5. *Consulted and informed;*
6. *Adult-initiated, shared decisions with children;*
7. *Child-initiated and directed;* and
8. *Child-initiated, shared decisions with adults.*

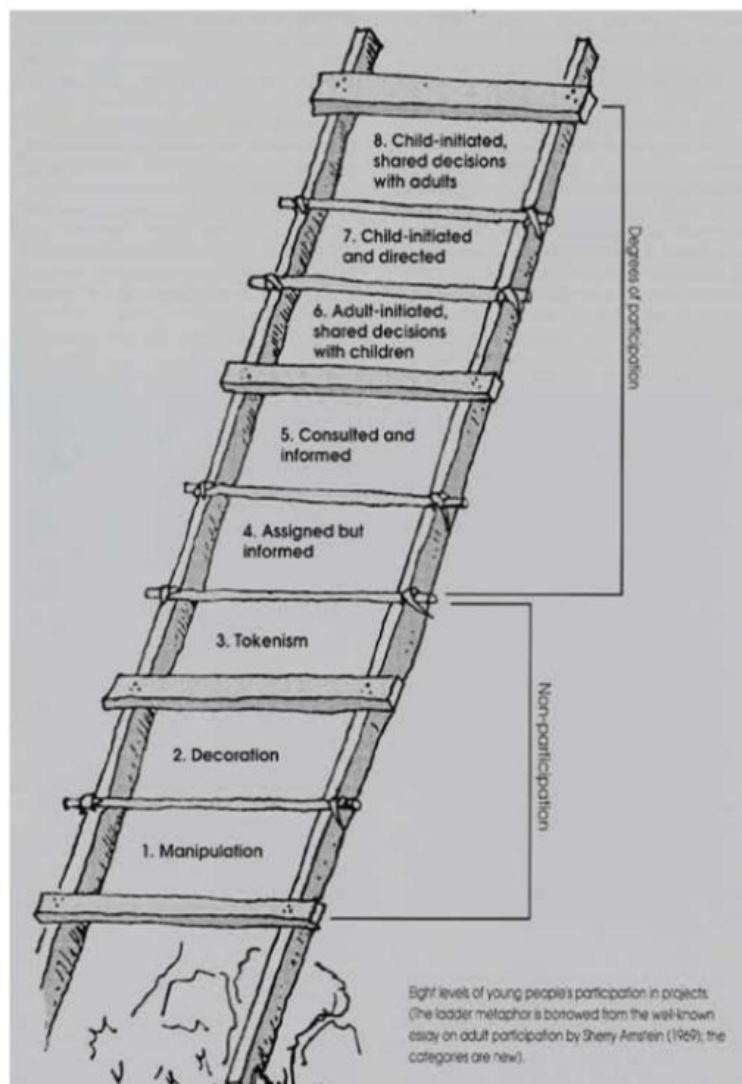


Figure 3.1 Hart (1992)'s Ladder of Participation

This ladder model can be applied to all the co-investigative processes to be carried out by children in Metamorphosis, including for group enquiries, on site research, audits and using child's perspectives, as well as involving them as co-creators and stakeholders, in order to achieve more than the token participations stages (rungs 1 to 4.) i.e. for full participation. This similar approach may also be used to activate the engagement of adults and other members of the community. Note however (Hart, 1992), that participation should reflect a child's ability and what they may want to be doing at that time, and children do not always need to participate at the highest level all of the time, but they should be able to if they wish.

3.6.4 Use of schemas

Another approach to activating children is through the use of schemas. First described by Piaget (1952), and subsequently studied by many researchers, these are a means of children's learning through repetitive behaviours. They describe natural instinctive urges by children to learn through these repeated behaviours, which are fundamental to their happiness. Several schemas have since been characterised, e.g. Nutbrown (2006), Caro (2012) and PACEY (2016), and there are many types of play or games associated with each, that enable and support children's natural learning and/or investigative processes. In the UK for example, this is now built into the 'Early Years Education Framework' for children under five (DfE, 2017), although the same principles apply to those beyond pre-school age. Since schemas help younger children make sense of the world, children with the same schemas are more likely to play well together also. In addition, research by Roberts (2006) also suggests that recognising children's need to develop a schema increases their self-esteem.

Therefore, schemas can be used to describe and help children to learn and investigate, and the understanding of them can be very useful for the design of the Metamorphosis interventions. However, in designing measures and activities, the process needs to provide for a host of schemas, some examples of which are listed below, although there is great potential of involving children as co-creators in developing new ones as part of Metamorphosis.

Example schemas (from references above) include:

- **Enveloping** - covering of objects, oneself or others. Associated games for example include dressing up, dressing toys and/or dolls, wrapping, covering things with blankets, putting objects inside one another;
- **Enclosure** - the addition of boundaries. Making "camps", fences around toy farm animals, can include making enclosures from Lego, enclosures made from cushions; can also include water play, pushing shapes through correct holes;

- **Connections** - includes construction and deconstruction of large or small objects, joining of trains, cars, building blocks, jigsaw puzzles, tying things together;
- **Trajectory** - the movement of themselves or objects in space. Includes jumping, throwing, kicking, games such as catch, marbles, football, jacks, bouncy balls, table football, blowing a paper ball with a straw, water balloons fights, and swings;
- **Positioning** - the organisation of items, i.e. lines or groups, and can include a preference for how food is arranged on a plate, to the position of the child in relation to other things, where they sit, and what sits next to them; age appropriate games of toys which can be organised into groups, even if the groups do not make sense to anyone but the child;
- **Transporting** - movement of objects from one place to another. Children will move anything, and includes toys such as train sets, where children build tracks, games like marble run, outdoor zip lines;
- **Transforming** - usually involves mixing things together to see what the result is, for example sand and water play, cooking, mixing coloured fluids, and clay;
- **Rotation** - fascination with things that go around, for example playing with a roundabout, toys with wheels, spinning themselves around, and moving the hands on a clock.

The key to improving children's roles as co-investigators as well as being stakeholders is therefore to engage them effectively through higher rungs of participation, and also to use tools such as schemas that help them to learn and investigate. Indeed, there is an argument for Metamorphosis that children should take the lead through many phases of the project, and that adults should act merely as reactive observers and facilitators as suggested by Piaget (1952).

3.6.5 Using a theoretical framework for environmental child-friendliness

In addition to the 'demand-driven' methods for engaging children above, Horelli (2007) provides a theoretical framework for the 'supply' (or situation-driven) approach to improving the quality of the relationship between children, their families and their environment. This builds on the 10 normative dimensions and abstract definitions for 'environmental child friendliness' referred to previously (see Table 3.1), to review and provide four concepts or 'patterns and structures' that could improve the 'collectively environmental fit' for children and adults (Table 3.2). This framework is further extended to provide an empowering approach, given supportive environmental conditions, for participative planning and communicative engagement with adults and children.

Table 3.1 Normative dimensions and abstract definitions of environmental child friendliness (Source: excerpt from Horelli, 2007)

Normative Dimensions	Abstract Definitions
1. Housing and dwelling	<ul style="list-style-type: none"> • Flexible and secure housing alternatives. • Processes that transform the dwelling into a home.
2. Basic services (health, education, transport)	Basic (public and private) services in the proximity that facilitate the everyday life of children.
3. Participation	Opportunities to participate in planning and development.
4. Safety and security	<ul style="list-style-type: none"> • The guaranteeing of physical and psychological safety by the state and the municipalities: child welfare and the prevention of violence. • An environment which is tolerant and pluralistic. • Safe transport systems and public places in general.
5. Family, kin, peers and community	<ul style="list-style-type: none"> • Opportunities for close social relationships with family, kin and friends.
6. Urban and environmental qualities	<ul style="list-style-type: none"> • High functional, aesthetic and cultural standards in the concrete elements of the local environment. • Provision of a variety of interesting affordances and arenas for activities.
7. Resource provision and distribution; poverty reduction	<ul style="list-style-type: none"> • The provision of financial resources and work opportunities to young people who have a role to play in the local economies.
8. Ecology	<ul style="list-style-type: none"> • The protection of nature and the application of the principles of sustainable development in the construction of the built environment and the society.
9. Sense of belonging and continuity	<ul style="list-style-type: none"> • A sense of cultural continuity and a sense of belonging to a certain place at a certain time.
10. Good governance	<ul style="list-style-type: none"> • A flexible local governance that takes into account young people's opinions in the decision-making. • The provision of participatory structures, e.g. youth councils and varying participatory projects.

While this framework can seem largely conceptual, the broader principles have wide application, for example that different environmental and behavioural situations lend themselves to participative engagement by children and adults in different ways, and at different levels, which helps to develop a sense of empowerment, which in turn can lead to influential changes in their environments. This integrated process will become more apparent from the discussion in chapter 5 on the potential measures and activities that partner cities could implement for Metamorphosis, for example through the use of 'living labs', and for the consortium to ensure there is a diverse portfolio of initiatives that engage children and adults at different levels and in many ways, to achieve the widest possible outcomes. This is not least so a wide range of child- and adult-based indicators for people-environment integration can be developed, but also because children evaluate their communities differently to adults.

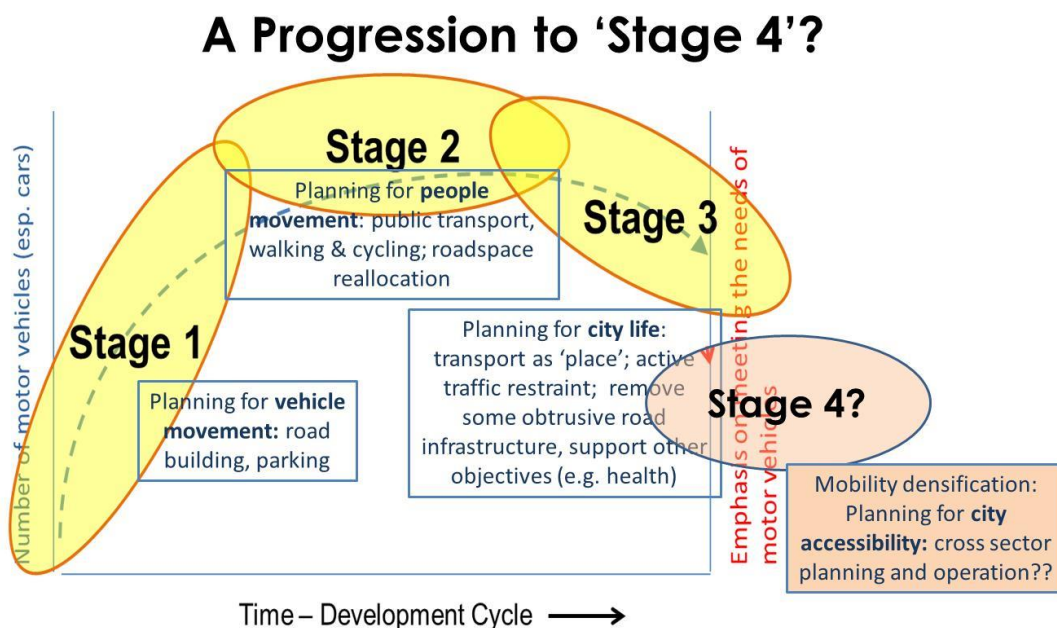
*Table 3.2 Example concepts that help 'collective environmental fit' for children and adults
(Source: from Horelli, 2007, which has the original concept references)*

Concept	Definition	Level	Examples	Comments
1. Behaviour setting (Barker 1968)	An eco-behavioural context consisting of a standing pattern of behaviour and milieu.	Micro	A school; a nursery; a youth centre; a team game	A useful analytic concept
2. Intermediary level (The Research Group for the New Everyday Life 1991)	A new level between the private world of households and the public and commercial world of institutions and enterprises.	Micro, Meso, Exo	A co-housing unit; a resource centre for young people	Originally a normative mobilising concept for the enhancement of new structures. Later it has attained explanatory power.
3. A supportive infra- structure of everyday life (Horelli and Vepsä 1994; 1995; Horelli 2002b)	A structure in the neighbourhood comprising environmentally friendly housing, services, mobility management and local initiatives that support the residents irrespective of age, gender and ethnic background.	Meso, Exo, Macro	A well-functioning neighbourhood	A normative and explanatory concept for analysing the supportive environmental elements of daily life.
4. A network for social cohesion (Horelli 2003; Rissotto and Tonucci 2004)	An intentionally interconnected network of real and virtual nodes and links.	Micro, Meso, Exo, Macro	e.g. Let's go to school- projects in Italy	A dynamic concept that can be used in planning with a network approach.

The next chapter will look at the early steps in implementation planning, including methods for engaging children in imagining and designing future child friendly neighbourhoods.

4 Implementation planning

Given the role that city or municipal councils play, the Metamorphosis partners will already have their own approaches to developing and implementing new policies and schemes. However, an overall approach to implementation planning based on the SUMP principles (ELTIS, 2013) is suggested in chapter 6, along with potential Metamorphosis implementation measures and activities provided in chapter 5. In addition, it should be noted that Metamorphosis implementation planning should form part of a wider strategy in the local transport policy and urban planning process. To set this in context, according to the EU CREATE project (Jones, 2017), which aims to decouple car use from economic growth, advance transport efficiency and reduce urban road congestion in Europe, transport policy development has historically taken place in a series of overlapping stages, corresponding to similar cycles in the EU funding of projects (see Figure 4.1). Historically, in the first stage, focus has been on vehicle movements, for example through road building and car parking provision, while the second stage has focused on the movement of people, including public transport and road-space allocation. Both these stages have led to an increase in the number of motor vehicles, especially cars. However more recently, i.e. stage three, policy has shifted towards planning for a higher-quality city life, with transport associated with a sense of place, and increased support for other objectives, including improved health, and greater traffic restraint.



Figures 4.1 'Transport Policy Development Process'
(Source: EU CREATE Project, Peter Jones, 2007)

It is in this context that the Metamorphosis project (to transform from car- to people-oriented neighbourhoods through a focus on the needs of its children) is currently being developed, i.e. stage three, although there is some intention to move towards stage four, i.e. planning for city accessibility, with the aim of improving cross-sector planning and operations, including engaging the community in these processes.

4.1 Summary of initial steps to implementation planning

The initial steps to Metamorphosis implementation planning may be summarised as several overlapping activities, which include:

- Agreeing the vision with stakeholders;
- Local planning and coordination to establishing the priorities for Metamorphosis; and
- Listening and engagement of children in strategic planning and design.

These steps are discussed separately below, with further guidance to be provided by FGM-AMOR (Participant number 1) as the WP3 lead, which will also feed into the implementation planning by partner cities for WP3. Coordination of the implementations trials in the cities for WP4 will then be conducted by Synergo (Participant Number 2), with NHTV (Participant Number 4) leading the capability building for WP5.

4.1.1 Project vision

Following on from the definition and characteristics of child friendly neighbourhoods (chapter 2), the Metamorphosis partners have developed an initial, high level project vision, which is:

- (i) to foster child friendly neighbourhoods, including residential streets where cars do not dominate, and where people of all ages including children can congregate to meet, play, learn, rest or relax, that are relatively secluded and safe from vehicle traffic;
- (ii) to share innovative ideas, information and best practice among all the partners involved in developing child friendly neighbourhoods; and
- (iii) to develop a network of cities with child friendly neighbourhoods that will be recognised internationally and sets an example for others to follow in terms of sustainable mobility and urban planning.

This project vision will be carried forward by each partner city, and refined with input from members of the local community, most importantly children, using Visioning Workshops

being planned for WP3 (see below for the initial instructions which have been given), before a series of specific measures and activities are designed and implemented.

Note that the first part of this project vision, to foster child friendly neighbourhoods, will also need to be interpreted by each partner city in the context of their local city or council's strategic plans. In Southampton, for example, Metamorphosis forms part of a package of initiatives to deliver a longer-term vision for the City, to create more vibrant, cultural, successful and sustainable neighbourhoods, with an increase in active travel (cycling and walking) and reductions in car use, to improve air quality and public health.

4.1.2 Coordination with local plans and establishing local priorities

Given the need to integrate with local city plans, and the potential complexities of planning and delivery in association with the community and many other partners, some Metamorphosis cities may wish to establish more formal partnerships with those who will be involved locally in the implementation trials, which helps to make clear the roles and responsibilities of those involved, as well as allow local communities to engage specifically with an organisation with a defined purpose, rather than the city or municipal council as a whole. There is already precedence for this, for example in Bristol UK, where 'Playing Out' was established as a not-for-profit Community Interest Group (CIG) organisation in 2011 (Playing Out, 2015a) with similar aims and objectives to Metamorphosis, and where subsequently the role of each of the different partners was clearly defined, for example with Sustrans taking the lead in developing sustainable mobility ideas and solutions, The Architecture Centre for urban planning, and the University of Bristol in evaluation and communications. Playing Out (<http://playingout.net/>) also defined a useful mission statement (or purpose) for creating child friendly neighbourhoods, which is:

'To enable children to play out freely and safely on the streets where they live, increasing their physical activity levels and improving wellbeing and sense of belonging in their communities; discouraging car use; encouraging walking, cycling and children's independent mobility in the city; bringing communities together and re-defining residential streets as playable, liveable public spaces.'

This purpose may be adopted by some Metamorphosis partners as the starting point for discussion with children as co-creators and local communities in the Visioning Workshops, to help identify residential areas that would be susceptible and could benefit from the Metamorphosis vision to foster child friendly neighbourhoods, and what this might look like in more detail.

While the aim of Metamorphosis is benevolent for children and society, it should be noted that, for example, the closure of streets to traffic to enable children to play may not be popular with all sections of society, or even some local residents, and some provision must be made by all partner cities to communicate, and provide education of the reasons for, the Metamorphosis measures and activities, well in advance of implementation in the affected neighbourhoods, and to guard against risks and potential backlash from those who persist in wanting to champion cars. In addition, some people may be worried about gaining access to/from their vehicles when the street is closed, while others may be concerned with the potentially increased noise from children playing in the street, and the local council may be further concerned about exposure to public liability. These are questions that need to be asked - and the community as well as children being given an opportunity to ask them - and relevant concerns addressed as part of the process of developing child friendly neighbourhoods for each city. The people who need to be engaged should form part of the considerations for the Local Analysis preparations (Task 2.3) for each partner City, and their Implementation Plans (Task 3.4) should include measures for having an open dialogue with communities and disseminating information (WP 7).

From the experience of Playing Out (2015b), some of the key priorities to be addressed by the Metamorphosis cities will be: (i) to challenge the status quo that streets are primarily for cars, and instead (ii) demonstrate they have the potential to be better used as healthy public spaces for residents of all ages, and as part of this process, (iii) to encourage more sustainable forms of transport, especially walking and cycling, and in so doing, (iv) support children's ability for independent active travel through building parent' confidence and trust, and (iv) by providing opportunities for them to play and cycle on traffic-free local roads to increase their confidence and skills, and (vi) by improving the 'walkability' of neighbourhoods through making the streets feel more safer and friendly. Partner cities will therefore need to consider how these priorities will be addressed as part of their local analysis and implementation planning, and in developing potential key performance indicators for assessing the success of the project (see chapter 6 below).

4.1.3 Listening and engagement of children as stakeholders in strategic planning and design

There is more emphasis now than ever on seeking children's opinions. From chapters 2 and 3, they experience life very differently from adults, and typically have different needs, so their voice is critical. They can also have a lot to say for themselves, and are able to provide unique views, so listening to them is essential. In the UK, following the establishment of the

Children's Act 2004 and the Children's and Young Person's Act 2008, children's views began to be sought more frequently, and a comprehensive document was produced by North West Leicestershire Council (NWLC, 2008) on children's participation, which again refers to the UN convention on the Rights of the Child: In addition to Article 12 referred to previously (Children and young people have the right to say what they think should happen, when adults are making decisions that affect them, and to have their opinions taken into account), this also refers to Articles 13 and 17:

- *Article 13: Children and young people have the right to get and to share information, as long as the information is not damaging to them or others*
- *Article 17: Children and young people have the right to receive, seek and give information.*

The engagement of children in the project would therefore be at its most complete and successful, if children are not only involved in the planning stage, but also included in the creation of the neighbourhood (bearing in mind ability and safety), and applying each of the eight rungs of Hart (1992)'s participation ladders. This adds value not only to the space being developed, but also to the children, who gain self-esteem and a feeling of ownership over the space, which is likely to extend to their parents as supervisory contributors and assistant to the children.

In addition, further guidance (Kirby, 2004) has been developed for researchers to engage with children as facilitators. For example, in the case of older children (aged 12+), they should expect facilitators to be:

- Non-judgemental;
- Friendly and approachable;
- Unbiased;
- Good at communication and not patronising;
- Willing to learn/gain skills; and
- Open minded and prepared to be challenged.

Young people may also expect facilitators to:

- Maintain confidentiality;
- Help to establish and maintain 'ground rules' in meetings;
- Know how to identify and use young people's skills;
- Give appropriate direction - rather than force ideas - and provide young people with necessary information; and
- Value and acknowledge young people's contribution.

In addition, research with children can involve direct participative action, or else using other constructs such as schools as a base for community research and development. (Other opportunities involving parents and carers, as well as children, are described in chapter 5.) Direct participative action is typically more complex, but can be useful for engaging hard to reach groups, such as those who are home-schooled or migrants. Direct participation will typically also require parental (or guardian) consent, which must be given beforehand, and there may be further considerations for each partner city to assess, for example as part of a wider ethical framework for engaging children directly in the Metamorphosis initiatives, e.g. see Kirby (2004). These ethical considerations will be reviewed in any case as part of the work for Task 2.4 (Ethics requirements), for which a framework report encompassing the contemplations by each city will be published at a later date. Engaging children through schools, on the other hand, are a useful starting point, not least because they provide a diverse range of participants of the required ages, and can also involve children's parents, teachers, others who work at the school, city council educators and associated children's services, as well as the wider community, i.e. those associated with the other groups. Children may also be engaged through other groups and centres where they and/or their parents naturally congregate, such as playgroups, play centres, activity centres, or other leisure and sports clubs and societies, although parental consent is still typically required in these cases, even where another responsible adult-in-charge is present.

The rest of this chapter now suggests some of the methods and tools for engaging children as co-creators and co-investigator participants in the visioning (strategic planning), design and implementation, feedback and data collection of the trials, which will be taken forward in the next Work Package (3) by the partner cities in conjunction with FGM-AMOR, and in the subsequent work packages.

Engaging children in strategic planning

From the discussions of the previous chapters and further above, it is clear that the definitions, principles and some guidance for creating child friendly neighbourhoods has been established. However, what *constitutes* such spaces, neighbourhoods and communities is still emerging, and may vary from place to place, with the crucial element that children need to participate actively in the discussion, which will help shape and define such spaces for future policy making.

Vision building workshops will be conducted in WP3, and partner cities have already been

given initial instructions on how to prepare for this, including who to involve (workshop composition) and the different types of brainstorming techniques (such as mind maps and attribute change) that could be used. A checklist has also been given for partners to prepare for their Local Analysis Report (Task 2.3), including consideration of who will form the local teams for planning and delivery, and who needs to be involved as additional partners in this, as well as all the stakeholders.

The visioning workshops (or indeed any workshop involving children) can employ a number of different techniques to ensure their participation, for example using developed schemas that they can identify with (as discussed in previous chapter), or the use of other innovative techniques such as *Appreciative Inquiry* or AI.

AI is a change management methodology that has been applied to changing organisations. It consists of four phases, although not every phase will be appropriate for every partner city. The phases involve 'Discover', 'Dream', 'Design' and 'Deploy' stages, which differ from traditional problem solving as shown in Table 4.1 below.

Table 4.1 Appreciative Inquiry versus traditional problem solving technique

Problem Solving - which focuses on:	Appreciative inquiry - which:
Identifying the problem(s)	Appreciates or values "the best of what is" (Discover phase)
Analysis of causes	Envisages what might be (Dream phase)
Analysis of possible solutions	Engages in dialogue about what should be (Design phase)
Action planning	Innovates what will be (Deploy phase)

The key to AI is that it emphasises the positive opportunities, instead of focusing on (usually negative) problems, which can often be fatalistic and/or results in a negative spiral among the contributors who participate in the discussion. Table 4.2 shows a worked example of how the technique could be applied in Metamorphosis.

Table 4.2 Example questions which could be asked during the Appreciative Inquiry phases

Appreciative Inquiry Phase	Example questions to ask
Discover phase	What <i>is</i> good about living around here?
Dream phase	What aspects <i>could</i> be made even better?
Design phase	What <i>should</i> be made better?
Deploy phase	How could we make it better?

The intention is to apply this relatively new research technique through the Discover phase, while elements of the Dream phase will also be used for the vision building workshops in WP3. This AI method could also involve some of the themes suggested by Gehl (2013) in designing cities around people, for example by asking participants what are the main things for improving the quality of life from a liveable, healthy and sustainable city perspective. If this AI technique works well in the early phases, then the Design and Deploy phases may also be used in WP3 and WP4, which will be determined later.

Method for designing children's spaces

Gehl (2013) suggests one effective method for designing child friendly spaces that are attractive for people to sojourn is to ask children to qualify the attributes of such spaces, perhaps through workshops that are being planned, and building on the characteristics which had previously been suggested by the project partners (section 2.2). For example, a key word list could be drawn up around the four core themes that summarise the nature of child-friendly neighbourhoods, namely 'Protection', 'Comfort', 'Opportunity' and 'Enjoyment', and within each theme, some of the key qualities that children and adults desire or that need to be addressed could be suggested, e.g. see Table 4.3, which can then be developed further through contributions from children and parents in workshops.

Table 4.3 Key words driven neighbourhood design

(Source: adapted from Gehl, 2013)

Protection	Comfort	Opportunity	Enjoyment
<p><i>1. Protection against traffic & accidents:</i></p> <ul style="list-style-type: none"> - fear of traffic; - risk of traffic accidents; - risk of other accidents, e.g. walking vs cycling 	<p><i>4. Possibilities for walking and cycling:</i></p> <ul style="list-style-type: none"> - room for walking & cycling, with no obstacles, and good surfaces; - untying layout of street / no segregation of pedestrians, cyclists & other users; - interesting facades 	<p><i>7. Possibilities to see:</i></p> <ul style="list-style-type: none"> - interesting and unhindered views; - seeing distances; - lighting (when dark) 	<p><i>10. Positive aspects of climate:</i></p> <ul style="list-style-type: none"> - sun / shade; - warm / cool; - breeze / ventilation
<p><i>2. Protection against crime & violence:</i></p> <ul style="list-style-type: none"> - lived in / busy / used - street life - street watchers; - overlapping functions in time & space, e.g. not quiet in the evenings 	<p><i>5. Possibilities for standing / staying:</i></p> <ul style="list-style-type: none"> - defined spots for staying; - attractive surroundings & edges; - supports for staying, e.g. not part of thoroughfare, and paving not hard on heels 	<p><i>8. Possibilities to hear / talk:</i></p> <ul style="list-style-type: none"> - low noise levels; - design of 'talkscapes', e.g. rotating benches so people can face each other 	<p><i>11. Scale:</i></p> <ul style="list-style-type: none"> - dimensions of buildings & space in proportion and stimulates children's perceptions, senses, movements, size & behaviour
<p><i>3. Protection against unpleasant sense experiences:</i></p> <ul style="list-style-type: none"> - cold / heat; - rain / snow; - wind / draft; - pollution; - dust, glare, noise 	<p><i>6. Possibilities for sitting:</i></p> <ul style="list-style-type: none"> - marked zones for sitting; - primary & secondary sitting opportunities; - benches for resting 	<p><i>9. Possibilities for play / activities:</i></p> <ul style="list-style-type: none"> - physical activities; - seasonal entertainment; - amenities 	<p><i>12. Aesthetic / positive sense & experience:</i></p> <ul style="list-style-type: none"> - good design & detail; - views / vistas; - trees, plants, fauna, water features

Alternatively, research from Australia (Stevens & Salmon, 2014) suggests that cognitive work analysis (CWA), a popular human factors technique based on IT systems analysis and design frameworks, could also help to improve the holistic and integrated design of urban environments for children, by recognising that cities are complex socio-technical environments and taking into account the different relationships between the engineering, urban-spatial and human behaviour elements, as well as the purpose, values and priorities,

and functions and processes required of the design. This technique, particularly the first phase (known as work domain analysis), has already been applied to the modelling of ‘ideal’ urban footpaths that embodies both safety for pedestrians and a sense of place (as described in chapter 3), which was subsequently used to evaluate the extent to which existing footpaths achieved their safety and ‘place’ requirements, as well as to inform new designs. However, at first sight, this method may require a certain level of proficiency in order to deploy the technique. Nonetheless, it has already been shown to help in exploring the constraints for a modal shift towards rail (Stanton et al., 2013), a more sustainable form of travel, including how considerations such as cost, improved comfort and personal safety may be interlinked, and the likely effects on the remainder of the system if these issues were removed, and by linking functions and situations, how new concepts could be identified and explored. The CWA method could therefore potentially provide a starting design template and process for modelling more comprehensively how children interact with their urban environment and through play, to help the development of additional measures where their needs can be satisfied.

Methods for data collection and feedback evaluation

In addition to gaining children’s views as stakeholders and in planning the implementation measures, it is important that their (as well as other adults’) feedback is sought throughout the trials, to both gauge their success, as well as identify pointers for improvement. The Metamorphosis partners are already familiar with many different techniques for gathering data, not least because the process of running cities already requires new urban/mobility/children’s schemes to be trialled and assessed regularly. However, two useful enrichment techniques (GSSF, 2015) for gathering people’s feedback as the Metamorphosis projects develop are to conduct: (i) an observational analysis, and (ii) intercept surveys.

An observational analysis typically goes beyond just counting the numbers of children/people who have participated in an activity or who are in a Metamorphosis space. The key to the effectiveness of this method is to first draw up the criteria (with both quantitative and qualitative indicators) that are important for the evaluation and assessment. While the method will to some extent be subjective for qualitative measures (depending on the observer), good guidance on the assessment criteria can help to level out some of the bias. For example, if the goal is to assess the depth or quality of conversations in a shared space, guidance can be given on what constitutes a short (‘greeting’), average (‘quick chat’) or long (‘engaged’) conversation between two people, which can then be grouped. Similarly, it is possible to distinguish between social activities which are largely ‘active’ (e.g. playing a

game together) and those which are largely ‘passive’ (e.g. watching a cultural activity), because by nature, the performance metrics used for the two groups may differ, e.g. assessing the extent to which children played (which can be complex), versus counting the numbers of people who were watching the activity (relatively easy). More guidance on the consideration of goals and target indicators for evaluating Metamorphosis projects will be given later in chapter 6.

Intercept surveys is a qualitative probing technique which involves data gathering and learning about a space by asking children and their parents who are directly active in that space, with questions such as if they feel comfortable with that space (and why), and the extent to which they may have used it, to assess the difference between recognition (e.g. that is a play space) and connection (e.g. did they use it for playing). Similarly, people will generally feel uncomfortable talking to strangers, but they will enjoy interacting with people they recognise or who are from the neighbourhood, and it remains to be seen the extent to which the Metamorphosis initiatives will encourage greater social interactions more widely. Nonetheless, the benefits of this technique (and observational analysis) are that they do not require children to recall subsequently their experiences of the implementation measure or activity (nor the need and difficulty for surveyors to describe adequately afterwards the nature of the event and what information is being sought). In addition, children can also be more honest and direct in providing feedback whilst or having participated in a measure or activity, e.g. through obvious signs of joy or non-participation.

By identifying the potential reach or space engaged by a particular measure or activity, and deploying this in different neighbourhoods, it is also possible to supplement the observed information with independently-collected statistical or demographic data, such as local population, size of households, and age/gender breakdowns, to provide more enriched analysis of the success of Metamorphosis trials among different target groups. This is important, because one of the key objectives of Metamorphosis is to transform neighbourhoods away from being dominated by the car, thereby improving the quality of life for all citizens, i.e. improving the sustainability, accessibility and inclusivity of these communities. In order to make this assessment, Metamorphosis partners will review the social-demographic nature of different neighbourhoods in their cities with different stakeholders, and identify those areas and target groups who could benefit from the implementation trials. The nature of child friendly neighbourhoods is such that trials should involve people from a wide variety of ages, from children to older people (i.e. cross-generational element), and be representative of each city in terms of social demographics

and cultural diversity. To this end, another potential measure of the project's success is the degree to which the implementation trials encouraged social mixing and community integration in public space, although the definition of what this comprises and how it will be assessed may differ from city to city.

Indeed, further techniques for data collection and evaluation of the trials will be considered as part of the work for WP3 and WP6, although these could potentially include:

- special workshops in schools and kindergartens for children to assess the effects, and help judge the changes in the neighbourhood;
- use of focus groups involved adults and children to assess the approach of having children as driving forces for change and transformation;
- using voting tools on local online media or through apps on smartphones and on websites;
- working with local SME businesses (e.g. cafés, barbers, shops) to encourage their clients and guests to provide verbal and written feedback (for example on special beer mats provided by Metamorphosis);
- indirect investigation methods by SMEs where they canvass the opinion of their customers regarding the neighbourhood transformation in casual conversations;
- developing apps and using freeware apps for measuring people's physical activities and for (map-based) feedback;
- deploying 'mystery shoppers', a technique used extensively in market research;
- engaging the help of people with a high street presence (e.g. postmen, street cleaners) to report on observed changes during and after interventions; and
- using 'Jan Gehl' public space indicators (GSSF, 2015) which includes e.g. counting the number of café seating places, walking and resting duration of pedestrians, number and duration of communications, and share of children on the streets.

Further development of child empowerment strategies, and capability building of the partner cities to develop children centric approaches in their implementation will be performed as part of WP5, to be coordinated by NHTV. The next chapter will look at some of the best practice and/or innovative interventions that the partner cities could potentially implement. This is followed by a suggested approach to monitoring and evaluation of the implementation measures and activities, including setting targets and illustrative indicators, in chapter 6.

5 Potential implementation measures and activities

Chapter 1 had previously indicated that cities have been largely designed around cars since the late 1950s, as urban areas experienced rapid building and expansion, and planners adopted a modernist architectural (i.e. macroscopic and top down) view of neighbourhoods, which ignored the ‘liveable’ qualities for people, and that was exacerbated by the growth in car use and the associated effects from traffic congestion and pollution. Chapter 2 introduced the concepts of an alternative model for creating sustainable and child friendly neighbourhoods, which are centred around children, and by association the needs of people, and described the typical characteristics of what this might look like, with a focus on play and recreation, and an environment where people are protected from or which is not dominated by cars. Chapter 3 explores the social and psychological theories further, by analysing the potential needs of children for child friendly spaces and how this supports their development, as well as the impact of parent-child influences, and suggesting activation strategies for engaging children as part of the planning and implementation process for Metamorphosis. Chapter 4 described an approach to implementation planning by the partner cities, including specific methods and techniques for engaging children and adults in the planning and design process. This chapter now deals with some of the wider policy concepts and specific interventions that can be implemented as part of, or in order to develop child friendly neighbourhoods. As such, it is based on both a literature review and the working experiences of all the Metamorphosis partners. It therefore provides further examples and suggestions of child friendly initiatives for partner cities (other than those who suggested it) to consider and take forward into their implementation trials. This includes further methods and tools for implementation, which are in addition to those which may be used for engagement, planning and design as discussed in the previous chapters. Further innovative concepts and implementation ideas will be developed as part of the work for WP3, prior to the finalisation of implementation plans and the trials beginning in WP4.

Before suggesting the specific measures and activities, it is important to consider the wider policy concepts that are useful, if not required, for establishing child friendly neighbourhoods.

5.1 Wider policy concepts for developing child friendly neighbourhoods

The concept of designing cities around people and not cars is not new. Colin Buchanan (1963) in the UK had highlighted concerns about the rapid growth of cars and its detrimental impact on towns and cities, while Jane Jacobs (1961) in the US had championed an

alternative approach to urban planning that centred not on construction and cars, but on bringing vitality and community back to neighbourhoods. Jacobs argued that cities did not thrive due to the confines of urbanisation, but developed from people's notions of place, and their experiences of them, which was characterised by a wide diversity of street life, through which they may engage or simply observe what goes on in them, with mixed uses for work, rest and play, and she recognised that people can be shaped by their cities, and vice-versa. However, although both are critically acclaimed, neither Buchanan nor Jacobs' ideas gain widespread application until much later. Ironically, Continental Europe and Australia (Gehl, 2013) took the lead in the concept of designing neighbourhoods for people, and the idea of liveable and sustainable cities took hold, particularly during the late 1980s and 1990s, for example with Copenhagen and Melbourne. Their approaches were complemented by similar ideas emerging in particular from the Netherlands, Belgium and Germany around that time. The development of child friendly neighbourhoods will build on these ideas, but still requires a step change in policy thinking, which the Metamorphosis cities will follow through on, that (i) enables local citizens and particularly children to be engaged around the planning process, (ii) involves them in urban designs which do not focus on the car, but integrates sustainable mobility with the use of neighbourhood space by the community, and (iii) engages them to participate in the transformational interventions that are planned.

'*Child friendly neighbourhoods*' is therefore very much a transformation philosophy, which incorporates many different and innovative concepts (as discussed below), and the principal aim of Metamorphosis is to build on these concepts, and by developing and implementing a programme of different intervention measures and activities in the seven partner cities, help bring about public sector innovations that support this philosophical change, and that encourages neighbourhood behaviours which transform communities to focus on sustainable mobility and play, instead of using the motor car.

5.1.1 Shared space

The concept of shared space is known by many names, and was introduced in several northern European countries between the 1970s and 1990s. In particular, Delft in the Netherlands first introduced the idea of 'woonerf', or 'residential yard', in the early 1970s (Ben-Joseph, 1995). The city adopted new residential street layouts, which counteracted the commonly-held notion at that time of segregating pedestrians from motor vehicles, which had encouraged the free flow of traffic at the expense of pedestrian integration and activity. More importantly, it gave pedestrians and cyclists legal priority over motorists, with the aim that such 'mixed modes' help to improve the living environment for everyone. Since then, such

woonerf-style streets have become a model in Europe for low traffic-volume roads in dense residential areas, where cars are either given restricted access or may only travel at walking pace. In the UK, similar schemes known as ‘Home Zones’ (Biddulph, 2010) were said to have resulted in lower traffic speeds and reduced numbers of traffic-involved accidents, with residents reporting their streets to be safer and more attractive than before.

(Please note the following features, and those described generally in subsequent sections, are taken from a number of transport policy databases, including ELTIS, the VTI Online TDM Encyclopedia, and KonSULT - see the References chapter for the online links.)

The typical features of shared space include:

- Largely residential streets;
- Paved street surfaces that are built at grade (same level for both pedestrians and traffic), allowing mixed use by people with different travel modes, and usually with priority for pedestrians;
- traffic calming measures (see further below) and/or through traffic discouraged;
- designated signage of the street or zone, with distinct, coloured road surfacing, together with bollards, that mark the entry/exit;
- colourful pictograms on the road surfaces, along with passage narrowings, and parking places specially marked on the street, and/or children’s play areas; and
- green landscaping (usually).

See Figures 5.1 (below) and 5.2 for an example in Dresden, Germany.





Figures 5.1 and 5.2 Example of shared spaces in Dresden

(Source: Stephan Lohse, <http://www.dnn.de/Dresden/Lokales/Dresden-hat-jetzt-Shared-Space>)

Although shared spaces are beneficial to local residents, they are still very much associated with the positive integration of traffic with pedestrians and cyclists. Hence, although this concept can act as a very good base for child friendly neighbourhoods, which helps to encourage walking, cycling, physical activity and play, it does not go far enough in itself for the purposes of Metamorphosis.

5.1.2 ‘Living streets’ for Metamorphosis

The concept of ‘living streets’ (as defined here) builds on the ideas of shared space, by essentially integrating it with Jane Jacobs’s principles of bottom-up (or microscopic) urban design which is focused around people, by integrating or facilitating the engagement of the local community with its council or municipality in urban planning. An early example of this (see Figure 5.3) can be found in Freiburg, Germany, in the Vauban district of the City, through their process of developing shared space (ELTIS). Since 1996, the neighbourhood has moved away from the principle of designing residential streets for the needs of cars to ones which are centred primarily around pedestrians, with lots of trees, cul-de-sacs which are interconnected with foot and cycle paths, and considerably less parking, which allows children to play, and room for open-air cafés where people could congregate and socialise. In addition to being shared spaces, for example with lots of green spaces, characteristics include:

- children's games are allowed everywhere;
- cars are only allowed to move at walking speed (7km/h or less);
- through traffic is discouraged; and
- parking is only allowed at specifically marked places.



Figure 5.3 Living street in Vauban, Freiburg

(Source: Harry Schiffer, from <http://www.eltis.org/resources/photos/freiburg-vauban-living-street>)

The idea of living streets was a long struggle with the authorities initially, although the first trials were a success and very popular with local people. Today, such a street redesign is relatively easy, as the City provides a gateway to enable the citizens to opt for a living street, with a step-by-step encouragement tool via the city website, which provides information such as the criteria for transformation (for example that 50% of the citizens in the street need to agree) and materials to distribute, including a listing template for collecting support signatures from people. In addition, the city provides a standardised process for residents to follow, which supports quick and easy implementation of a range of low-cost measures, in the form of trials and tests or participation schemes, where the citizens have the option to be co-creative, to jointly evaluate provisional designs, and/or to influence the final planning. This easy access has led to the establishment of 180 living streets in Freiburg, a medium-sized city with 250.000 inhabitants, and the transformation of the City council's philosophy and engaging approach to planning is an important element.

Such an approach is by no means unique, with Copenhagen in Denmark, and other cities around the world including Melbourne in Australia also having adopted similar top-down and bottom-up complementary approaches to integrated urban planning and sustainable mobility, and these two cities are often voted as the most popular places for people to live (Gehl, 2013). Such living streets therefore act as a starting model for the implementation of Metamorphosis, with its aim to improving the life of children, and therefore all citizens, as discussed in chapters 2, 3 & 4. First, the partner cities will plan to carry out trials that are similar to that in Freiburg (see WP3), but with a focus on children, and the adoption of a range of innovative engagement concepts that involve them as stakeholders (chapter 4), as well as many inclusive and participative interventions that are orientated towards meeting their needs (see below); and these interventions will occur in many different formats in several different neighbourhoods across the seven cities (WP4). Second, the Metamorphosis partners will investigate how these trials can become institutionalised in their cities, and determine some of the critical success factors for such an institutionalisation, so that child friendly neighbourhood initiatives can be more sustained for the longer-term (WP4 and WP6). Third, many similar activities have never been evaluated in a scientific way, so the Metamorphosis partners will use the implementation trials as an opportunity to close this gap (see WP6). Finally, Metamorphosis will use innovative transfer methods and provide tools that should be very effective in helping other cities to copy such successful examples (WP3 and WP7).

5.1.3 Play streets ('Speelstraat')

Play Streets or 'speelstraat' take the concept of living streets further, by recognising children's need for play, which is complemented by the creation of play and sustainable mobility environments where they are protected from traffic, as discussed in chapters 2 and 3 above. Such streets again have many origins, for example Leuven in Belgium. Another good example is Bristol in the UK, where the idea gained traction since 2009 (Playing Out, 2014). The main concept is to enable children to play out safely on the streets where they live, by closing residential streets to traffic, and typically providing further activities for people to engage in, that reinforce a sense of community in the street, and to encourage people of all ages to play, engage in activities, walk, cycle/scoot, socialise and converse with each other more. It therefore sets a good foundation for the Metamorphosis partner trials, which can be complemented/implemented with other ideas suggested further below.

However, establishing the concept of play streets and effecting street closures may not be easy in all cities (see details below), and experience from Bristol shows such ideas require strong political support (Playing Out, 2015a), including the buy-in from local councillors, as well as the engagement and coordination of appropriate organisations from the city or municipality, such as Children Services and the Transport Department. On the positive side, having a local play street scheme is said (Dare Hall, 2017) to also make the neighbourhood more attractive for property buyers, as people know it is a more welcoming environment for children, which can be important for sustaining the economic prosperity of neighbourhoods, and this evidence can be used to counteract arguments that cars are essential for economic development. In the UK in particular, there has been growing demand for Play Streets, with schemes now established in numerous cities, including London (e.g. Hackney, Ealing and Charlton), Reading in Berkshire, Worthing in West Sussex, the City of Birmingham, Tyne and Wear (near Newcastle), Abergavenny in Wales, as well as Bristol in the West of England. Over 100 roads are now said to be involved in holding play street sessions (Playing Out, 2014), with further trials planned for Edinburgh, Scotland, and interest enquired from other European countries, including Portugal.

5.1.4 Living laboratories

The idea of living labs was first deployed in the early 1990s to introduce students to community operations research (OR) through the use of a city neighbourhood as a living laboratory (Bajgier et al., 1991), although the term probably preceded this. Its wider acceptance and recognition was later attributed to WJ Mitchell from MIT (Leminen et al, 2012), who used this user or community-centric approach to study future smart homes, with the purpose of trialling, validating and refining the complex technologies in a real-life context. The practice was later advocated by the EU in 2006 to advance and promote research and innovation projects, based on the use of living labs, where the users/stakeholders are involved directly in the development of the end-products and services, in a co-creation process that is validated in collaborative, multi-contextual real-world environments, which can involve multiple and public-private partnerships, much of which is voluntary from the user or community perspective (as they benefit from their co-created ideas as a consequence). The process is based on an evolving maturity spiral, running concurrently and involving a multidisciplinary team in four main activities: (i) co-creation; (ii) exploration, (iii) experimentation and (iv) evaluation of innovative ideas and concepts.

This process, to involve children and their parents/teachers in co-creation (and subsequent evaluation/review), as well as other stakeholders, has been adopted by the Metamorphosis

partners in developing and evaluating the implementation trials. However, the integration of end-users in product design (who may not be aware of the techniques or process) is never considered easy. Hence it is important to identify specific situations where real-world living labs can thrive, and two examples have already been identified for Metamorphosis, i.e. mobility share points and schools (see below), although more may follow.

5.1.5 Mobility crystallisation points

'Mobility crystallisation points' is a relatively new concept in Europe (Synergo, 2017), that describes attractive neighbourhood spaces where people can congregate and which encourage children and parents to spend more time outside and use sustainable mobility methods and tools. They can function as living labs, which in the context of Metamorphosis, builds on the ideas of integrating sojourning and sustainable mobility (as discussed in chapters 2 and 3), to create locations where people are offered a formal or more informal opportunity for communication, exchange and sharing, to foster greater community interaction, connection, social cohesion, personal networking/relationship building and neighbourhood spirit. Possible examples (i.e. specific interventions) include:

- Mobility share points (*mobilitäts station*);
- Shared spaces in neighbourhoods;
- Schools (as places in addition to teaching/learning activities);
- Shared gardens, where people can collectively grow plants, fruit and vegetables (see Figure 5.4);
- Mobility activities, locations and events, such as shared cycle rides.

Some of these measures are described further in the next section below.



Figure 5.4 Example of a shared garden in Zurich

(Source: Grün Stadt Zürich, from *Gartenbeete zwischen Betonschluchten*, SRF News 5 June 2013)

Like play streets, the key to success for crystallisation points is the appropriate engagement of stakeholders, including the municipality, local real estate management, neighbourhood associations, community centres, school council and teachers, local businesses, and most importantly, parents, children and other local inhabitants.

5.1.6 Public sector innovations

In addition to living labs and crystallisation points, Metamorphosis aims to apply a public sector open innovation process in which temporary or small initiatives (see below) are seen and used as an opportunity to test and adapt, in order to achieve longer term and large scale changes. Initially, this involves the various city stakeholders, including council departments, educational organisations, business representatives and politicians to work together on a small scale and for a limited time, with input coming from various experts and the proven experiences from other cities. Further processes will then be initiated among all those involved, so that it leads to more simplified and changed procedures, for example:

- to ease the involvement and activation of all end-users in neighbourhoods as well as integration of children into the planning processes (in some cases, changes to governance procedures may be required, to acknowledge the rights of children and invite their participation in these processes);
- to ease the introduction of temporary car traffic closures, both regular and for test purposes;
- to ease the transformation of temporary measures into permanent changes;
- to recognise maintenance plans as opportunities for change, e.g. that:
 - road maintenance can be a chance to create neighbourhood transformations;
 - building modifications can be a chance to redesign public space.

As well as helping to integrate the community more in urban planning and to use opportunities for change, city and municipal councils could also facilitate greater community through online methods and social media, for example to provide online urban planning forums, to encourage the debate of new designs and proposals, as well as an electronic gateway that enables people to submit suggestions and keep abreast of proposals that affect them, which would then be reviewed and discussed. The gateway could also provide information on how they could improve their neighbourhoods, with various toolkits and relevant information, such as the process for organising street closures, as well as the sustainable travel options in their neighbourhoods. One such example, which is focused mainly on information provision, is found in Southampton, UK, which set up the ‘My Journey’ website with the local county and other city councils: <https://myjourneysouthampton.com/>.

This site principally seeks to engage and inform local habitants of the implications of their travel choices, as well as providing information on all the alternatives to car use in their travel planning, which they might otherwise not be aware of, and acts as a 'one stop shop' to help them with all things travel-related, which also includes (usually negative!) traffic updates. It should also be pointed out that aspects of this website are designed such that it appeals to both children and adults alike.

The next section will now provide innovative and best practice example of initiatives that could be implemented by the Metamorphosis cities to create or develop child friendly neighbourhoods.

5.2 Best practice and innovative measures and activities for child friendly neighbourhoods

While the previous section dealt with wider policy concepts and ideas for child friendly neighbourhoods, this section provides specific example interventions that partner cities may take forward as part of considering their implementation options and work towards WP4. Further examples of such interventions in public space will be provided by specific case studies compiled as a 'Catalogue of Potential Measures and Activities' (Deliverable 2.2), which is being produced in one of the next steps in this Work Package. This list is therefore by no means exhaustive.

5.2.1 Temporary street closures

Temporary street closures can be a simple and effective way of effecting Play Streets, as discussed in the section on concepts above. Experience suggests (<http://playingout.net/>) that where local councils have an existing policy in place to help the local community to manage the closure of streets and encourage more street play, then temporary street closure measures can be relatively easy to extend to other areas. For example, in the UK, 'Temporary Play Street Orders' (TPSO) have been developed specifically for Play Streets, which invoke similar local authority legislative powers as for holding a street party and other community events - in this case, effected by an act of central government, the Town Police Clauses Act 1847, Clause 21 (National Archives, 2017), which historically has been used to allow local residents to hold various celebrations, including the Queen of England's Silver and Golden Coronation Jubilees in 1977 and 2002 respectively. The TPSO's then make it relatively easy for neighbourhood residents to apply for the local council's permission to implement these orders, without further legislation (political and/or legal changes) required. However, where no such policies or legislation exist, street play or closure schemes may

take much longer to implement, running potentially to many months for the planning process alone. It is therefore important for Metamorphosis partners to review the specific country (as well as any wider European) legislation which applies to them, and determine whether any local planning tools such as TPSO's exist, and whether there are any other legal or planning restrictions associated with street closures. If no legislative tool exists, it is important for Metamorphosis partners to work with local policy makers to establish these at the very outset, because the benefits of using such tools is that it makes it very easy for local residents to apply to close streets. In the UK, it is typically done in a single process (Playing Out, 2015a), provided the applicants have demonstrated that they have consulted all affected local households and businesses (using a form supplied by the local council), which is free and takes up to six weeks, to allow the city or municipal council to consider whether there are any valid local objections on a case-by-case basis, although it is made clear in the process that the *idea* of road closure for a play street is not a valid objection. The TPSO's therefore enable neighbourhood residents to close any local street which is not a primary road (main streets for traffic in the UK), and which has no bus routes, for up to three hours a week, and which is typically valid (and can be repeated) for up to a year. Such street closures require two local residents to act as stewards to allow others to drive in and park safely, as well as appropriate signage for people and traffic (e.g. 'Road Closed' and 'Road Ahead Closed'). In addition, TPSO's may have other limits, such as the number of permissible streets which can be closed by the local council under the orders each year. It is therefore possible that these tools alone do not go far enough to enable the specific measures that Metamorphosis partners may be planning. However, these legal instruments provide an important tool for encouraging wider participation and behaviour change in the community, as they make the local championing and engagement for street closures easy, and potentially enable such schemes, if not wider neighbourhoods, to be repeated by local people for at least a year.

Note also that street closures need not be 'temporary' by nature, as closure orders and similar policy instruments offer the opportunity for local residents to demonstrate and highlight what can be done to transform streets instead of it being used mainly for traffic and parking, which may in turn gain popular momentum for a campaign to close the road on a permanent or regular (i.e. semi-permanent) basis.

5.2.2 Alternative uses for streets and road surfaces

Temporary street closures can be used for many different purposes, not just to encourage children to play in the street or for the community to mingle, although this is beneficial in itself or as a start to gauge local opinion for the idea. They, or at least partitioning off parts of the

street, can also be used to host many different events and activities, which encourage people to spend time outside, community building, further socialisation, and to demonstrate the many different alternative ways of using the street for the benefit of people. Specific examples where street closures and/or use of the streets play a part include:

- 'School streets' (see section 5.2.3 below);
- 'Holiday street' in Graz (Figure 5.5), which closed during the summer holidays for a few days, and Platte Lostraat in Leuven, Belgium (ELTIS, 2014a), which closed for two weeks;



*Figure 5.5 Holiday street in Graz
(Source: FGM-AMOR)*

- The main road in Budapest, Hungary, being closed during a weekend, offering its full 2.5km to 700,000 pedestrians and cyclists to use (EMW, 2015). Note that such large scale reclaiming of the street for cyclists is now very common in Latin America (e.g. World Bank, 2015);
- Public bookcases and playing street in the Nordend district of Frankfurt, Germany ('Short-range Mobility Nordend'): <https://frankfurt-greencity.de/en/status-and-trends/mobility/mobile-in-vibrant-urban-districts/>;
- Street parties for celebrating local children/people's birthdays;
- For 'Walking Trees' (Figure 5.6);
- Provision of outdoor school lessons for learning and play;
- 10 residential streets in Ghent, Belgium being converted to car-free living streets for a month (EMW, 2015), with local residents deciding and come up with innovative ideas for what to do with their street, including study, play, socialise and eating outside;



Figure 5.6 Walking trees in Wanderbaumallee, Munich, Germany
(Source: FGM-AMOR)

- To celebrate 'World Car Free Day' on or around September 22: <http://www.worldcarfree.net/wcfd/>;
- For people to perform group yoga, Tai Chi or other exercises in the street;
- As a venue to showcase local musical talent, where pedestrians and artists are free to roam, (e.g. 'Music in the City': <https://www.musicinthecitysouthampton.org/>);
- To act as a comfortable outdoor living room or kitchen for people to relax, with sofas and carpets, or tables and chair;
- A grass carpet being laid on the main street of Vienna, Austria, which invited people to have a picnic (EMW, 2015);
- To celebrate 'National Clean Air Day': <https://www.cleanairday.org.uk/>;
- Initiatives involving disruptive groups such as 'Critical Mass' or 'Reclaim the Streets' (British Library, online);
- Providing City cycling festivals, e.g.: <https://www.letsride.co.uk/city-ride/southampton>;
- World Naked Bike Ride Day, e.g. in Amsterdam: https://www.youtube.com/watch?v=XixYKb_LFko;
- Critical Mass cycle rides in Graz: <http://www.criticalmass.at/>;
- Street 'flash mobs', e.g. as organised by Greenpeace or by the local community: <https://www.youtube.com/watch?v=kbJcQYVtZMo>;
- For folk dancing, flea markets and street games in Larnaka, Cyprus (EMW, 2015);
- Holding innovative events as part of European Mobility Week, which takes place annually in September: <http://www.mobilityweek.eu>;
- Other on-street leisure activities, such as hopscotch (and see further below for innovative uses of parking spaces also).

5.2.3 School streets

A school street is a specific example of a street closure for a particular purpose, in this case (Giona, 2017) to stop the increasing amount of vehicles accidents which occurred in front of local schools due to the high traffic coinciding with the children's entrance and exit times. It is a street where a kindergarten or primary school is located, where the road is closed to traffic for a specific amount of time to coincide with the start and the end of the school day. This is also to address the issue in schools (FLOW, 2016) where many parents drop off and pick up children by car, and it is common to encounter congestion, indiscriminate parking, and conditions that discourage parents from allowing their children to walk or cycle to school, perhaps also adding to parents' sense of danger due to the higher incidences of accidents.

The idea developed in Bolzano in 2001 (Giona, 2017), involving 8 streets where the municipal police closed both sides of the street with a dedicated sign for 15 minutes before and after the children's entry and exit times. Although it initially raised concerns, particularly among teachers and residents, when the long term results of the measures became clear, for example the number of associated accidents reduced from 18 in 2005 to 1 mild case in 2014, it was accepted as the right thing to do, and families and children in particular appreciated the new status quo. The closure times differed from one street to the next, because each school has a different time schedule, and vigilant wardens also helped to accompany children from buses (a certain meeting point) or who are walking to the school. A prerequisite of the schemes was the existence of a network of pavements, cycle lanes and efficient and sufficient local public transportation. However, there may be wider issues associated with tackling 'trip chaining' using public transport, e.g. where parents have to drop children off to school before going onto work in a set time window, and are therefore concerned with connectivity, convenience and reliability, although schemes such as local school buses can also help to reduce the need for parents to drive to schools.

Since the early experience in Bolzano, a wide trial involving more than 10 schools has been conducted in the area around Edinburgh since 2014-2016 (Streets Ahead, 2017), with other UK cities following, including London (St Joseph's Primary School in Camden), which uses folding bollards that elevate into the street (Camden, 2017) to provide two 45 minute access restrictions periods in the school morning and evening peaks (Figure 5.7). Initial monitoring data from this trial suggests there has been a 4-9% drop in car travel, with corresponding increases in walking (including 'park and stride'), cycling and scooting, although the use of public transport also fell.



*Figure 5.7 School street in Camden, London, UK
(Source: Camden, 2017)*

School street schemes can differ, as some will allow exemptions for disabled drivers and access for local residents (FLOW, 2016). These streets can also form part of a wider long-term strategy for promoting a city-wide cycling-oriented culture, such as that which is said to exist in Odense, Denmark (Guardian, 2016), where people of all ages go about their daily lives on two-wheels for all manner of purposes, with 81% of children cycling to school, and 50% of all central trips being made by cycle.

5.2.4 Transformation / alternative uses of parking spaces

Previous studies, e.g. Bates & Leibling (2012) and Shoup (1997), have shown that cars are generally on the move for only 4% or 5% of the time. This means they are idle or parked for the other 95-96%, which includes daylight hours, and the cost to provide this (mostly free) car parking in cities has historically been associated with very high costs. This has major implications from a resource utilisation and planning perspective, because the space that a car occupies is not being used most of the time - apart from having a vehicle on top of it. Therefore, one of the intentions of Metamorphosis is to demonstrate examples of better (or more innovative) uses of on-street parking spaces, particularly as these spaces can also be transformed to become more attractive places for people to enjoy or to provide improved local amenities. Possible examples include:

- Building and exercising ‘gehzeuge’ or ‘walking vehicles’ (Figure 5.8), an awareness raising activity originating from Salzburg (Harper & Muno, 2010), which demonstrated the relatively large amount of spaces that motor cars occupied, which people are generally not aware of;
- International Park(ing) Day, an annual event originating from San Francisco, US, to reclaim parking spaces on the third Friday in September, where artists, designers and citizens transform metered parking spots into temporary public parks:
<http://parkingday.org/>;
- Conversion to cycle racks, cycle parking and cycle maintenance points;
- More permanent ‘parklets’, or car parking bays being transformed into other uses and/or public seating spaces, for a period between a week and several months, including:
 - outdoor reading ‘rooms’ and temporary libraries;
 - for outdoor games, e.g. swing tennis or ‘hook-a-duck’;
 - providing temporary children’s playgrounds;
 - playing a grand piano (to show that parking spaces can be very big);
 - provision of art and other colourful installation ‘conversation pieces’;
 - as places to showcase new alternative parklet designs by young architectures and designers, for example ‘parking (r)evolution’ in Gdynia, Poland (EMW, 2015);
- Providing mobile vending or other services, including:
 - temporary retail outlets, e.g. selling farm or organic foods;
 - mobile bars, e.g. that flourish in Copenhagen:
<https://www.addtoevent.co.uk/listings/mobile-bars/denbighshire/copenhagen>;
 - Moving tourist information points;
- Parking alternative or cycle-based vehicles, which can be used as homes;
- the Caravan Gallery (an art gallery in a caravan):
<http://thecaravangallery.photography/about/>.



Figure 5.8 Walking vehicles - shows the size of typical parking spaces

5.2.5 Mobility share points (as living labs)

Mobility share points (Synergo, 2017) can act as living labs and crystallisation points, and therefore serve many useful purposes and could be of various size and scope. Traditionally, they can provide spaces for sharing bicycles and e-cycles, cargo bikes, and possibly even offer car-sharing opportunities (see below where these sustainable mobility schemes are all discussed). For Metamorphosis, they could also provide equipment that encourages children to use and play with, for example scooters, roller blades and skate boards, and where families have the opportunity to share and/or exchange their children’s mobility tools (for example stabilisers, lights, and trailers) - see Figure 5.9, and can act as a source of information about neighbourhood events, mobility offers, and act as meeting points for social interactions within the neighbourhood. These share points could also be used as a location to deposit deliveries, saving freight-oriented vehicle journeys, and provide attraction points or wider encounter zones where people can simply meet and chat.



Figure 5.9 Mobility share point in Zurich, Switzerland

(Source: Baugenossenschaft mehr als wohnen, <https://www.mehralswohnen.ch/angebote/mobilitaet/>)

5.2.6 Hybrid zones

These are zones where the private and public realms meet, and provide further opportunities for people to mingle and build neighbourhood trust. Examples of such activities in hybrid zones include 'public breakfasts' on the pavement or outside a café, as well as actions to encourage other local businesses to provide more on-street activities. For example, mobile hair dressers and cycle repair shops can do their work on the street and thus create a subtle transition zone where social contact and interaction with neighbours and visitors are encouraged. The experience from Ciclaveiro (EMW, 2016), a cycling advocacy group in Aveiro, Portugal, suggests there are many benefits to such exchanges, including increased profit opportunities for the businesses, as well as creating a cycle-friendly city. This in turn creates a powerful feeling of ownership and neighbourhood-ness.

5.2.7 Schools (as living labs)

As well as being places for education, schools can also act as crystallisation points. Schools provide a focus for children and adults alike to mix and socialise already, and the simple provision of additional infrastructure and space, such as cycle/scooter parking ranks, will not only encourage more parents and children to cycle to school, but also provide further opportunities for them to engage, in addition to the traditional 'talking outside the school gates'. This can be further extended through other initiatives that encourage more cycling and walking (see further below), as well as mass participation events that involve children and the community. In Southampton for example, children in schools are encourage to

compete through ‘The Big Pedal’, the largest inter-school cycling and scooting competition in the UK. Developed by Sustrans (2017), this challenge inspires pupils, staff and parents to choose two wheels over four for their journey to school, and provides fun feedback on subsequent benefits in terms of e.g. equivalent number of trips around the world (total miles travelled), donuts consumed (calories burnt), and balloons filled (CO₂ emissions saved). There is a similar, ‘Climate Miles’ scheme operating for children and schools in Austria (EMW, 2015).

It should also be noted that schools have often been innovative in developing concepts of play, which benefits both their children and the wider community. In Westbury on Trym, UK, for example, a children’s nursery was placed inside a retirement home for older people as a trial (St Monica Trust, 2017), and the subsequent interactions between the young and the old was said to have led to many benefits for both social groups, which demonstrates the power of play and providing emotional connections between the different ages. The concept was said to be so beneficial that the first nursery school to be sited inside a retirement care home has now opened permanently in South London (Nursery World, 2017).

In addition to being living labs and potentially innovative places, schools (and other associated Metamorphosis activities) can also act as the starting point for the consortium partners to engage children and adults in the discussion of what is needed for child friendly neighbourhoods, and how measures can be implemented and evaluated.

5.2.8 Cargo bicycles and mobile freight depots

So far, this report has focussed on removing the prominence of cars in child friendly neighbourhoods. However, freight deliveries involving heavy and light goods vehicles can also be problematic, if not also dangerous, for children in urban areas, particularly given the general lack of coordination between logistics companies to coordinate and share deliveries for ‘the final mile’ (FTC2050, 2017). However, cities have an inherent need to supply goods and services for shops and other businesses, as well as to individual households, so alternative solutions must be sought for reducing freight traffic and/or encourage goods to be delivered in a more sustainable way.

There have been network-level initiatives for reducing freight traffic in Europe (van Rooijen & Quak, 2014), including the use of consolidated distribution centres. However one measure that supports child friendly neighbourhoods is the use of cargo cycles by delivery companies (VCD, 2015), which already operate in many cities in Europe, including Vitoria-Gasteiz in

Spain, Bolzano in Italy, Cambridge in the UK, and Basel in Switzerland. The use of these cargo cycles has grown in recent years, with in some cases, e.g. Strasbourg, France, the cycles forming part of the municipal fleet in making deliveries, while in others, e.g. Brighton in the UK, the use of electrically-powered cycles was particularly encouraged.

For Metamorphosis, the base premise is that road traffic is restricted or not allowed in child friendly neighbourhoods, and in some cities, even cycles are not allowed generally in pedestrianised zones (see below). However, exceptions can be made for cargo bicycles, which may be registered or operate to a permit, with enforcement by cameras, where they would be allowed to deliver goods and services in the restricted zones - but with access restrictions, usually time based (and during the main part of the day), and in some cases with the riders being better trained so as not to endanger pedestrians. Through increased technology (booking apps), it is also possible for cargo cycles to deliver to specific time slots, which means existing access restrictions can largely continue to apply. However, cities looking to implement a similar measure should consider whether food delivery bicycles should be incorporated into this remit, as anecdotal evidence suggests that such riders tend to be more reckless, given they are under severe time pressure (hot food will get cold), especially in the evenings (when demand for delivered meals is the highest).

In addition, certain cities, e.g. Brussels in Belgium and Mannheim in Germany, have begun trials to take the cycling delivery model further, by allowing one large goods lorry to be parked in a reserved space near the centre of town, which acts as a central depot from which electric cycles provide onward delivery to the final mile. Other initiatives to encourage the transport of freight by other modes have been trialled (van Rooijen & Quak, 2014), including the use of boats through canals in Utrecht, Belgium, which also tested a scheme to provide merchandise pick-up points for shop customers, to reduce the need for vehicles making deliveries, although with limited success.

5.2.9 'Mums on bikes' type schemes

These are regular cycling scheme targeted at both current and future mothers, with the premise of (i) encouraging parents to cycle, as a way of getting their children to see this as the norm from an early age, and (ii) to provide further networking and socialising opportunity for mothers. These typically take place weekly, at a time that suits mothers with young children, particular babies and toddlers, e.g. at mid-morning, with the bicycles, trailers and seats for children, helmets, high visibility jackets, and helmets all provided, as well as friendly guide (who also acts as a bicycle mechanic should things go wrong). Information about these

schemes can also be given to potential mothers, as part of initiatives to encourage their return to fitness after giving birth, or beforehand as a social activity or to connect with other mothers. Note that these schemes are typically not gender exclusive, as fathers are welcomed too, and they not exclusive to parents either. In the UK, they are labelled ‘Mums...’ simply to easily identify with the targeted group, and share similarities with a large community that led to online networks such as Mumsnet.com (Pedersen & Smithson, 2013), which has been a particularly success brand, that recognised both the demands, opinions and needs of mothers, and in particular their need to discuss, review and participate in a broad range of topics; and more importantly, their large perceived social influence and purchasing power. ‘Mums’- type networks are therefore ones that many parents can easily identify with, and are perceived as being easy to join as well as being honest (i.e. with open discussion) and generally supportive.

A variant of this idea is community cycling clubs, although these tend to be more volunteer-run (and appeal to those who are more able-bodied/experienced/do not have dependents), so the city intervention is largely to help set them up, or encourage more of them through communications and seed funding. Although the theme is very much focussed on cycling, such schemes encourage socialising around a common theme, with meeting points e.g. at the start, end, and/or for lunch.

5.2.10 Teaching the next generation to step away from the car and skills training

From chapter 3, it is important that children develop positive attitudes towards sustainable mobility from an early age, and have the opportunities to learn the importance, benefits and enjoyment from active travel, while at the same time are less dependent on motor vehicles that can produce many harmful effects, as discussed previously in chapter 2. This is very important for the long-term development of child friendly neighbourhoods, i.e. that communities develop to be less dependent on the car overall, and the EU BAMBINI project (2012) shows there are potentially several ways of achieving this cultural change, and provides a useful report on how to approach this, for example by targeting children and parents via pre-birth classes, kindergarten and crèches, and creating longer-term effects through permanent integration of topics and schemes into the education and training curriculum of teachers and other child pedagogues, as well as raising awareness amongst the other target groups, such as child care givers and city officials. The report also provides specific techniques and examples for achieving this cultural change, including:

- motivating child-oriented industries to produce toys and books for infants and children that depict why sustainable travel is importance to individuals and society;
- promoting the use of alternative transport in antenatal classes by identifying various options and providing expecting parents with this information material;
- motivating parents to bring their children to childcare facilities without a car; and
- creating specific motivational programmes for children in nurseries and kindergartens by encouraging walking and cycling through stories, rituals, games and other working materials such as brochures, arts and crafts, as well as books.

These techniques are complementary to working directly with primary and secondary schools (see section 5.2.7) to reinforce and further progress the child friendly neighbourhood philosophy with children, and it is also important that their learning is supported through wider evidential practice, such as the transformation of more local streets into home zones/shared space, play streets or school streets, as described further above.

However, despite measures to achieve the overall transformational philosophy, the use of motor vehicles in society may still be a necessity in the short term, and it is therefore important that children are also provided with adequate road safety training and cycling proficiency skills. In the UK for example, this used to form an essential aspect of childhood development, e.g. through the ‘Tufty the Squirrel’ Club to inform children of the dangers from traffic (<https://www.rosopa.com/about/history/tufty/>), and using a simple ‘Green Cross Code’ in order to traverse roads safely. It is therefore important that the Metamorphosis interventions are mindful of continuing this safety skills component, as well as emphasising the development of child friendly neighbourhoods and play spaces, i.e. safety and/or skills training for children should form an integral part of any implementation trials where day-to-day traffic may be present. For example, in Southampton, schools are encouraged to join the national modeshift ‘STARS’ accreditation programme (<https://modeshiftstars.org/>) in order to change the overall travel-to-school ethos, by increasing the levels of walking and cycling, as well as improving the health and well-being of its pupils. However safety training, particularly in and around the schools, forms a core consideration in this process, and children are also typically given for example ‘Bikeability’ (<https://bikeability.org.uk/what/>) or other similar cycling proficiency/safety training. The BAMBINI project (2012) also emphasises the need to target children with ‘Balanced Bikes’ and bicycle training, for both safety and to convey the fun, joy and physical health benefits that can be experienced from cycling and using scooters.

5.2.11 'Children Go' and technology-driven initiatives

A gamification craze that took hold during 2015-2016 for many children and young people was the smartphone app 'Pokémon Go'. Developed by an SME (Niantic, Inc.) that was originally spun out of Google, to allow the identification and collection of data for local places of interest (Weinburger, 2016), the largely free-to-play smartphone game grew to be a very popular pastime for both children and adults alike. Instead of being card-based in the previous Pokémon games that were mainly targeted at younger children, it used location-based augmented reality for people to collect the well-known Japanese characters, which was also intended to allow them to view the world differently. While the benefits/drawbacks of such smartphones games can be debated (LeBlanc & Chaput, 2016), this particular app was relatively unique in that it encouraged players to walk outside, in order to accompany or collect the characters, as well as discover virtual 'Pokéstops' which had all manner of goodies, and take part at augmented reality 'Gyms' where their Pokémon could battle each other, with additional rewards including unique characters to be collected (Figure 5.10).

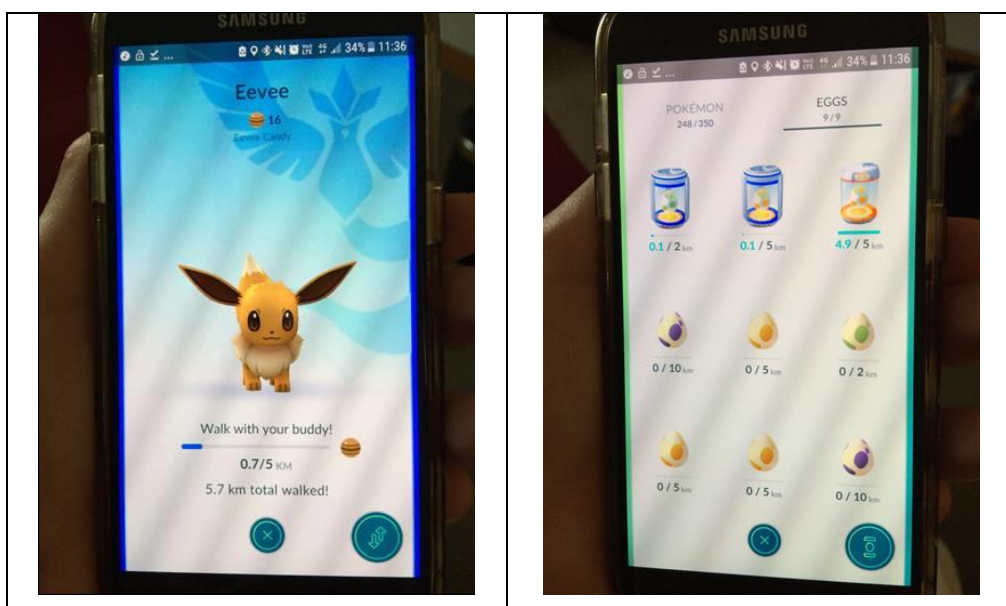


Figure 5.10 Pokémon Go encourages children to walk outside

Although smartphone games typically come and go (pardoning the pun), initial reports suggest (ibid) it is a successful population-level strategy to increase physical activity, although further research needs to be conducted to understand the long-term risks and benefits. Nonetheless, Pokémon Go showed the potential to deploy smartphone apps that both engaged children in an enjoyable pastime and encouraged them to do more walking, and as such, the University of Southampton intends to build on this experience by using local crowd sourced data collected through this game to identify further potential Metamorphosis

crystallisation points, where players are already known to congregate. The potential to use games and other public engagement activities that provide similar incentivisation and reward systems, where children would be able to earn points and compete for fun through participation will also be explored, as part of a wider gamification strategy to encourage active travel, and 'intelligent' as well as sustainable mobility. Plans are underway to develop these activities in conjunction with other partners, for example with the Winchester Science Centre, a major local child-oriented attraction, which thousands of children visit with their parents during the school holidays, as well as during term time with their teachers.

The potential to use technology and innovation in the development of child friendly neighbourhoods is vast, especially with augmented reality. For example, the Stanford Healthy Neighbourhood Discovery Tool (Buman et al., 2013), which provides a GPS-enabled app that encourages users to walk around and interact with their local living environment, including taking pictures and videos, and commenting on places they have visited, has already been put to good effect in promoting public health. The GPS tracking and accelerometer functions built into many smartphones and similar devices also potentially enable improved data collection and monitoring of children and adults' physical activity or active mobility, which has already been used in e.g. New Zealand (Carroll et al., 2015) to complement more traditional measures such as trip diaries. Other technology-driven opportunities include invoking mobile, GPS-enabled emissions monitoring devices that allow local citizens to capture 'before' and 'after' images of air quality in their neighbourhood, for example in order to assess traffic congestion/pollution or the effectiveness of active travel and car reduction schemes. Such opportunities for 'citizen science' can also be opened up through developed apps on smartphones, for example to complement living labs, e.g. with the participation of local people (especially older children, who are generally conversant with technology) in assessing and evaluating the effectiveness of different Metamorphosis initiatives. With appropriate connectivity, such as a widely distributed wi-fi network, these assessments can often be conducted in real-time, e.g. through the SurveyMonkey app.

In addition, cities have been known to include competitions on social media, such as through Instagram for Östersund, Sweden (EMW, 2015), as well as for the national Facebook contest 'Commute Greener'. The experience of local campaigners in Sofia, Bulgaria (EMW, 2016), also suggests that it is very important for a city to disseminate information on its initiatives via online media, as well as through newspapers, radio and television.

5.2.12 Public spaces, including squares and parks, as multi-use destinations

Last but not least, it should not be underestimated that any public space in western countries, including squares and parks, could potentially act as a multi-use destination or crystallisation point for people to meet, relax, socialise, interact, or simply enjoy outside space. However, public spaces in cities can often be uninviting, even in parks ('please do not walk on the grass'), and gone are the days when a city's public spaces were prime cultural and political attractions for people, such as in ancient Rome, when they were key sites for cultural formation and popular political practice. For the reasons given in the previous chapters, public spaces are no longer designed with people in mind, especially children, so it is important that people are encouraged to sojourn at more of these places, either through the measures and activities described here, or more generally, e.g. through the provision of ample seating, an environment conducive to ball or other traditional games (Figure 5.11) such as chess (particularly if there is a large chess board!), and/or that forms an attractive location for people to stop by and visit (section 2.2). This is particularly where these spaces are said by children to form attraction points, where they might congregate naturally anyway (see section 3.1). In essence, this is a reminder of the vast potential to transform into child friendly neighbourhoods, and that the base 'place' for implementation measures may already be present, and the issue is more a case of thinking about how to cultivate these spaces to develop them in a child friendly way, as well as providing play ideas that encourage socialisation and alleviating people's tendency to be weary of strangers and uninviting places, as discussed previously. An innovative example of this is the provision of 'canvas walls' near cycle racks, where children are able to paint, i.e. for them to cycle to local places where they are able to express their art, and where graffiti is acceptable.



*Figure 5.11 Example of public place in a residential street
(Source: Amin, 2008; from photographer M. Kaggan)*

5.2.13 Other interventions, play and child development toolkits and guides

The development of child friendly interventions for Metamorphosis may also include usage of other tried-and-tested interventions, and play and child engagement toolkits and guides, which are available from:

- UNICEF (2017a)'s 'Early Child Development Kit', which describes a wide range of activities designed to engage children up to the age of eight in play, stimulation and early learning opportunities, including puzzles, games and storyboard books, as well as a Trainer's Guide;
- Playing Out CIC provide a very useful step-by-step manual (Ferguson & Rose, 2014) on how to organise play sessions on the street, including tips on planning, and who to get support and permission from;
- The EU Intelligent Energy project BAMBINI (2010) also provides a detailed guide and toolkit for the creation of both home zones and playing streets, including further illustrative examples from European cities;
- KOMPAN (2010)'s 'Play for all' Guide, which includes the philosophy of 'universal design' (so that products, services and the environment can be used by all people), which is applied particularly to the design of playgrounds and other play spaces, to improve accessibility and inclusion;
- Play England also provide a detailed guide (Shackell et al., 2008) for creating successful play spaces;

- The EU Eurocities network provides a very useful Handbook for Local Campaigners (EMW, 2017) to develop different types of sustainable mobility schemes, as well as the preparations towards European Mobility Week;
- North West Leicestershire Country in the UK (NWLC, 2008) provide a useful resource pack for the effective involvement of children and young people;
- Alternatively, Involve, which is part of the UK's National Institute for Health Research, provide a guide for researchers and commissioners (Kirby, 2004) on how to involve children from age 12 upwards, including some of the issues and how to engage them effectively;
- The United Nations Human Settlements Programme provides a useful guide for reclaiming the streets as public spaces and how re-designs contribute to drivers of urban prosperity (UN-HABITAT, 2013);
- The FLOW (2016) Horizon 2020 project's case studies measures that are supportive of walking and cycling, including more details on school streets, and further examples of sustainable travel/car reduction schemes;
- 'Happy City' is another community interest company based in Bristol, UK, which seeks to improve the wellbeing and happiness of people living in the City, but that has also produced wider methods and indicators for assessing and measuring these attributes (Hiscock et al., 2016), including the Happy City Index;
- UNICEF (2017b) also provide a Resource Pack to help programme planners understand the basic elements of what constitutes a best start in life for children, and how to work effectively with others to achieve those aims;
- The 'Play Strategy' (DCSF, 2008), a policy document published by the UK's Department for Children, Schools and Families, which describes the stakeholders they involved, and sets out their findings from engaging children and all interested groups;
- UNICEF (2009)'s 'A Practical Guide to Developing Child Friendly Spaces', which although focusing on meeting the generic needs and rights of children, is still useful.

5.2.14 Other complementary measures

Schemes to develop child friendly neighbourhoods could also include one or more of the following 'best practice' measures which are designed to encourage walking and cycling and/or reduce car use, especially when combined with one or more of the concepts and interventions described above. (Please note this list is just a selection, and again is by no means exclusive.)

- ***Cycling improvement and cycle hire schemes***

These schemes include cycle hire and cycle sharing systems, as well as major cycling infrastructure improvements, such as long range cycling ‘freeways’ that are segregated from traffic, with clear and legible signage, as well as surface markings to inform all users. Segregated cycle lanes can help to encourage greater cycle use, as they address people’s perceived fears of cycling on the roads, as well as provide alternative accessibility to child friendly neighbourhoods. However, research conducted as part of the work for the UK Local Sustainable Transport Fund suggest that segregated lanes need to form part of a wider strategy for developing a network of cycle routes in cities and beyond, and should not be implemented piecemeal, which can lead to the risk of sudden merging of cyclists with traffic where they end. In addition, cycle routes should ideally be segregated from pedestrians, as cycling-pedestrian conflict can be an issue (GOAL, 2013), perhaps even more so for e-bikes.

In terms of cycle sharing or hire schemes, one of the first that became popular with local people was in La Rochelle, France (EMW, 2009), known as Yélo, which is accessible through a public transport smartcard. This was followed by many others, including that of London, which claimed a record of 73,000 cycle hires in one day (TfL, 2015). Such systems may gain even greater popularity, as the historic smartcard-based schemes are complemented or replaced with alternative methods of electronic payment, including Apple Pay, PayPal and other contactless methods, and/or are apps based (i.e. associated with a credit or debit card), which make the hiring or sharing of cycles accessible to everyone (and not just those who register/pay in advance). An example is YoBikes, which originated in China, and now operates in Bristol, and is being trialled in Southampton: <https://yobike.co.uk/>. The scheme does not require smartcards or docking stations, and the cycles are located through an app on the user’s smartphone, and unlocked through the scanning of its QR (Quick Response) code, with cycle hire being as low as just over one euro per hour.

The popularity of cycling can also be improved with schemes that link to other modes of public transport, such as ‘Bike2Bus’ e.g. in Dublin, Ireland (Coleman, 2016), where secure lockers are provided for commuters to store their cycles while they continue their onward journey into city centres, which helps to improve the accessibility to bus and train travel, and reduces the need for people to drive or walk long distances in order to catch these modes. An alternative to linking cycling with buses is provided in Zagreb, Croatia,

where people may place their cycles directly onto three racks attached to the vehicle, which then transports them both (EMW, 2015). In the Murcia region of Spain (EMW, 2016), a similar cycle and bus scheme works, which also allows the transport of foldable cycles.

The provision of cycle ‘hubs’ (‘service stations’ for cycles, typically integrated into cycle networks), public maintenance stations (smaller, which provide e.g. pumps for air), ‘bike kitchens’ (shops or cafés where people can fix their own cycles, but with free help and advice from knowledgeable volunteers), and cycle training or skill development schemes can also all improve cycling uptake. The roll-out of ‘pop-up’ cycle repair shops, such as the bike doctor scheme (‘Bike Dr’: <http://rideride.co.uk/bike-dr>), can also be very popular, as they take professional cycle maintenance and repair expertise into the community, including at schools and universities, and encourage people to have their equipment serviced or repaired close by so they can continue cycling.

Note also that checks for the roadworthiness of cycles, for example that the brakes work, are important not only for cyclists, but also potentially for pedestrians, as accidents between the two are also possible, especially in shared space.

- ***Street improvements for pedestrians and cyclists***

Street improvements can take many forms, from larger area transformations such as shared space/home zones, to targeted redesign of a street or specific sections. When aimed at encouraging children to play, street surfaces need to be at one level wherever possible, and be constructed from protective materials, for example recycled plastics or soft wood. In addition, high volume and densely parked cars must be avoided (see section 2.2), and hazards such as street furniture must be clearly marked or protective. A good example of effective street improvement is the car-free Mariahilfer Strasse in Vienna, Austria, which was created as one of the longest shared spaces in Europe (LAN, 2015), with new designs and materials used. The design was built around the objective of providing as much street space as possible for cyclists, pedestrians, and recreational users, with new paving level from side to side, in light granite instead of traditional asphalt, and street furniture composed of all sorts of shapes and arrangements, which are said to be more visually appealing and creates a sense of place for people entering the street.

- **Schemes for reducing cars / car use**

There are many other ways for encouraging reductions or alternatives to car use (Wong et al. 2013), including:

- *Car-sharing* (where people hire vehicles on a time-limited basis as part of car rental schemes or car clubs), thereby reducing the need for car ownership;
- *Car-pooling* (where individuals combine to share private vehicles for specific journeys), therefore reducing the number of car trips.

Note that, depending on the country, these terms can be used interchangeably, and may also be known as lift-sharing, ridesharing (which typically involves a booking system or app), or *covoiturage* in France. An example where car-sharing has been particularly successful is in Bremen, Germany (Hurley, 2014), which claims to have 10,000+ users, who are inspired by low monthly subscription fees. Local residents are also encouraged not to own cars through the development car-free properties, or flats where there is no parking provision or spaces reserved only for car club cars. The experience from London also suggests that a reduction in parking spaces and/or an increase in their costs, together with improvements in public transport, will also encourage the reduction of car use.

- **Speed reduction and traffic calming measures**

As well as compulsory speed reduction zones (e.g. 30km/hour or 20mph), these can involve measures to reduce traffic speeds and/or encourage safer driving, to improve the environment for pedestrians and cyclist. It is well-known (York et al., 2007) that drivers adapt and reduce their speeds when their direct sight is restricted and/or due to the presence of obstacles, or when they encounter surroundings to which they are unfamiliar. For example, the use of mid-street traffic island chokers force cars to slow down, while serving as a refuge island for pedestrians at the same time. Other measures to calm traffic (Pucher & Dijkstra, 2000) include physical barriers such as artificial dead ends, roundabouts, road narrowing, zigzag routes and/or lines, curves, raised intersections/crosswalks, rumble strips and speed humps, which can all be effective in deterring or slowing cars, but may also require enforcement, e.g. through speeding cameras. An example with many of these attributes from Freiburg is shown in Figure 5.12.



Figure 5.12 Traffic calming measures in Freiburg, Germany
(Source: FGM-AMOR)

- **Pedestrianised zones**

These are local measures to improve accessibility of urban space by converting a street or small area to pedestrians, which is free from traffic, and in some cases, may also restrict access for cyclists to certain times to avoid conflicts with pedestrians. One of the first examples of a purpose-built pedestrian street is the Lijnbaan in Rotterdam, which was opened in 1953. However, although these measures are good for pedestrians, they can also be self-defeating, particularly in older or historic cities, where wide-scale street re-design can be prohibitively expensive, leaving patches of pedestrianisation, where people still have to traverse busy roads and/or be exposed to traffic. In addition, with poor integrated planning, areas that have been designated for pedestrians can often be accompanied by mass parking zones nearby, for example with the purpose of attracting people to shops, and therefore do not encourage the community and sustainable mobility transformations that are sought by Metamorphosis.

Although these mobility-focused complementary measures can be helpful in supporting Metamorphosis interventions, they are not in themselves completely effective, and need to be implemented in the context of a wider package of sustainable mobility and children-

oriented behavioural change measures that engage and are supported by the community, as well as the local public authorities. This is what separates the Metamorphosis implementation trials from being purely sustainable travel-oriented or solely urban re-design driven initiatives.

Further case studies of measures and activities that encourage child friendly neighbourhoods, i.e. potential implementation options for Metamorphosis partners, will be given in the next deliverable (D2.2). The next chapter will look at suggested ways of setting goals and targets for implementation trials in the partner cities, including potential key performance indicators and critical factors for success.

6 Approaches to monitoring and evaluation

6.1 Planning

As stated in the grant agreement, there is a need to integrate the Metamorphosis knowledge and activities into the EU Sustainable Urban Mobility Plans (SUMP) of the partner cities. The Metamorphosis partners will therefore employ an approach to planning their implementation trials based on previous work conducted with SUMPS, including the use of the MaxEva and MaxSumo evaluation methods, an adapted version of which is described in the next section for setting goals and targets. The SUMP work shares many common principles to Metamorphosis, but without the focus on children, and the wider integration of sustainability mobility with urban planning. This includes (see Table 6.1) for example:

- a focus on people;
- the main objectives are to improve accessibility & quality of life;
- a shift to cleaner & more sustainable transport modes;
- multidisciplinary planning & cross policy working;
- involvement of stakeholders.

Table 6.1 SUMP principles (Source: ELTIS, 2013)

Traditional Transport Planning	Sustainable Urban Mobility Planning
Focus on traffic	→ Focus on people
Primary objectives: Traffic flow capacity and speed	→ Primary objectives: Accessibility and quality of life, as well as sustainability, economic viability, social equity, health and environmental quality
Modal-focussed	→ Balanced development of all relevant transport modes and shift towards cleaner and more sustainable transport modes
Infrastructure focus	→ Integrated set of actions to achieve cost-effective solutions
Sectorial planning document	→ Sectorial planning document that is consistent and complementary to related policy areas (such as land use and spatial planning; social services; health; enforcement and policing; etc.)
Short- and medium-term delivery plan	→ Short- and medium-term delivery plan embedded in a long-term vision and strategy
Related to an administrative area	→ Related to a functioning area based on travel-to-work patterns
Domain of traffic engineers	→ Interdisciplinary planning teams
Planning by experts	→ Planning with the involvement of stakeholders using a transparent and participatory approach
Limited impact assessment	→ Regular monitoring and evaluation of impacts to inform a structured learning and improvement process

The SUMP methodology also details a comprehensive planning cycle, which is comprised of four phases, with 11 planning steps and 32 sub-activities (see Figure 6.1).

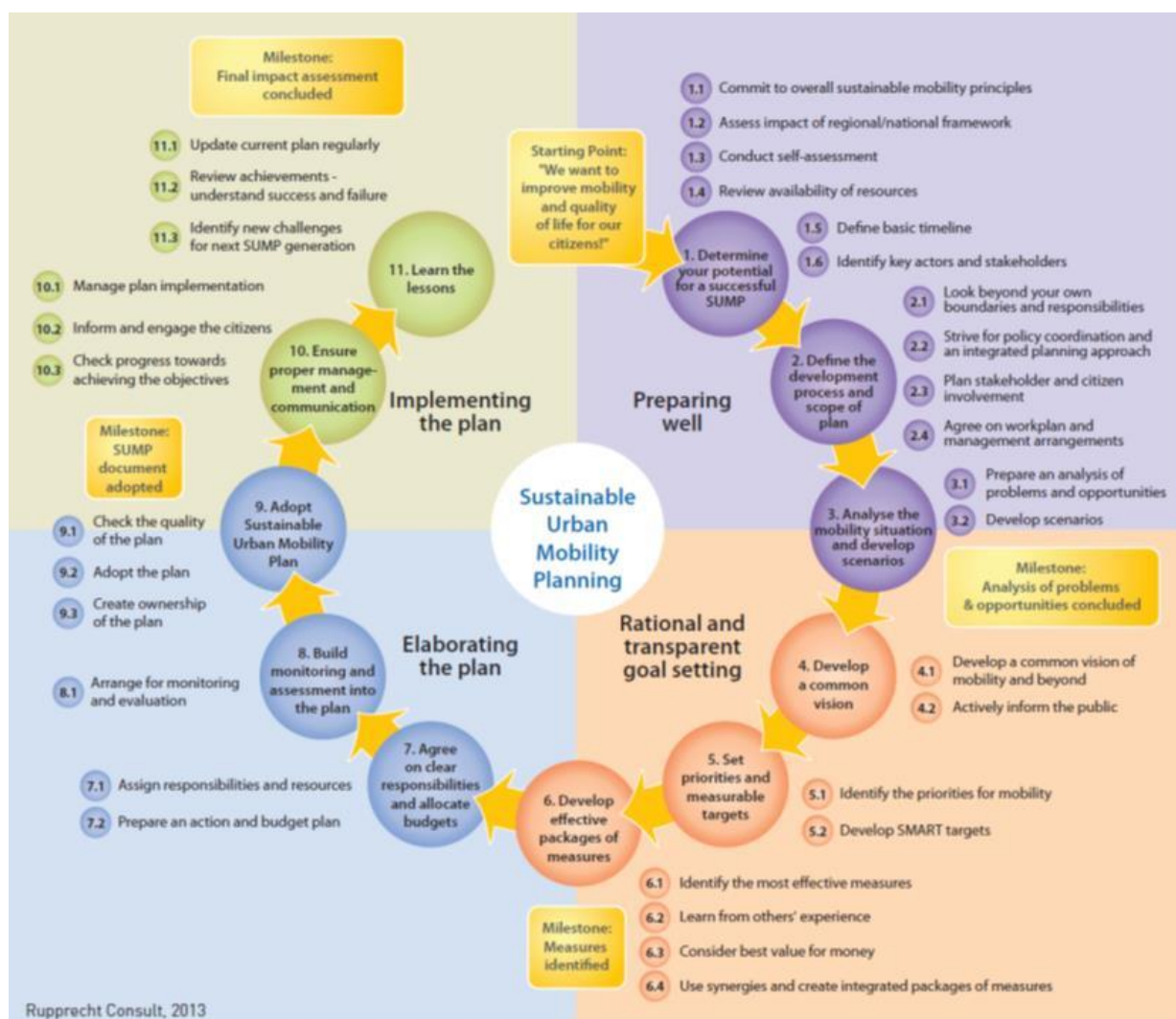


Figure 6.1 SUMP planning cycle (Source: ELTIS, 2013, from Rupprecht consult)

The Metamorphosis partners will use this approach as a starting point for planning their implementation trials, as part of the next package of work (WP3), and taking into account the input of children and their parents and teachers as stakeholders, for example as part of the Vision Building workshops. Further guidance for this work will be published by the WP3 lead.

Note that the “Master-Planning Model” is often used for improvements for urban environments. However urban environments are also dynamic, living and fast-changing and these Master Plan models usually need long implementation times. For dynamic systems like neighbourhoods, a more agile approach is therefore required, and Metamorphosis partners may also take elements from Agile Planning, with its roots in prototype design and evolution, for example through the use of living labs. This approach does not use a linear, unidirectional

flow, but moves in small incremental steps that can last from a few weeks to potentially much longer - but can be altered 'on the fly' (a term used in systems design), i.e. quickly and wherever required. Thus, it will be possible to fine-tune and improve plans in a more flexible way wherever necessary, using the living labs and some of the implementation measures and activities as discussed in chapter 5. This approach fits quite well with the MaxSumo evaluation method that is both impact and process oriented, which is the basis of the approach to planning suggested here.

6.2 Targets for the project

While the aims and objectives for the Metamorphosis project are clear (see chapter 1), its success will be assessed according to the impacts from the different country initiatives, as measured through a number of key performance indicators (KPIs), which will be defined specifically by the partner cities as part of their Local Analysis Report (Task 2.3) and Implementation Planning (Task 3.4). This assessment, and the monitoring and evaluation of the KPIs (Work Package 6), will be coordinated by TU-Dresden (Participant number 10), who will work in close cooperation with the partner cities to ensure the agreed indicators are relevant and suitable for each City prior to the Metamorphosis initiatives being implemented, and that they take into account data and resource availability, as well as the feasibility of data collection.

6.2.1 Overall approach to setting targets

In considering what are appropriate indicators, TU-Dresden, has recommended using an overall approach which is based on an assessment of tools from previous research, including the MaxEva and MaxSumo evaluation methodologies from EPOMM (source: Hyllenius et al., 2009), the Bike Print Tool (from NISTO) and the Bicycle Policy Audit (from BYPAD). This approach asks partner cities to consider responses to 10 questions as part of their Local Analysis and Implementation Planning, taking into account the initial guidance provided by chapters 2 to 5 of this Report. The 10 questions are:

- 1) What are your overall goals and targets, what do you want to achieve?
- 2) What is/are your target group(s)?
- 3) What measure is planned?
- 4) When will the measure be implemented?
- 5) Who is responsible for the planned measure, e.g. your department or somebody else?
Who else needs to be involved?

6) Impact evaluation (KPIs):

- Which indicator(s) do you think is/are appropriate to prove that you reach your goals as described in (1) above?
- The Metamorphosis project should benefit children most of all, so with which indicator(s) can you prove that children benefit?
- How will you collect the data, at best also with a special focus on the involvement of children?

7) In question (6) above you thought about the involvement of children in the evaluation process. How could you include children's expertise and children's perceptions elsewhere in the implementation process?

8) Process evaluation: With which indicator(s) do you think you can measure the progress in the process of project development? How can you collect the data needed?

9) How much money and which other resources will you need during the process? Are these resources already assured?

10) Which major risks could severely endanger your project? Concerning those risks: How can you counter or prevent them?

6.2.2 Detailed considerations and illustrative examples

For Question (1), the approach recommends that targets should be set in an appropriate and constructive way, and therefore partner cities should divide their overall project goal(s) into specifically measurable sub-targets, using the well-established 'SMART' model, i.e. Specific, Measurable, Ambitious and Realistic Targets. There are other variations to what the acronym stands for, including Achievable and Relevant for A and R, and T could also be 'Time demarcated' (i.e. to be achieved in a certain time frame), but in essence SMART targets are:

Specific: Specific and clear targets which should, as far as possible, define what is to be achieved, preferably also in quantifiable terms. For example, "walking and cycling mode share should increase" is more specific than "improved modal split". Even more specific could be "share of walking and cycling should be increased by Y% for shopping trips in town X over the period Z".

Measurable: If the targets are not formulated to make them measurable, then they cannot be binding. For example, "Share of public transport (PT) for school trips in town X should be increased from 20 % to 25 %" is one such measurable target. However, this target requires a baseline study to establish the current modal split; and in this case, the partner city will need to know that the current PT modal share for school trips is 20 %.

Ambitious (or *Accepted*): Ambitious and challenging targets encourage activity to achieve them, whereas targets that are easy to meet do not produce this effect. A target that “share of public transport should be increased by 0.5 % for school trips” would not produce any noticeable effect (or be measurable typically). The target should also be accepted by the project team and the funders, such that they can commit to it.

Realistic (or *Relevant*): However, it is important that targets are not so ambitious as to become unrealistic, and therefore unachievable. The danger here is that if the targets are set unrealistically high then people consider them unattainable and consequently give up, or they are not relevant so people lose interest. The challenge is to make the targets relevant, demanding AND realistic, which people often refer to as ‘stretch’ targets.

Example	
Goals	<ul style="list-style-type: none"> - To increase the quality of life - To increase especially the safety for children and cyclists
Target	<ul style="list-style-type: none"> - Increasing number of children playing in the street - The number of visible children in the street should rise by 50%, while the overall resting duration of pedestrians should rise by 20% on average over 6 months.

In considering Question (2), the selection of target groups may be based on various criteria, including:

- population group (e.g. primary school children);
- what are the key issues faced by that population group (in relation to the Metamorphosis project);
- trip purpose (e.g. school or leisure);
- specific areas or routes (i.e. different locations, or combinations of points);
- geographical regions, such as living in a certain area;
- specific sustainable transport modes, such as walking or using the bus;
- certain attitudes towards the neighbourhood or specific transport modes;
- socio-demographic variables (e.g. age range);
- major life events or changes (such as people moving to a new location or school);
- current stage of behaviour or development.

Example	
Target groups	(Local) residents, especially: <ul style="list-style-type: none"> - Children - Cyclists and pedestrians - People with an affinity to participate in public life - People whose social or travel destination is in the street

For Question (3), Metamorphosis partners should describe in a paragraph to half-a-page, what measure is planned.

Example

Description Roads A and B will be temporarily closed to traffic for one day in Spring 2018 from 3pm to 7pm. No cars are allowed to pass through or to park on the street during the closure. The road is closed to give children and local residents the possibility to play and linger in the street during the afternoon, while it is daylight. The entrances are barred with tapes. During the closure, two traffic controllers will be in attendance at the beginning/end corners to control the entrances. If the closure is accepted very well, it will be repeated monthly/weekly.

For considering Question (4), partners should describe the timeline for the measure or activities (as expected at this point of time), including the different steps of implementation. This then acts as a useful guideline for partners to check at different points during the project lifetime to see if they are on schedule with the work planned, and any already planned evaluation activities should also be noted.

Example

Step	Activity	Start date	End date
1	Analysis of possible streets to close	10/2017	11/2017
2	Purchase material and look for staff required	11/2017	01/2018
3	Discuss/promote the closure in the neighbourhood	12/2017	02/2018
4	Implementation	03/2018	

For Question (5), partners should provide details of those responsible and who else needs to be involved.

Example

Name	Organisation	Role	Contact data
Person A	City Council	Project Coordinator	Telephone number 1
Person B	City Police	Manage road closure	Telephone number 2
Person C	Community leader	Event planner	Telephone number 3
Person D	Local resident	Traffic controller	Telephone number 4

For Question (6), consideration should be given to what indicators (KPIs) may be used to assess the *impact* of each measure, and the suggested method(s) for data collection (see section further below for further examples of indicators).

Example		
Indicator	Method for collecting data	Experience in measurements (due to already implemented measures)?
Number of people on the (closed) street	Counting	Yes (street closure in 2015)
Duration of conversations	Time measurement	No
Number of children on the (closed) street	Counting by other children	No
Satisfaction with the closure	Survey carried out by local children	No

Question (7) asks the partner cities to elaborate on their thoughts about the response to Question (6), in terms of how they can further engage children, both to contribute their experiences and expertise, as well as being stakeholders in the evaluation process, therefore applying two fundamental requirements of the general approach to developing child friendly spaces (as discussed in chapter 2 above).

Question (8) is similar to Question (6), but relates to *process* evaluation, to help assess the progress in developing/implementing the measure, with again suggested methods for data collection. This prompts partners to consider the processes, which will be rendered effective by associated critical success factor (CSF) indicators.

Example		
Indicator	Method for collecting data	Experience in measurements (due to already implemented measures)?
Number of closed streets	Counting	Yes (street closure in 2015)
Number of complaints	Counting	No

Question (9) asks partners to list the resources to be deployed, both in terms of the hours the organisation has available for the measure/activity, and any other specific costs that might be associated. The starting point is to consider how many hours are allocated to each partner for the relevant WP, and to list which persons are planned to work within this WP, from which the estimated number of hours required for each particular implementation can be estimated.

Example

- Resources**
- The resources are mainly working hours from WP4 (implementation) and WP 6 (evaluation), assuming costs for external contractors are not required.
 - For the application of the temporary street closure an amount of about 100 working hours within WP 4 is planned.
 - The materials (capital cost) of the street closure will be about 300 Euros.
 - The traffic controllers (local residents) will work 10 hours in total and cost about 15 Euros/hour.

Finally, Question (10) prompts partners to assess the risks involved which could endanger the project, and consider what counter-measures can be taken to prevent or mitigate them.

Example

Risks	Counter measures
Poor usage of the closure	Detailed analysis of potential user behaviour
Protests against the closure	Strengthen acceptance e.g. in discussions with the opponents

Detailed consideration of the responses to these 10 questions should enable the partner cities to develop appropriate SMART targets for the measures/activities they plan to implement as part of the Metamorphosis project.

6.2.3 Further suggested impact indicators which may be used by partners

From previous project experience, and a review of the literature, e.g. Gehl (2013), Balsas (2004) and Litman (2010), partner cities may include some of the following impact indicators for child friendly neighbourhoods:

Primary data which can be collected specifically for the Metamorphosis project, for example:

- Number of children congregating or playing in a public space over a specified time period;
- Average time spent by people (including children) in a public space;
- Satisfaction with the child friendly neighbourhood transformation measure (%);
- Number of citizens actively contributing to the neighbourhood;
- Perception of social relations in the neighbourhood (e.g. through Likert-scale surveys);
- Children's assessments of the new/play space (before and after);
- School teachers' feedback of the transformed neighbourhood (qualitative assessment);
- Number and usage of playground and/or play-associated equipment;
- Number and usage of seating options/possibilities;
- Number of reported robberies/crimes against pedestrians in public space; and
- Perceptions of cleanliness.

Partner cities may also make use of **secondary** data which support the development of child friendly neighbourhoods and/or that are collected or estimated from other sources, for example as part of wider neighbourhood or city transport operations, commercial development and/or public health initiatives, such as:

- Number of pedestrians, cyclists, or changes in sustainable travel behaviour;
- Number of car trips for escorting school children;
- Proportion of home to school trips on foot or by bike;
- Number of car trips for daily goods shopping;
- Number of external leisure car trips;
- Number of car trips for commuting;
- Reduction of second attempt goods deliveries;
- Levels of physical fitness (e.g. obesity or sickness indicators);
- Extent of local participation in physical activity programmes;
- Size of the area for pedestrians;
- Number of accidents (and conflicts with cars, bicycles etc.).

It may also be possible for some partner cities to compile secondary data for social life cycle analysis, for example to determine key dates such as how old people are when they:

- started pre-school/kindergarten;
- started primary school;
- started secondary school;
- began work (part-time/full-time);
- are permitted to vote, get married, drink alcohol/smoke, etc.

These indicators may potentially be used to assess the social and sociological aspects of the implementation trials, including the positive and negative impacts for human well-being, or as part of a wider Social Life Cycle Assessment (UNEP, 2009), although the latter will require further consideration of how the Metamorphosis measures could impact on the more traditional determinants of quality of life and living standards, such as life satisfaction, health, happiness and utility, as well as human development.

Note: In any case, the specific list of targets and KPIs defined by each partner city will be specified in Task 3.4 (resulting in Deliverable 3.2, Implementation Plans), which will have been reviewed with TU-Dresden (the WP6 lead) beforehand (and who will provide further guidance to the partners should they require it).

This ends the General Analysis Report, although it will be followed by further deliverables that are described by the Description of Works contained in the Metamorphosis grant agreement.

Note: The sole responsibility for the content of this document lies with the authors and the Metamorphosis Consortium, which does not necessarily represent the views and opinions of the European Commission and other organisations. This document is designed to inform only, and neither the European Commission nor the authors are responsible for any use that may be made based on the information contained herein.

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