



NORDISK ARKITEKTURFORSKNING

Nordic Journal of Architectural Research

2-2012

Nordic Journal of Architectural Research

ISSN: 1893–5281

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Outside the Nordic countries pay in SEK to SWIFT-address:

PGS ISESS Account no: 4190325-3, Postgirot Bank Sweden, SE 105 06 Stockholm

Published by SINTEF Academic Press

P O Box 124 Blindern, NO-0314 Oslo, Norway

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FUNCTIONAL DENSITY – A CONCEPTUAL FRAMEWORK IN A TOWNSCAPE AREAS CONTEXT

**PER G. BERG, MADELEINE GRANVIK AND
PER HEDFORS**

Abstract

Densification is today a popular strategy among planners and planning researchers to promote sustainable urban development. Some common arguments are that urban neighbourhoods with higher population densities can reduce car traffic and promote public transport, biking and walking – thereby reducing the environmental impact from transport. Densification is also presumed to provide a better economic basis for municipal services. The effects of densification has–however–seldom been evaluated and needs to be discussed in a nuanced and critical way. This paper discusses densification as a planning strategy mainly from a theoretical and conceptual point of view. Focus is on what kind of densification strategies and meanings that are to be found in different townscape areas in typical Swedish cities. We suggest a conceptual framework, developed from the main concept Functional Density.

Key words:
Densification, Functional
Density, Sustainable habitation,
Habitat Agenda, Urban planning,
Landscape planning

Introduction

A current trend among politicians, planners, constructors, consultants and researchers is that high-rise and dense land use development of urban areas is a main solution for sustainable urban development. By increasing i.g. the numbers of *urban dwellers per surface unit*, transport impact to global change are expected to decrease by bringing citizens closer to service, commercial markets and public transport. This has become a basic assumption among planning researchers, planners and other practitioners (Gaffron *et al.* 2005; 2008; Thwaites *et al.* 2007; Gullberg *et al.* 2008; Ståhle, 2008; Mossfelt & Reneland, 2005). But, there are also other opinions about what constitutes appropriate urban structures, architectural and spatial qualities for modern residents. Common arguments against what is denoted as *urban sprawl* (i.g. Duany, Plater-Zyberk & Speck 2000) are: dependency on automobiles, spread out public services are assumed to be more expensive, public transport often becoming significantly more expensive, as well as the i.g. provision of water and sewers. Low density expansion like the American sub-division uses up more of the surrounding land than i.a. traditional European city structures (Newman & Kenworthy, 1992). This *urban sprawl*, fuelled by a car-dependent modern society, has soon become a symbol for the inefficient fossil fuel era (Alekklett, 2008). Gordon and Richardson (2000) – on the contrary – give arguments for a more spacious planning: they state that especially families with children and middle- and upper class families, have shown a preference for the suburban lifestyle. Arnstberg and Bergström do in a similar way state that: «...Today, when planners finally have accepted urban ways of life and propagate for a dense living, there is, beside the attraction of city life, a parallel and growing trend of abandoning the city. Families with small children usually prefer to live in the suburbs, if possible in a house of their own, with green surroundings and a neighbourhood community (Arnstberg & Bergström, 2002, p. 5). Thus, there is among a significant part of the population a preference towards lower-density development, to increase the privacy and get lower ambient noise, as well as having a generally slower lifestyle than in urban areas. Another argument is that this sort of living situation is an issue of personal choice and economic means, which is given in liberal democratic societies. British geographer Peter Hall (1998, p. 862–63) writes: «...there is also no acknowledgement that many similar experiments in social planning have been tried before, with less than satisfactory outcomes. Consider, for instance how similar modern smart-growth theory is to the 1952 General Plan for Stockholm, which proposed establishing new suburban districts, each for 10.000 to 15.000 inhabitants «the “ABC-city”, strung like beads along the lines of a new subway system.»¹ In this context, the so-called Stockholm school arises with parkway systems: a world famous approach in landscape architecture in that time (Andersson, 1993). Hall (1998, p. 876) continues: «Stockholm’s General Plan, however, did not work out as planned. Surveys in the late 1970ies found that 90 percent of Stockholm’s residents preferred single-family

1 The ABC-city is a functionalistic concept developed in the context of suburban areas first implemented in Greater Stockholm in the 1950-ies where A is work-places (in Swedish: Arbete) B is housing (Bostäder) and C is Service centre (Centrum).

homes». Finnish architect Christer Bengs states that it is impossible to give a general answer to what city is considering being the most sustainable: the sprawled or densified city (Bengs, 2005), or which structure uses less energy (Falkheden & Malbert, 2000). Furthermore, Bengs stresses the importance of listening to the opinion of the inhabitants in the planning process. Changes that citizens experience as non-sustainable can never be compatible with a sustainable development (Bengs, 2005; Granvik, 2005a).

Paradoxes of densification

Densification processes lead to new conditions of density of various elements depending on the context. Density means high concentration. In the context of sustainable urban development it can be experienced in many ways. Density of people can serve as an example: a crowded situation can be perceived positive. On the other hand, the narrow perception can also be experienced as stressful. In this urban context a contrast to density is either a sparse population in desolation, or a positive perception of spaciousness, all depending on the situation on site.

Densification measures may not always lead to actual densification and redistribution of spatial qualities. One major example is when vertical densification is combined with a status quo motorism. The higher the buildings – the larger the area needed for parking lots and other surface-demanding infrastructure areas. If densification is realised with high-rise buildings, the loss of contact with the street, with coincidental informal encounters with neighbours on the ground; in shops, squares, pavements and inner courtyards – may be a high price to pay for children families, lonely elderly and home-working adults (Thwaites *et al.* 2007). If new buildings are erected on earlier accessible green areas in the city or in the suburbs, higher densities are not necessarily affecting a decrease in leisure trips (aiming for green recreational areas) (Berg & Florgård, 2005).

This introduction gives a picture of the complex nature of *densification*. There are certainly good built examples of new dense urban areas, *i.a.* in Südstadt and Saiben in Tübingen, Germany (Gaffron *et al.*, 2005, p. 73–79) and Hammarby sjöstad in Stockholm (Bylund, 2006) of new dense urban areas with better energy-, waste- and water use performance than other comparable projects. But can we draw the conclusion already that densification, through additions of new buildings among the old and through an erection of high-rise buildings, is always better than urban structures with more in-between-spaces and less floors? We suggest that there is a need to explore the nuances, where we elaborate on the phenomenon of densification, and through which research we may expect both positive and negative effects. We discuss how *densification* can appear differently depending on the context and the type of townscape area.

Theoretical background

Coming from dense, smoky, contagious industrialised cities in the end of the 19th- and the beginning of the 20th centuries, it was no wonder that most planning theory after WWI was looking for air, greenery and space (Asplundet al., 1931). Both the garden city concept (Howard, 1902), site analysis in planning (Geddes, 1904), community planning (Mumford, 1938) as well as the modernists' project inspired by Le Corbusier (1967) were – in their own way – seeking a formula with less density for a good city life. The first real understanding of the potential in relatively dense cityscapes (but without smoke and having better sanitation than in the beginning of the last century) – with mixed use for creating an attractive urban environment – was represented by Jane Jacobs. This challenged the established air-space-light planning doctrines of her time (Jacobs, 1961). She was later followed by Christopher Alexander who nuanced many of the observations done by Jacobs, turning them into a new Pattern Language theory (Alexander et al. 1977). Alexander discussed density factors (elements of densification) in urban and rural settings. The following patterns can be seen as one approach, which is relevant when developing the discussion on elements of densification: *City-country fingers* (Ibid, p. 21–25), *Lace of country streets* (29–32), *Country towns* (33–35), *Magic of the city* (58–62), *Web of Shopping* (104–109), *Density rings* (156–162), *Activity nodes* (163–167); *Shopping street* (174–178), *Night life* (179–182), *Interchange* (183–186), *Work community* (222–226), *Accessible green* (304–309), *Common land* (336–340), *Connected play* (341–347), *Corner grocery* (440–443) and *Numbers of stories* (473–479). Those important works have been followed in our time by many authors (see i.g. Gehl, 2010; Thwaites et al., 2007).

Rådberg (1988) elaborates comprehensively about vertical densification, where he questions that high-rise building will be more efficient from an energy aspect and a number of other sustainability indicators. With a focus on the *public spaces* of the city, the *dense cityscape* with narrow pedestrian streets, lively café-alleys and squares with small-scale dense mixes of culture, residential areas, workshops and commercial activities, was thoroughly described by Jan Gehl and his co-workers in a series of works (Gehl, 1996; 2005; 2010; Gehl & Gemzoe, 1996). They were seeking a grammar for architects wishing to develop a density culture – especially in the spaces between the buildings. In our time, the idea of dense cityscapes and residential areas have been developed further by a number of authors (Hallsmith, 2003; Roseland, 2005; Gaffron, 2005; 2008; Thwaites et al. 2007), but those planners and researchers have also started to emphasize the nuances of densification: how is it carried out; what are the components of densification; for what different purposes and stakeholders should the densification be done? Especially Thwaites' group has developed a theory on environmental urban design (with Alexander as one main inspiration), emphasizing what they call: *time-people-place responsive urban spaces* (Ibid). Simon Bell in the Estonian University of

Life Science has developed a range of arguments dealing with densification from a Landscape Architecture perspective and within the EU project PLUREL developed a web-based tool for assessing green and public spaces values affected by different densification strategies (forthcoming).

Obviously, there are both opponents and supporters of densification. Our intention is to elaborate on both the advantages and disadvantages of densification, from a critical and context dependent perspective. Our basic assumption is that densification will often lead to both improvements and degradation in local areas. The results presented in this paper are part of a broader research project. The approach in the overall research project is to investigate densification strategies, implementation and effects in typical Swedish townscape areas, both from a theoretical- and an empirical point of view. This paper focuses on a theoretical framework and a development of concepts with particular emphasis on densification in different townscape areas.

In the empirical work we use – among other methods – SWOT analysis to illustrate strengths, weaknesses, threats and opportunities with densification strategies in different Swedish townscape areas. Table 1 below illustrates an example of a general analysis of densification in any of Swedish townscape areas, using SWOT analysis.

Main framework and earlier studies

The *Habitat agenda* (UNCHS, 1996) highlights several dimensions that characterize the sustainable city, which we have operationalised into a *resource model* PEBOSCA, comprising seven main aspects of sustainable communities: *Physical, Economic, Biological, Organizational, Social, Cultural* and *Aesthetic resources* (Berg et al. 2010; Granvik, 2005a; Berg, 2004). Our earlier studies have demonstrated a need for general, townscape type and site-specific sustainability strategies for local areas in Swedish and Baltic Sea Region cities (Berg et al. 2012 *submitted*; Berg et al., 2010; Berg, 2009; Granvik et al., 2008; Hedfors et al., 2008; Granvik, 2005a; Granvik, 2005b; Berg, 2004; Berg et al., 2002). We suggest using the PEBOSCA model to exhibit different consequences of densification in a selection of different townscape areas. In Sweden we have extensively studied, during the last 15 years, different townscape areas inside cities and small communities or towns outside of cities (see figure 1). During the last decade, *three* townscape types were particularly scrutinized in a number of studies in a total of 22 townscape areas in 11 Baltic Sea Region cities and towns, where 5 were Swedish cities and towns (Uppsala, Göteborg, Strängnäs, Örebro and Hällefors) (Berg, 2004; Granvik, 2005; Granvik et al., 2008; Berg et al., 2010, 2012 *submitted*).

Earlier townscape area studies

In *small-house areas* from 1930s to 1950s, we have observed that there is currently an *extension densification* of the small houses to more spacious ones. This is one source of conflict between residents in these areas. On the other hand – a supplementary *service densification* with new houses for common interests (shops, workshops and community premises) would probably contribute to such housing areas significantly, thus strengthening its neighbourhood performance. But also functional and designed green areas (*green densification*, see below) for common use would support a more sustainable function of such areas (Berg et al., 2012 *submitted*).

Table 1. An example of a general analysis of strengths, weaknesses, threats and opportunities with densification strategies in any of Swedish townscape areas. It refers to our current research, to the introduction and theory sections above and also to planning documents (i.a. Uppsala Municipality Comprehensive Plan 2010). It also refers to our earlier research on sustainability in townscape areas in Sweden (Berg et al., 2012 *submitted*) and in the Baltic Sea Region (Berg et al., 2010).

Strengths	Densification can improve the efficiency in land use, access to service including shops, pre-schools, schools, communication (postal-, message-, data base access systems), libraries and primary care, energy use and distribution, public transport and access to culture. Densification can also strengthen the real estate economy or increase common property value (upgrading of i.a. parks and streets) for municipalities or housing companies.
Weaknesses	Densification may lead to an increased pressure on, or reduction of green structure of different scales. It can be socially demanding with a higher concentration of dwellers in a smaller townscape area. It may challenge views, secludedness and insight protection, generate more noise, winds and shadow. It may also lead to a decreased contact for residents with the ground, gardens, courtyards, pavements, squares and streets. Densification may also lead to more foul air, smells and challenge the micro-climatic comfort in the housing area. It may, finally lead to the generation of new supplementary travels (to recreational green areas, to cultural centres and to specialized services).
Opportunities	Densification may have a potential to result in: an extended and more efficient physical resource management and use (energy, water, sewage treatment, waste management, material recycling); a modern integrated IT-supported infrastructure; a supplement of lacking categories of residents in segregated areas; a novel or highly improved service-structure; a more resilient economy for residents and managers; a chance to improve green structure quality and availability for more categories of townscape residents; an opportunity to introduce local exchange and trading systems (LETs) of sufficient size; an increased cultural diversity; an opportunity for re-introducing the walkable city.
Threats	Densification may threaten or lead to: a seemingly physical resource efficiency with an actual systems inefficiency; lower building costs but higher residential costs; a sub-optimal green structure of different scales (less access to i.g. courtyard and district green structure); new management challenges in outdoor maintenance (overflow of stormwater, heat-island effect, snow-clearing problems). Densification may also lead to: a difficulty to create community cohesion in vertically densified areas; increased problems with smell, hygiene and basic tidiness; a degraded pest control and spreading of viruses, bacteria, fungi, insects and rodents; an aggravated problem with current traffic intensity and current means of transport (i.a. the spreading paradox with vertical densification and increased motorism - i.a. more cars per surface unit).

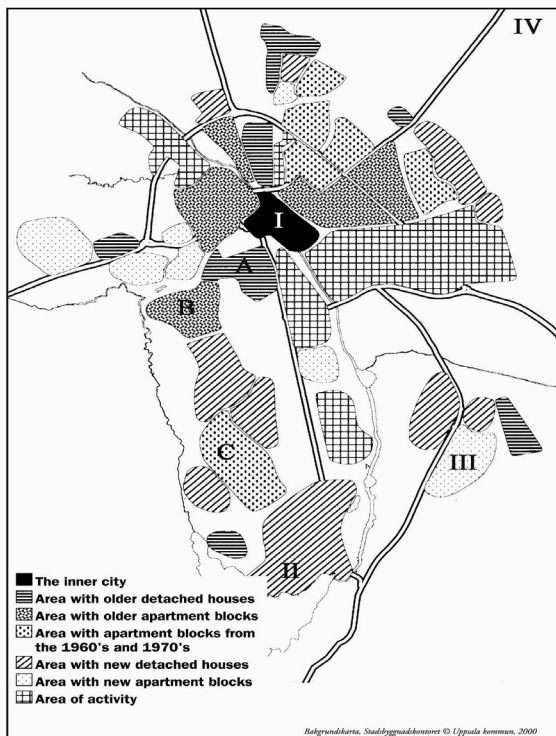


Figure 1. Six townscape areas inside and one townscape type area outside the city, according to Uppsala municipality functional categories (Uppsala Kommun, 2000). A = Small-house area (*Kungsgården*) with detached houses built between 1937 – 1953; B = Older multi-family house area with apartment blocks (*Lassebygården*) built around 1948 – 1950 («peoples homes houses»); C = Multi-family house areas with apartment blocks (Northern *Gottsunda*) built from 1960s and 1970s («million program areas»). The other areas were studied more extensively up until now: I = The inner city historic townscape; II Area with old and new detached houses at a distance from the city core; III = Area with new apartment blocks; IV = Smaller communities and towns outside the larger city (not shown).

Table 2. Seven categories of resources necessary for a sustainable function of local townscape areas, developed from the policy texts of the Habitat Agenda (UNCHS, 1996).

Resource Category	Examples
Physical Resources	Clean water and air, energy, matter and soil available to the residents of the local community.
Economic Resources	Houses, roads, tools, knowledge and informal economic services of importance to the residents in the community.
Biological Resources	Species, biotopes and ecosystems in natural and cultural landscapes within or closely connected to the community.
Organisational Resources	Plans, orders, laws, infrastructures, services and informal rules connected to the local community.
Social Resources	Relationships and local co-operation within the community. Moving rates within the community. Age structure, demographics and health of inhabitants in the local community.
Cultural Resources	Knowledge of history and cultural patterns of the site. Fine arts, traditions and ceremonies, in or of significance to the local community
Aesthetic Resources	Sensuous impressions, architectural and spatial qualities (related to visual, auditory, olfactory, kinesthetical and tactile senses) characteristic for the local community.

In the 1950s areas, a strong densification trend typically utilize district green areas and open public spaces, formerly designed for multi-generational outdoor life for its citizens. Our results suggest that a limited but crucial densification could strengthen the area by adding a small number of strategically placed multi story buildings with modern equipment for its ageing population (ibid). Another demographic densification in such areas may also be achieved by merging smaller apartments to larger, to make room for a new generation of families with many children and service in the ground floor. In these areas, there is also a need to develop the district green elements and inner courtyards through verdure densification.

In million-program areas², built during the 1960s and 1970s, segregation and large empty public spaces, roads, pathways and green structures constitute a basic problem. A desegregation densification, with supplementary multifamily house buildings in villa areas and villa in-fills in predominantly multi-family house areas, as well as a development of green areas may be an appropriate measure for strengthening these areas (Berg et al., 2009a; Baker, 2008; Granvik, 2005; Berg, 2004; Eriksson, 2009; 1998). The multifamily house areas also need to be developed through local community service densification and strengthening of social networks between neighbours and local clubs, schools, site managers, service companies and municipal authorities.

- 2 The million-program areas were built for the large urbanisation migration between 1960s and mid 1970s in Sweden.

Development of theory and concepts

A comprehensive problematisation of densification has been done by a few authors (Jacobs, 1961; Alexander et al., 2007; Thwaites et al., 2007; Gaffron et al., 2005; 2008; Stähle, 2008). See in particular the discussion by Baker (2008), analysing densification in U.S. suburban sprawl areas. Densification can in general be understood as a relative increase of dwelling population per ground surface unit in different urban settings. This can be accomplished in many ways – the most common being to add extra houses in existing housing areas. But densification can also be achieved by redistribution of houses and other land use objects. Other ways are to increase the height of existing houses (vertical densification), or to change the distribution of different sizes of apartments to harbour more residents per surface unit. Desired positive effects may also be achieved by densifying supplementary functions to a residential area, like shops, schools, houses for common meetings, green spaces or new cultural stages. This broad repertoire of components serves as examples of densification elements (see above and Berg et al., 2010).

Densification processes lead to new conditions of density of various elements depending on the context. Our conceptual array aims at contributing to the scientific discourse and to facilitate spatial planning, to consider densification elements and their effects, either as supporting or contradicting each other. In table 3, various meanings of densification are listed and preliminarily explained.

Table 3. Examples of different densification elements and strategies, developed by the authors of this paper.

<i>Type of Densification</i>	<i>Explanation</i>
Real estate densification	Increased new built area per ground surface area. This type of densification is primarily driven using real estate economic reasons.
Vertical densification	Extension with new floors on already existing buildings. This type of densification is primarily driven by real estate economic reasons. Vertical densification could also denote a relative increase in building heights in newly developed areas in the city.
Exploitation densification	Real estate densification may be supported by municipal authorities, with the purpose to mobilize capital for improving public spaces and functions coinciding and stated by the municipality as a prerequisite for allowing the exploitation.
City planning densification	Increased new built area or increased population per ground surface area where all other densification elements are included, necessary for creating an attractive and well-functioning human urban habitat.
Demographic densification	Increased population per ground surface area with the clear purpose of creating an even mix of ages in a certain townscape area, or the whole city or town.
Social densification	Development of public meeting places for social interactions to exchange information, knowledge and opinions.
Anti-segregation densification	Introduction of new areas or redistribution of the population in townscape areas with the clear purpose of counteracting segregation in i.g. million program areas or large villa areas.
Service densification	Development of the range of services in a local townscape area: new shops, public transit options, schools and commercial enterprises.
Green-structure densification	An increase of designated green areas in cities, towns or townscapes per surface unit or improvement of green structure quality and the range of uses for a range of users (flexibility of sociotope functions).
In-fill densification	Addition of new buildings or other city planning functions in single locations for a variety of reasons: for real estate economic reasons for supplementing dwelling categories or for increasing the foundation for services and other values.
Townscape type specific densification	Densification strategies related to the typical properties of different townscape areas in cities and towns. This is the focus of this article.

Defining functional densification

A fundamental goal for our densification research is to identify main interpretations of the concept and also extending such a list of definitions and explanations, to enclose also obvious functional meanings based on townscape typologies, urban functions and – not the least – resource management in a UN Habitat perspective.

Densification can be understood as a quantitative measurement of increasing the number of residents or inhabitants in urban or rural human settlements per surface unit i.g. inhabitants per km². The motive may

vary (see introduction and background above), but a basic assumption is that a higher density in urban areas motivated by a more efficient use of various resources: land, energy, public transport, social capital, green structure, population health and service. Densification can – however – be assumed to reach a number of critical transition points, beyond which the gains in resource efficiency is balanced by adverse effects. Also the same number of inhabitants per surface unit may be organized in many different ways, designs and functions. This is why authors like Thwaites *et al.*, 2007 and Gaffron *et al.*, 2005, 2008 talks about *time-sensitive space* (the former) and *qualified density*, implying that it is important how we densify the city or the rural town. *Functional densification* is thus a concept for describing the qualitative aspects of densification, for investigating its limits, beyond which it become counterproductive. Above all it is a way to develop tools for analyzing urban or rural community development, so that we can make conscious choices about what is a sustainable urban development and help us avoid unwanted effects. We stress the *contextual* meaning that densification need to be adapted to the site properties as well as the situation of a place. Hence we state the relevance to investigate the densification rationale in different local townscape areas of the city and in rural communities. Also, we are convinced that densification effects – positive and/or negative – needs to be analysed from a multi-dimensional framework – in our case drawn from the *Habitat Agenda* (UNCHS, 1996). Our working definition is therefore:

Functional densification denotes a densification of urban or rural human communities, increasing the number of inhabitants per surface unit, by systems optimizing³ and site- and situation- adapting⁴ the function and experience of a sustainable urban living by utilizing a range of relevant townscape design elements⁵ in accordance with a seven resources framework⁶, developed from the *Habitat agenda*.

Townscape type densification strategies

Some densification strategies are clearly related to specific townscape properties, which are compiled in table 4. A comprehensive discussion about alternative concepts to densification, like «nearness» and useful antonyms like «spacious» or «non-dense» is – however – out of the scope of this paper. Densification processes of different kinds (see below for a typology based on morphological, geometric and organizational functions in the urban fabric), are today a reality in all parts of the city. New housing areas, in-fills of buildings, service, roads and other settlement functions may be most obvious in central parts of our cities. It is – however – also a growing phenomenon in post-WW2 multi-family residential areas (the people's homes areas) and million program areas. The densification projects have been more scarce in small-house areas near the city centre, newly developed multifamily house areas at a distance from the city centre and in large villa areas, and also in smaller municipalities, towns and rural communities outside the large or other mid-sized

3 Referring to the optimum function of the townscape areas' all relevant physical and non-physical resources.

4 Our starting point is that each townscape area has its own unique properties and that it is at any time in a unique set of circumstances and thus need to be developed according to its context.

5 Townscape design elements (Lövré, 2003) are all relevant ingredients in an appropriately functioning and in a reasonably attractive cityscape or other human habitat area with houses, roads, pathways, bike-ways, pedestrian network, lighting, squares, patios, gardens, cultivation areas, greenways, trees and other green or water elements, public transit, service, shops, coffee-shops and other commercial elements, stages and other cultural and social meeting places outdoors or indoors.

6 See Table 2 above

growing cities. Today the densification rationale has, on the other hand, also reached stagnant or even depopulated towns as a means of increasing the attractiveness in central parts – thus potentially and indirectly contributing to a positive population trend in the whole community. Still more surprising is maybe that densification projects are introduced in formerly protected cultural heritage villa areas, near as well as far from the city centre. Also housing areas built from 1980s and forward has seen additional buildings and neighbourhoods added to the existing quite dense, but low areas. From densification projects from the past two decades in Swedish cities – a pattern is now emerging, displaying a range of strategies (see Table 4 below) – all in different ways adapted to the townscape type. For dense urban quarters in the city centre, for instance, dominating strategies include *brown field densification* and *district green densification*. Also *in-fill* densification, where single buildings or smaller house complexes are added to the existing patterns shows both successful and problematic examples. Table 4 reviews a range of townscape types and typical *townscape type* densification. For each townscape type, also specific potential densification functions are suggested.

Table 4. Townscape type specific densification, developed by the authors of this paper.

Townscape type	Current and needed densification strategies ⁷
City core	The city core is where the strongest pressure exists to add new dwelling surface. This is also where the scarce greenery is the potentially most valuable and most vulnerable resource seen over time. Densification in the city core is also the most challenging, since the core is already dense and a number of scarce values are at stake. Vertical densification relates to current typical additions to existing building of more storeys, or by building successively higher building blocks on for instance brown fields, green areas or public spaces in the city core. <i>Needed densification</i> in the city core could involve selected <i>in-fill projects</i> completing the city core with new residential categories, new or improved service or new or improved green areas or public spaces.
Small-house areas near the core, built in the beginning of the last century	The pressure on these areas is not the greatest in Swedish cities and towns compared to city cores and suburbs, but densification is still very real. On the other hand, much can be gained by a limited but purposeful densification. Extension densification is the most common type of densification in small-house areas, in order to expand the typically original 50-square meter small houses with a modern standard of dwelling-space. <i>Needed densification</i> include <i>service- and community common space densification</i> .
Older multi-family house post WWII-areas	These areas are – like the city core – currently under a large densification pressure. Typical densification in a number of 1950s areas involves additions of new districts often on common district green areas, formerly intentionally built for an active outdoor life in the residential areas (meadows, small forests and small parks in-between building blocks). <i>Needed densification</i> includes <i>demographic</i> densification by redistribution of ages (there is a need for new young families) or by merging small apartments to larger ones. It also includes strategic <i>in-fills</i> to harbour elderly residents having trouble moving in the (typically) elevator-lacking, narrow-spaced and threshold rich 1950s people’s homes houses.
Multi-family house areas from 1960s to 1970s	Those areas may be the most fruitful for a significant densification but it is crucial to make it well-adapted, i.g. by involving residents and other stake-holders in participatory processes. Typical densification involves anti-segregation densification, with the outspoken intention to widen the range of residential categories to involve mid-income, socially stronger and typical Swedish family categories. <i>Needed densification</i> includes an introduction of private, semi-private and semi-public space outdoors and a qualitative upgrading of houses, courtyards and green structure (aesthetic densification).
Large-scale villa areas at a distance from the city core	Typical densification involves <i>subdivision</i> densification where large estates are divided in several and sold to new villa-owners. <i>Needed densification</i> includes <i>service densification</i> and <i>anti-segregation densification</i> where large-villa areas are supplemented with multi-family house areas, hosting lacking categories of residents.
Newer multi-family house areas (dense, low) at a distance from city centres	These are areas already quite dense, but where additional districts may increase the service foundation significantly. Typical densification strategies involve in-fill densification in quite few places where there is room for more houses, as well as <i>expansion and additions of new building blocks</i> . <i>Needed densification</i> is i.g. <i>service densification</i> – especially for adolescents and for better support of a fast public transit.
Smaller communities and towns outside cities	Smaller towns and communities have a need for all categories (Table 3) of densification. Typical densification involves new in-fill houses in the centre of the towns in order to increase the tax bases of the municipality or local town. <i>Needed densification</i> is among other categories <i>cultural densification</i> with the objectives of developing the community cohesion and sustainable function.

7 Current strategies refer to the typical densification for the townscape type and needed strategies are implied where densification would supplement a need also typical for the townscape type (Berg et al. 2012)

Further work and conclusions

So far in the research project, the focus has been on theoretical work. Empirical studies are currently carried out between autumn 2012 to spring 2013 in seven different townscape areas in three Swedish cities, to analyse the effects of actual densification projects. The study will investigate different phases of densification projects, denoted: *on-going or current densification areas*, *newly densified areas* and *established densification areas*. Residents, housing managers, small house associations and responsible planners will be interviewed. Another study being discussed is to investigate the possible distribution of functional densification in the wider landscape. This could be exemplified by the 'Smaller communities and towns outside cities' discussed in table 4 above. Granvik and Hedfors (2012 *submitted*) present a theoretical framework for urban-rural interactions, where transformation processes like densification, sprawl, development of neighbouring agglomerations, and regional hierarchies of city, town, village etc. are highlighted as factors changing the proportion of interaction between urban and rural areas. This put the discussion on densification in a wider landscape context than what has been discussed in this paper.

The research developed so far and presented in this paper is expected to contribute to a theoretical- and conceptual framework on densification with focus on the concept *functional densification*. The model of PEBOSCA and the mindset of functional densification are all intended to contribute with knowledge in the present discourse on densification for sustainable urban and rural areas. We invite researchers, practitioners and others to contribute to the further development of such a theoretical framework.

Acknowledgement

The research discussed in this paper is financed by *the Swedish* The Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas). The research project will end in 2014.

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