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## Benchmarking integrated infrastructure planning across Europe – moving forward to vital infrastructure networks and urban regions

Jos Arts <sup>a, b, \*</sup>, Tertius Hanekamp <sup>c</sup>, Raymond Linssen <sup>a</sup> and Jasper Snippe <sup>a</sup>

<sup>a</sup>Ministry Infrastructure & Environment Rijkswaterstaat – Water, Transport & Environment, The Netherlands

<sup>b</sup>University of Groningen, Department of Spatial Planning & Environment, The Netherlands

<sup>c</sup>Temah Consultancy, Utrecht, The Netherlands

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### Abstract

Achieving a smart green and integrated transport system is key to sustaining and developing the economic, social and environmental vitality of urban Europe. Within this context the challenge is to deliver the next generation of infrastructure governance, design, management and operation that enables optimal accessibility, liveability and vitality across the various scales: from the local daily urban system to the wider EU-regions that cluster metropolitan areas. To tackle this challenge, a research programme has been developed for EU's Horizon 2020 – *Networking for Urban Vitality (NUVit)* – that focuses on the integration of the planning of multi-modal transport infrastructure with land-use planning. This paper discusses best practices amongst Europe of such integrated infrastructure planning – including cases from The Netherlands, Sweden, Estonia, Belgium. On basis of a benchmark we do an analysis addressing such issues as: spatial concepts (multi-modal corridors, nodal development); multi-modal network optimisation at various spatial scales; life-cycle issues; value creation and capturing; and, institutional and governance approaches. The paper ends by exploring the main elements of an integrated infrastructure planning approach that enables us to move forward to innovative, vital infrastructure networks and urban regions of tomorrow.

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\* Corresponding author. *Tel.*: +31-6-53748103.

*E-mail address*: [jos.arts@rws.nl](mailto:jos.arts@rws.nl) or [e.j.m.m.arts@rug.nl](mailto:e.j.m.m.arts@rug.nl)

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## 1. Introduction: the challenge of integrated infrastructure planning

Today's investments in the physical environment, in particular in infrastructure and mobility, are a main driver for urban economic and environmental vitality of tomorrow's urban areas. Achieving a smart green and integrated transport system is key to sustaining and developing the economic, social and environmental vitality of urban Europe. At the same time, transport infrastructure authorities across Europe face ever-tougher challenges to accommodate increased traffic while dealing with climate change and delivering environmental and societal objectives. This requires a shift from current small-scaled – *ad hoc, technical solution driven* – planning approach towards a broad/network-scaled – *integrated, strategy driven* – planning approach. Within this context the *challenge* is to deliver the next generation of infrastructure and mobility governance, design, management and operation that would enable optimal accessibility, liveability, health, safety and security across the scales: from the local daily urban system to the wider EU-regions that cluster metropolitan areas. This challenge of consistency across different spatial scales is widespread across metropolitan regions in Europe. Deployment on a EU-regional scale should be centred on TEN-T clusters such as in the Benelux/Nordrhein-Westfalen – part of the economic centre of Europe, the so-called 'Blue Banana'. Fundamental in addressing this challenge is: 1) further optimisation of multimodal mobility of daily urban systems (DUS), which is only possible when the local peri-urban system and the long distance freight transport are taken into account; 2) considering TEN-T as a whole (corridors and their interlinks) for regions where the TEN-T network is highly clustered, interlinked with regional and local networks.

To tackle this challenge, a research programme has been developed for EU's Horizon 2020 – *Networking for Urban Vitality (NUVit)* – that focuses on innovations for the integration of planning of multi-modal transport infrastructure with land-use planning (see [www.nuvit.eu](http://www.nuvit.eu)). This enables synergetic integration of spatial development with investments in infrastructure (across all relevant scale levels: local, regional and corridor) in order to achieve the highest added (asset) value. Best practices across Europe show that by implementing this integrated NUVit approach significant benefits can be achieved in accelerating infrastructure delivery, environmental and spatial quality, investment climate, mobility network resilience and stakeholder commitment (see Arts et al. 2014a,b).

This paper builds on the results of the NUVit-programme. It aims to explore the main elements of an integrated infrastructure planning approach that enables us to move forward to vital infrastructure networks and urban regions. To this end, the paper will discuss best practices amongst Europe of such integrated infrastructure planning – this includes cases from e.g. The Netherlands, Sweden, Estonia and Belgium. On basis of this benchmark we will do an analysis addressing such issues as: spatial concepts (e.g. multi-modal corridors, nodal development, transit oriented development), multi-modal network optimisation at various spatial scales, life-cycle issues, combined value creation and capturing, and institutional and governance approaches. The paper ends by exploring the main elements of an integrated planning approach for moving forward to vital infrastructure networks and urban regions.

## 2. Conceptualizing vitality of networks and regions

Integration of land-use planning and transport planning is crucial for more resilient and sustainable planning outcomes as is discussed in academic literature as well as recent policy documents in various countries (see for a detailed discussion Arts et al. 2014a). However, such integration is scarcely present in practice as has been discussed by various authors (Te Brömmelstroet & Bertolini 2009, Heeres et al. 2012a,b). Planning and realisation of transport infrastructure and spatial planning have been separate worlds ('silos') with specific planning systems that contained own specific planning legislation, sectoral policy frameworks regarding different levels of government, own funding mechanisms as well as a specific planning agencies. In infrastructure planning, government agencies – usually responsible for only a certain infrastructure mode: road, water, rail, etc. – develop often projects with limited scope (Arts 2007, Banister 2005). They focus on solving a bottleneck, applying a minimalistic approach oriented on formal requirements for public consultation, implementing expensive end-of-pipe mitigation measures. Similarly, spatial planning authorities pay all too often little attention to the mobility effects of their development plans (see Arts et al. 2014a). The integration of transport infrastructure and land-use planning is seen as an essential element of a more inclusive, sustainable transport planning (Arts 2007, Banister 2008, Cervero 2009, Van Wee et al. 2013).

Transport and land use planning sectors can have considerable impact on each other by as explained by the so-called 'Land-Use Transport Feedback' cycle (Wegener & Fürst 2004). The transport system affects a region's

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