

# **Corridors and/or linear cities; a historic contribution to the contemporary discussion on corridor development**

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## **Abstract**

In the Netherlands, at the end of the 1990's, the concept of 'planned corridor-development' appeared to become one of the leading concepts in spatial planning. In the discussions and documents preliminary to the national planning document 'Vijfde Nota Ruimtelijke Ordening' (Fifth National Policy Document on Spatial Planning, VROM, 2001) corridor-development (spatial and urban development along de lines and nodes of main infrastructures within multipolar urban networks) was considered as an inevitable form of spatial development and as part the development of network cities. Corridor development was considered as something that occurs relatively unplanned due to spatial-economic forces and that should be developed by active planning in order to control and improve it. When the actual report on spatial planning was finished in 2001-2002, the concept of (planned) corridor development however had vanished from the document.

One of the reasons for the vulnerability and eventually the abandonment of the concept of *planned* corridor-development was the lack of a clear definition and (thereby) the inability to develop a adequate visualisation of the concept on different scale levels. Another important reason was the desire of spatial planners to persist on the familiar 'compact city' concept; the idea of compact cities in an open landscape.

To overcome the lack of definition and visualisation in discussions and publications on corridor-development often is referred to concepts and designs for linear cities; either to support or reject corridor-development.

In the 1960's corridor-development gained influence in spatial theory and praxis by researchers like George R. Collins, C.F.J. Whebell and Constantinos Doxiadis. These researchers wrote from different points of view and different disciplines (architectural history, geography and urban planning/design) about linear cities and corridor development and the relations between the two. Linear cities and/or corridor development in these studies was already considered as part of an increasingly mobile society and as an addition to earlier theories on urban networks (for example central place theory).

Since the late 1960's new ideas on spatial planning and design have emerged; a cultural shift from modernism to postmodernism and a economic/technological shift from fordism towards postfordism and postindustrialism can be noticed. This shift is connected with an increase of mobility, flexibility and need for space, connectivity and visibility together with a decentralisation and withdrawal of government influence; ingredients for contemporary (unplanned) corridor development.

This paper aims to investigate the possible relations between recent theories and spatial policy concerning corridor development and those from Collins, Whebell and Doxiadis and (thereby) between theories on corridor development and concepts/designs for linear cities in order to research the validity and possible contribution of reference to those sources in contemporary discussions on corridor-development.

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## Discussion on 'Corridor Development' in the Netherlands

In 1999 the Dutch spatial planning documents 'Corridors in balans' (Corridors in balance) (VROMraad, 1999) and 'Startnota; de ruimte van Nederland' (Starting document; the space of the Netherlands) (VROM, 1999)- the document preliminary to the 'Vijfde Nota Ruimtelijke Ordening' (Fifth National Policy Document on Spatial Planning) (VROM, 2001) - propagated 'planned corridor development' as future concept for spatial planning in the Netherlands.

Initially the corridor-concept entered the Dutch spatial planning discussion as 'transport-corridor' and was promoted by the Dutch employers organisations (NEI, 1994). The concept of 'transport-corridors' focussed on the bundling of infrastructure and related commercial activities in the transportation sector but also for offices, research & development and production sites. This idea can also be found in a part of the definition of corridors in the 'Starting document'; "*bundles of road, rail and where possible water and pipe infrastructures,*

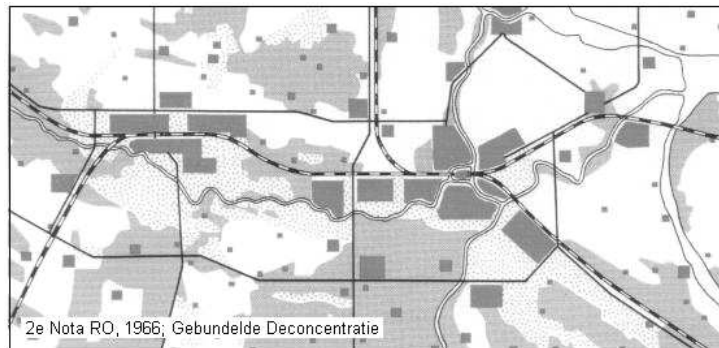
*connected by so-called multimodal change and transshipment locations” (VROM, 1999, p.42, authors translation).*

The recognition of actual ‘unplanned’ corridor development that includes space for other functions than transport resulted in a notion of the corridor as potential urbanisation concept and broadening of the definition. The corridor in the ‘Startnota’ thereby became defined as *“an urban development axis, constructed along infrastructure, composed of (existing) urban centres in combination with building zones in suburban densities between those centres, intended for companies, services and dwellers.”* (VROM, 1999, p.41, authors translation). This first part of the definition is followed by a slightly cryptic second part: *“Corridors are intended to meet the urgent need for settlement-space of households and companies and thereby form a realizable integration-framework for the bundling of deconcentrating urban space-use”* (startnota, p.41, authors translation).

This *“bundling of deconcentrating urban space-use”* refers to the earlier Dutch spatial planning concept of ‘bundled deconcentration’ which was presented in the Second National Report on Spatial Planning (VRO, 1966). In this report of 1966 a breach was presented between

the ideal of concentrated urbanism and the actual suburbanisation that took place. The concept of a ‘bundled deconcentration’ of urban development was presented to meet the anticipated population growth and to concentrate suburbanisation in appointed

agglomerations along main infrastructures.



1. VRO, 1966. Bundled deconcentration

The ‘Starting document’ of 1999 regards corridor development as actual and inevitable spatial phenomenon; *“The necessity of corridor development mainly presents itself along the large-scale connections of the leading urban centres in the West of the Netherlands towards similar centres abroad; the Ruhr Area and the Flemish triangle and North-France.”* (Startnota, 1999, p.41, authors translation) and recognizes it as part of the emerging network-city in which the *“nodes and corridors are associated”* (Startnota, 1999, p.41, authors translation)

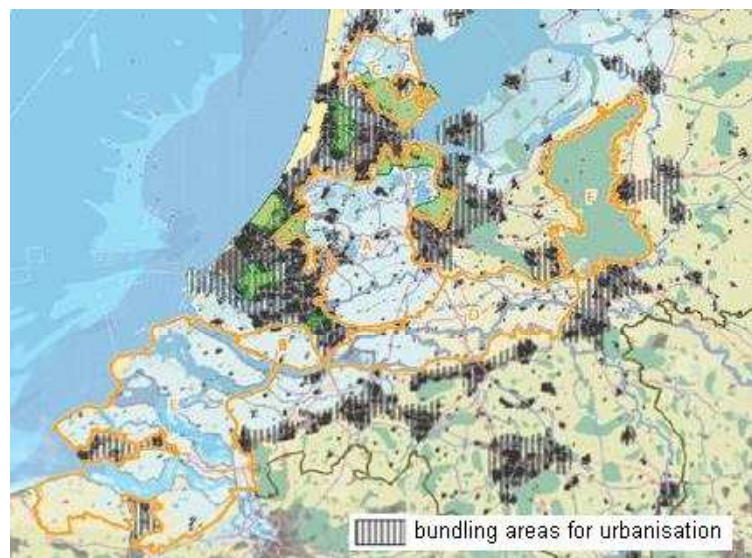
The ‘Starting document’ favoured the concept of planned corridor-development *“as ordering principle, as deliberately chosen support of spatial development”* (Startnota, 1999, p.41, authors translation) by stating that *“clearly confined corridors, situated along the infrastructure connecting the cities around the green heart, can offer indispensable suburban growth possibilities”* (Startnota, p.39, authors translation).

The Startnota embraced the ‘planned corridor’ as reaction to the actual unplanned corridor-development and urban sprawl. The Confederation of Netherlands Industry and Employers (VNO-NCW) actively supported the idea of planned corridor development. Planned corridor development became incorporated in several regional plans. Nevertheless the concept could not gain political support on the national (and in some cases the regional level) and was confronted with criticism by researchers and professionals from the field of spatial planning and urban design (a.o. Priemus, Zonneveld, 2003). Besides fear for undermining the economic position of existing urban centres (Zonneveld & Verwest, 2005, p.187) there also was a fear for a presumed continuous zone of buildings along infrastructures resulting in a reduced articulation of the landscape and not fitting in the traditional city versus countryside

thinking (L. van Duinen, 2004). The strong and romanticized image of the 'compact city' surrounded by a green countryside prevailed above the unclear defined and schematic visualised concept of the corridor (o.a. Boomkens, 1999).

By the time the Fifth National Policy Document on Spatial Planning was finished the concept of planned corridor development was abandoned and replaced by the re-introduction of the 'compact city' incorporated in the concept of the 'network city' (of which the corridor was earlier recognised to be a part of). In this new 'compact city' concept settlements could only expand within boundaries (so called 'red contours') which would be drawn around them. The contra-mould of these urbanised 'red contours' should be formed by 'green contours' of protected nature and countryside. At the same time a rather ambiguous and euphemistic corridor-concept was introduced with the (re)use of the concept of bundling of infrastructure and urbanisation in 'bundling areas' (VROM, 2001, p.4), echoing the Second National Policy Document on Spatial Planning of 1966.

Due to change of government the Fifth Report was -though published- never validated. In march 2004 the new Dutch government has published its own version of a national report on spatial planning; the Nota Ruimte (English version; National Spatial Strategy, VROM, 2004). In this new report the attitude towards corridor development, as found in the *Fifth National Policy Document on Spatial Planning*, has not changed and again a rather undefined and indistinct concept and visualisation of 'bundling' of infrastructure and urbanisation in urban networks is proclaimed.



2. VROM, 2001. Bundling areas for urbanisation (fragment)

The discussion about planned corridor development in the second half of the 1990's turned out to be a rather unstructured stakeholders-discussion which failed a clear definition and visualisation. Definition turned out to be problematic because three concepts (the corridor as urban development axis, the corridor as infrastructural axis, the corridor as economic development axis) were (conf)used in the discussion and accordingly visualisation turned out to be problematic because it showed mainly lines/arrows on large scale maps which were not elaborated on smaller scale levels, abstract schemes or what was not meant. This left room for criticism based on resistance against the presumed ribbon-development on the one hand and speculation on linear cities on the other hand.



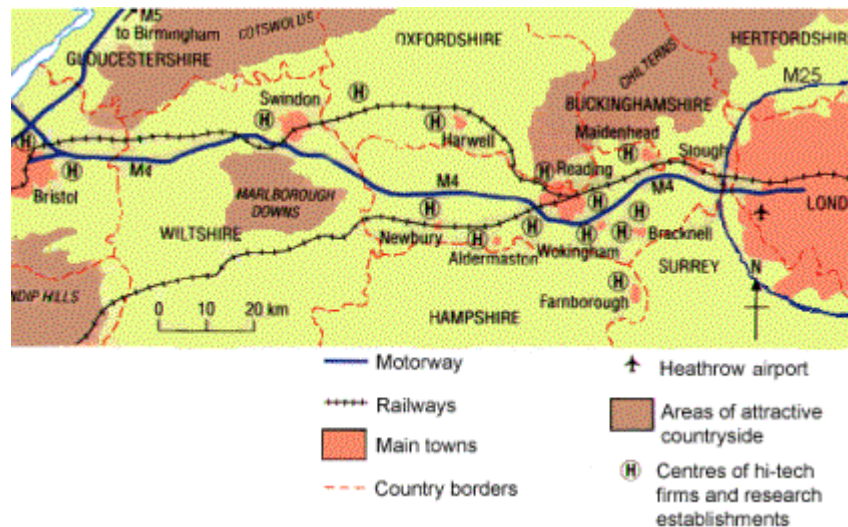
3. VROM, 1999. Principles for the organisation of corridors

The concept of corridor development entered the discussion on spatial planning in the Netherlands at the end of the 1990's, but it is neither an exclusively Dutch nor a contemporary concept.

### International context

Corridor development is not just a Dutch concept. In Europe for example the United Kingdom and Germany know forms of planned corridor development as part of their spatial planning strategies. The corridor here encounters the same problems as in the Netherlands; confusion and discussion whether to regard the corridor as urban development axis, as infrastructural axis or as economic development axis, also the idea of corridor development is not accepted or recognized by every scale-level and a lack of clear visualisation on different scale levels can be noted.

A known corridor in the UK is the M4 corridor between London and Bristol. This is a relatively unplanned corridor with a concentration of companies and institutes focussing on micro-electronics, ICT, commercial services and (military) R&D. This corridor is studied in the 1980's (a.o. by P. Hall, 1987) because at that time the corridor generated economic growth while the rest of the UK encountered recession. Attempts to spread this growth failed. Peter Hall traces the origin of the corridor back to the end of the 19th century when laboratories and providing and technological companies in the western part of London started to expand and move westwards in search for expansion space. An important factor for growth in the corridor has been the post WWII policy to spread military research and production west of London. In the years following, these military R&D centres generated all kinds of commercial offspring and attracted other companies, resulting in development and consolidation of the corridor. Remarkable of this corridor is the fact that the road and rail infrastructures have not initiated the development of the corridor, but on the contrary have followed the development; construction and improvement of the M4 motorway and the high-speed train connection with London met the demand for mobility in the corridor and resulted in a still continuing intensification of the corridor.



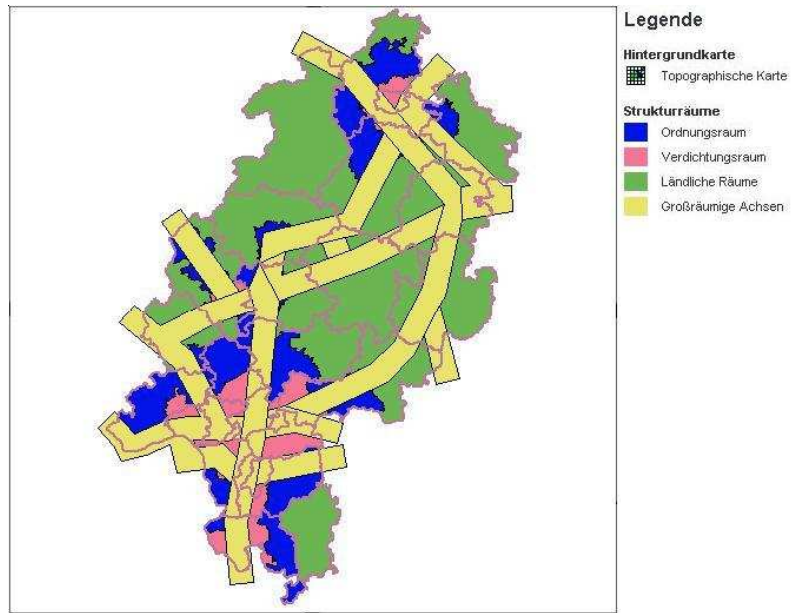
4. M4 corridor

In Germany corridor development is a known but contested instrument in spatial planning; mainly on the level of the counties (länder) of the BRD. One example is the spatial planning in the county of Hessen, including the Frankfurt Rhein-Main Region. Morphological maps of different periods in the development of the Frankfurt Rhein-Main Region show an intensification of urban and economic development in a linear zone along the east-west orientated infrastructure (river, rail and highways) and along the different lines towards the south. This intensification mainly started with the industrialisation of the region and the construction of the first railroads. The region, especially Frankfurt, also has a long history of trade and commercial services; a position that the region has managed to consolidate. Remarkable of the controversy in spatial plans made for the region is that on the high scale level (county) and low scale level (some municipalities) planned corridors (so called Siedlungsachsen or Entwicklungsachsen) are explicitly part of the spatial planning,

while on the middle scale levels of regional planning the corridors are not acknowledged and even contested.

### Historical context

At the end of the 1950's and during the 1960's and 1970's the idea of corridor-development, both planned and unplanned, was actively studied and discussed among spatial planners, designers and scientists (e.g. by C.F.G. Whebell, George R. Collins, C. Doxiadis). Many of these practitioners and scholars also encountered the difficulty of visualising the dynamics of corridors and often referred to (earlier) schemes and designs of linear cities. As further on in this article will be described, already in this period there was discussion about the interchangeability of corridor and linear city concepts.



4. Landesentwicklungsplan (county development plan) Hessen, 2000

A study on both the definition and visualisation of corridors and its reference to linear cities in this time-period may contribute to the current rather confused discussion on corridor-development and urban networks. These designs/concepts/studies show early examples of thinking in processes or development instead of blueprint-design. They recognise the importance and formative character of mobility and modern infrastructure for urban development; not only regarding accessibility but also visibility, mobility culture, mobility aesthetics, new ways of urban concentration instead of sprawl etc. They often are based on a combination of city and countryside.

Three spatial designers and/or researchers; George R. Collins (art- and architecture historian), C.F.J. Whebell (geographer) and C. Doxiadis (architect/urban designer) who were actively involved in the discussion on corridor development during the 1960's are discussed here. Each of them has published, from their different points of view and different disciplines, on the subject of corridor development and has more or less directly related this to concepts and designs for linear cities.

### George R. Collins (architectural historian)

The contemporary art- and architecture historian George R. Collins wrote a series of articles on linear planning in the late 1950's and the 1960's. Collins wrote his articles in response to the rising popularity of the concepts for linear cities in those days, the actual unplanned linear urban growth he noticed and the lack of research on both subjects. In his articles Collins states on the one hand that linear growth has been *"the natural pattern of growth of our great urban regions"* (Collins, 1968) and on the other hand that architects and urban designers over the last decades have been developing concepts and designs to meet this natural tendency towards linear urban development.

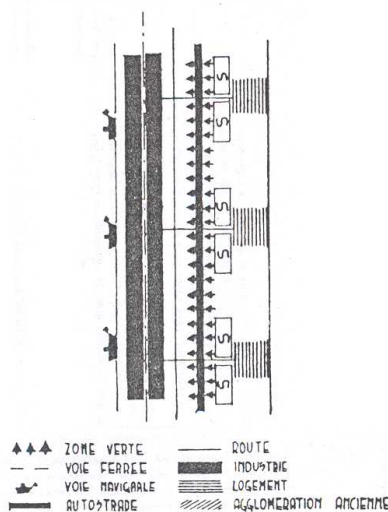
Collins emphasises the existence of linear settlements in history, due to topographical or ecological circumstances but he describes the actual 'linear plan' as *"very much a modern idea"* (Collins, 1968, p3), related to the transportation revolution and the search for efficiency



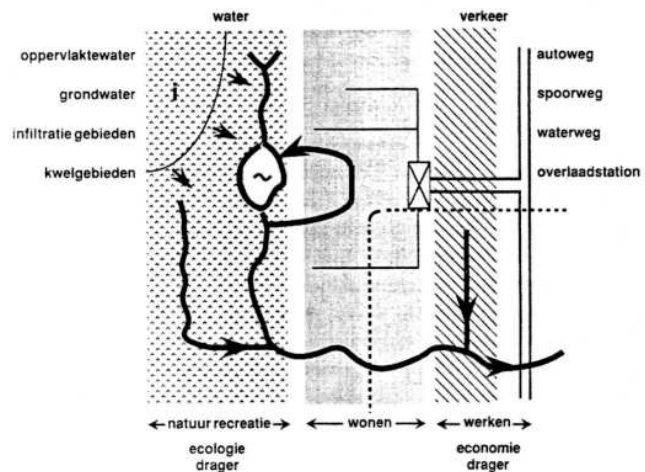
linear decentralization etc.) and moreover tries to bring together two types of presenting linear plans; the scheme (like e.g. the schemes of N. Miljutin (image 5) or R. Soetewey for linear cities and the blueprint (like the blueprint-plans of R. Neutra, R. Malcolmson (image 6) or K. Tange).

Though balancing between these two types through classifying and describing various types of linear city designs and concepts Collins acknowledges that linear planning is 'regional planning' and not 'city building'; it is the system or process that prevails. Collins states that "[i]n the linear plans ... it should be kept in mind that, regardless of the artists' renderings by which they may on occasion be presented, linear planning is primarily a schema, a process, a system, and not a physical or architectural actuality" (Collins, 1968, p.2).

Especially the scheme for the linear city Tractorstoi by N. Miljutin (1930) has proven to be a strong and inspiring one; a paradigm for linear zoned planning. It not only inspired coevals of Miljutin like the Belgian urban planner R. Soetewey but also contemporary urban planning. The 'strategy of two networks' e.g. (in which land- and water infrastructure is considered as formative for spatial development) developed by the former Dutch Spatial Planning Service (RPD, 1996) shows similarities; space is divided in different zones (following the modernist quartet) recreation (park & water), housing, working and infrastructure, or as Tjallingii puts it; from clean and quiet to polluted and crowded (S.P. Tjallingii, 1996). Both Miljutins, Soetewey's and the RPD's scheme show a sequence of zones with water, nature/recreation, housing, commercial (industry, offices etc.) and heavy infrastructure.

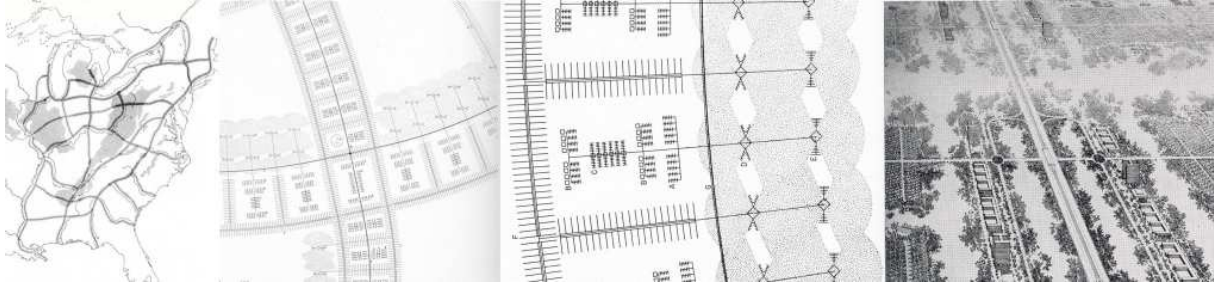


8. R. Soetewey, 1935. Scheme for a linear industrial region in Belgium



9. RPD/Tjallingii, 1996. Dual network strategy.

One of the architects/urban designers that seems to be able to combine both; a scheme for linear development over time and a clear visualisation of how this city/urban development may look and function, is Ludwig Hilberseimer. Hilberseimer is studied by George R. Collins as well as by the, later in this article discussed, geographer C.F.J. Whebell. Collins links the zonal linear plans of Hilberseimer a.o. to the schemes of Miljutin (Collins, 1968, p.19)



10. L. Hilbersheimer, 1955. Linear urban development on different scale levels.

Despite all the examples of linear city plans that Collins collected and described, he recognizes that the concept of linear planning never gained broad popularity but concurrently appears as a natural pattern of urban growth; *“Although the linear planning of cities has never won popular support among professional planners, it has, paradoxically enough, been the natural pattern of growth of our great urban regions.”* (Collins, 1960, p.345) Collins concludes that *“... linear growth receives acceptance as a fact, but not as a theory”* (Collins, 1960, p.345). A similar conclusion can be drawn 40 years later from the Dutch corridor discussion in which the existence and emergence of *unplanned* corridor development was acknowledged but the following attempts to develop concepts and a spatial policy for *planned* corridor development could not gain enough support.

#### **C.F. Whebell** (geographer)

In 1969 the geographer C.F. Whebell published a study about corridor development in the *Annals of the Association of American Geographers*. In this article Whebell develops a theory about corridor development and presents a case study on the Canadian province of Ontario. Whebell defines the corridor – influenced by the architect/urban designer Ludwig Hilberseimer - as *“a linear system of urban places together with the linking surface transport media”* (Whebell, 1969, p.1) and as *“a linear pattern of major towns joined by highly developed “bundles” of transport routes.”* (Whebell, 1969, p.4). Analogue to Collins who claimed that linear planning has been the natural pattern of growth of urban regions also Whebell recognizes the corridor as *“very persistent historically...”* (Whebell, 1969, p.1).

In his article Whebell mainly focuses on geographical assets and economic forces resulting in corridor development and less on the actual planning aspects. Corridor development is regarded by Whebell as a development both subject to economic development as well as a condition for economic development.

The architectural historian George R. Collins focussed in his publications concerning linear planning mainly on describing the different concepts and designs for linear planning. Even though Collins emphasises that linear planning should be seen as a process, he mainly shows a variety of renderings of blueprint linear plans and of linear scheme’s or concepts that can only develop in one fashion. Whebell on the other hand deliberately and explicitly includes, besides space, the dimension of time in his theory (Whebell, 1969, p.1), and describes corridor development as an *evolutionary process*.

Where for Collins efficiency and expenditure are the key characteristics for linear planning, Whebell emphasises the relation between trade and location for the development and structure of urban systems. (Whebell, 1969, p.2)

Whebell starts his article on corridor development with a critique on the work of Walter Christaller a.o. from the 1930’s on the ‘central place theory’ (e.g. W. Christaller, 1933, Lösch, 1954). The central place theory tried to explain how cities and towns develop hierarchies of

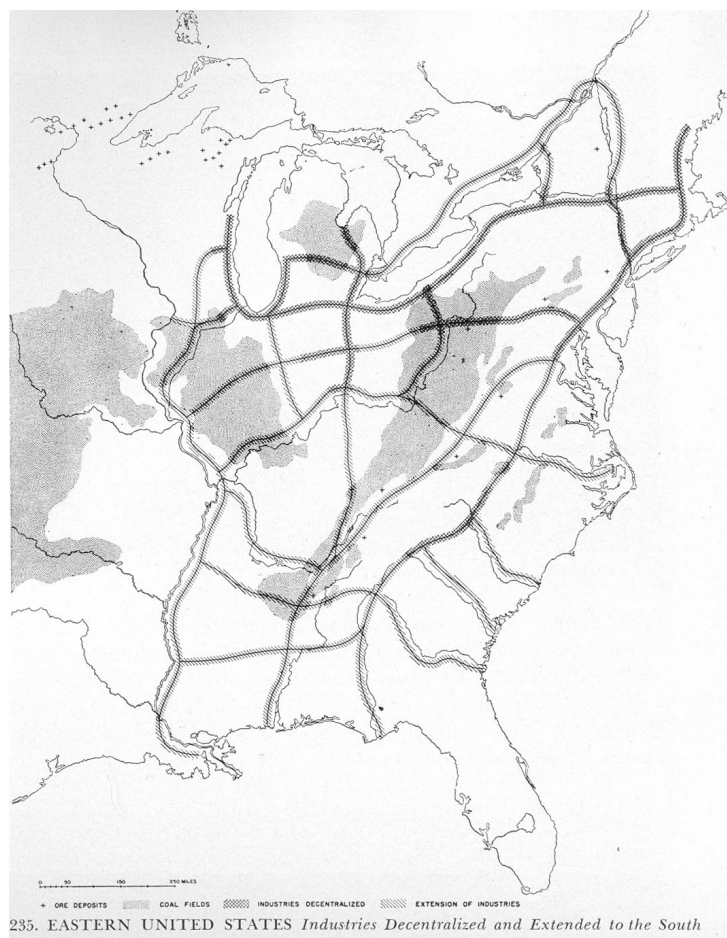
economic activity from the population size and the distance inhabitants are prepared to travel for goods and services. The model in 'central place theory' is based on geometric shapes, such as hexagons and triangles. A 'central place' is a settlement or a nodal point that serves the area around with goods and services.

George R. Collins noticed a latent linearity in the 'central place theory', due to transportation between places (Collins, 1968, p.26). Whebell is more explicit in his critique. Whebell feels an "intuitive dissatisfaction with the landscape models of Christaller and his successors ..." (Whebell, 1969, p.1). Whebell based his critique concerning Christaller's 'central place theory' on the lack of attention for locational differences and the assumption of even distribution of raw materials, agricultural population, industries etc. (Whebell, 1969, p.2). Whebell also quotes several arguments against the central place theory introduced by others, like; the influence of trade on locations (W. Isard), irregularity (R. Barlowe), lineation (C.D. Harris) and adds that "Christaller himself might well have been led to the notion of corridors had he pursued his 'traffic principle' further..." (Whebell, 1969, p.2).

Whebell's corridor-theory describes an evolutionary system of urban development based on the differences between locations; geological, economical, infrastructural, cultural etc. and the accumulation of wealth and technological means in the successful locations; resulting in a hierarchical system of more or less urbanized and advanced corridors instead of central places. Whebell refers to the research-by-design of linear urban systems by Ludwig Hilbersheimer as a model for planned corridor development (Whebell, 1969, p.1; reference to Hilbersheimer, 1955, p.261). Collins also made reference to the concepts and designs from Hilbersheimer, focussing on the morphological aspects of zoning, infrastructure, orientation, adaptability etc.

The importance Whebell attaches to locational differences also appears in three postulates, which he derives from his corridor hypothesis. These postulates are based on (1) geographical differences in "physical surface" and "land factors of production", or shortly; differences in attractiveness for settlement, (2) geographical differences in state of technology and (3) human development; based on trial and error and following the principle of least effort. Whebell connects this third postulate to "the 'inertia' of fixed capital and socio-economic structure." (Whebell, 1969, p.2).

From these postulates Whebell derives; that some locations prevail as settlement location, that movement and spatial development between settlements will follow the most convenient

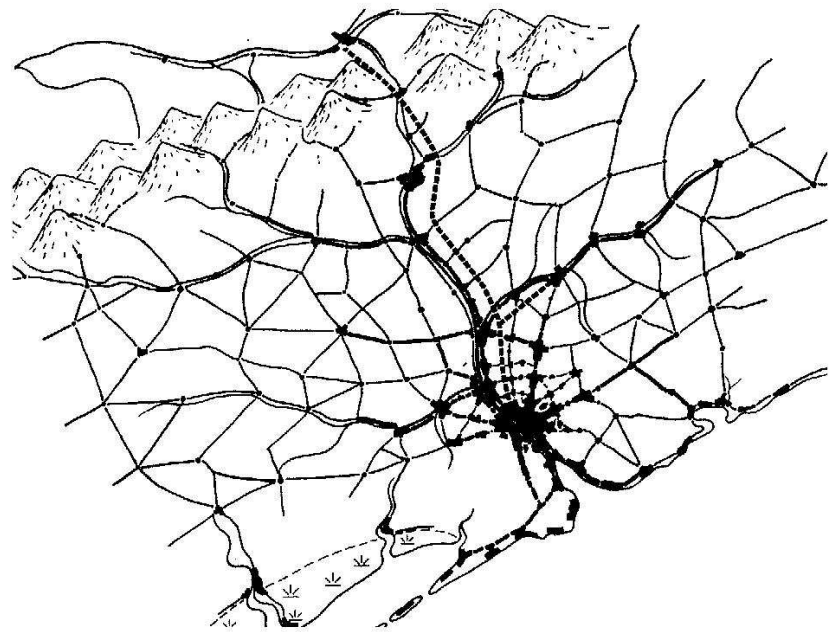


11. L. Hilbersheimer, 1955. Corridor development in the eastern US

route (fast, save etc.) and that (technological) knowledge and trade will spread by these routes. Whebell hereby describes a 'space of flows' (Manuel Castells, 1996) avant la lettre.

Taking into consideration the postmodernisation of production in which production has become more and more spatially unfixed (a.o. Castells, 1996, Harvey, 2000, Hardt/Negri, 2000) a critique on these postulates can be given. Instead of the 'land factors of production' factors like accessibility, visibility, image and facilities of a place or the (lack of) environmental laws, minimum wages, and tax-rates have become the dominant factors for settlement and development. Moreover the (importance of) geographical differences in state of technology and human development have shrunken due to ICT, flexibilisation and increase of mobility of people, production and technology.

Locational assets in postmodern hypermobile society still play an important role in case of e.g. harbours and concerning the proximity of historical/cultural and ecological/recreational sites, but the potential of locations becomes increasingly determined by the position in networks. Locations that combine both a privileged position in the urban and global (economic) network and posses the former mentioned assets, such as Frankfurt A.M. and London, tend to develop as 'cities of control' (Sassen, 1991, Hardt & Negri, 2001).



12. C.F.J. Whebell, 1969. Corridor development, stage five; Metropolitanism

The notion of development of (urban) networks and development of dominant nodes in this network can already be found in Whebell's exemplary diagrams for evolutionary corridor development. Despite a postmodern change of variables Whebell's 'evolutionary system of urban development' still seem to apply, as e.g. is shown by Castells and Hall (1994) concerning the cumulative effects of innovation, infrastructure and economic development of western London and its M4 Corridor towards Bristol.

### **C. Doxiadis** (architect & urban designer)

The third researcher on linear urban development discussed in this article is the Greek architect and urban designer Constantinos Doxiadis. While Collins as an architectural historian focussed on systems and morphology and Whebell as geographer focussed on spatial/urban transformations and development due to economic forces, perhaps the architect/urban designer can make a syntheses of these two points of view.

Doxiadis recognized a transformation and increasing complexity of the pre-industrial model of the city (which was based on pedestrian speed and distance) due to the introduction of new modes of transportation. These new transportation modi multiplied the historical measure of pedestrian speed (6 km/hr) by a factor 20 (cars) or even a factor 60 (high speed

train). The city thereby changed from a pedestrian speed/axiradius system into an urban system of multiple speeds and axiradia.

*“When man began using mechanical transportation the one-speed pedestrian city of the past changed into a two-, three- and four-speed-system”. “From this it follows that, where in the past there were isolated settlements, there now are complex systems of transportation leading to very complex urban settlements...”* (Doxiadis, 1963, vol.3, p.117)

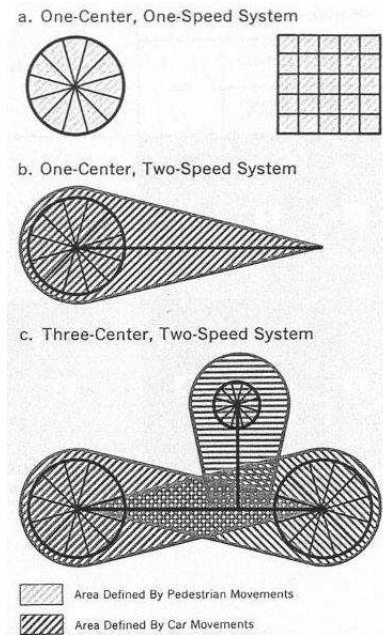
The diagrammes for urban development that Doxiadis shows are for example comet-shaped in case of an infrastructural development in one direction or star-shaped in case of infrastructural development in more directions (a.o. Doxiadis, 1963). Doxiades asserts that many ‘Ekistics’ (settlements) are a combination of hexagonal (compare Christaller) and dynamic (due to

new transportation technologies) systems. This notion of a combination of hexagonal ‘central place theory’-like development and dynamic systems can also be found in Whebell’s earlier mentioned critique on Christaller. The combination between hexagonal and dynamic systems is according to Doxiadis’ theory determined by historical, locational and evolutionary forces. Here as well a similarity with Whebell’s theory can be noted.

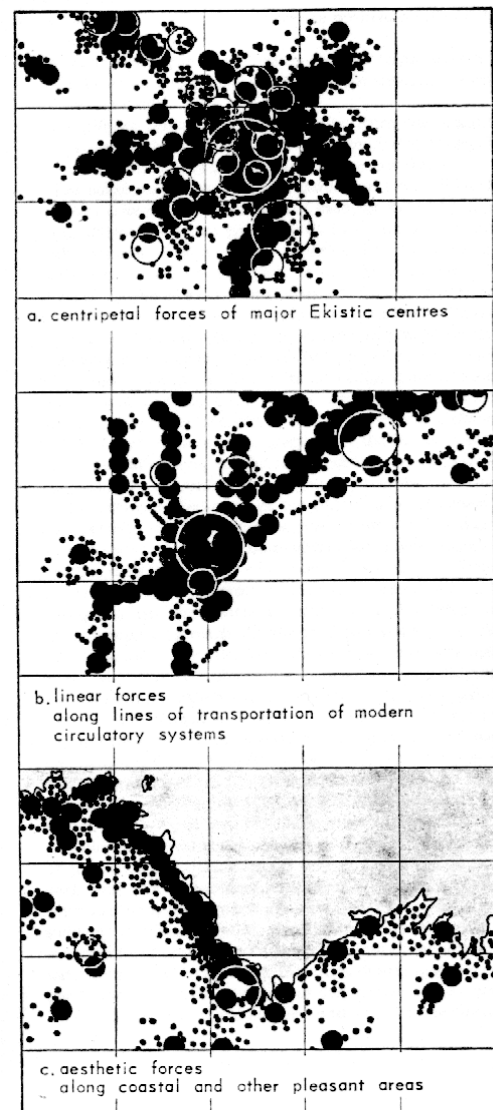
Doxiadis critique on central-place theory is clearly formulated in his article *Architecture in transition* (1963), in which reference is made to corridor development; *“There are people who prefer new small isolated cities instead of urban sprawl. An analysis of such a solution, however shows how unrealistic this is. Since the growing urban systems need to expand along main lines of transportation in order to operate as unified systems, groups of people cannot realistically be isolated as they will feel left out of the urban system. These people will ask why they have been taken away from the normal corridors of growth which help them maximize their potential contacts and minimize the energy they consume. They will resist this trend and this is why such isolated cities will not satisfy their inhabitants. They are neither desirable to man nor capable of succeeding and, therefore, are not a realistic solution.”* (Doxiadis, 1963, vol.3, p.177).

Doxiades distinguishes three main forces shaping this new dynamic urban system:

- A. Centripetal forces of existing settlements,
- B. Linear forces of modern transportation systems,
- C. Aesthetic forces of attractive locations.



13. C. Doxiadis, 1963. Increasing complexity of movements in urban systems



14. C. Doxiadis, 1963. The forces shaping the urban System

With regard to the linear forces he asserts that they: “[...] lead to the formation of linear parts of settlements; under certain conditions, this may lead to a linear form of the entire settlement for a certain length only, and after a certain period of time” (Doxiadis, *Ekistics, an introduction to the science of human settlements*, 1968, p311).

In the three diagrams that Doxiadis uses to illustrate these forces, linear urban systems are clearly distinguishable.

Diagram [a] shows linear urbanisation along (rail)roads between new and historic urban centres that (have) become important settlements, resulting in radial growth of cityregions. Diagram [b] shows linear- or transportation-forces also occurring on a larger scale than the city(region); at a national or supranational scale.

Diagram [c] shows the aesthetic forces (for example due to a scenic coastline) occurring both on the scale of the city(region) as well as on the larger scales.

Doxiadis recognises these forces that shape the dynamic urban system as distinguishable but often often inseparable;

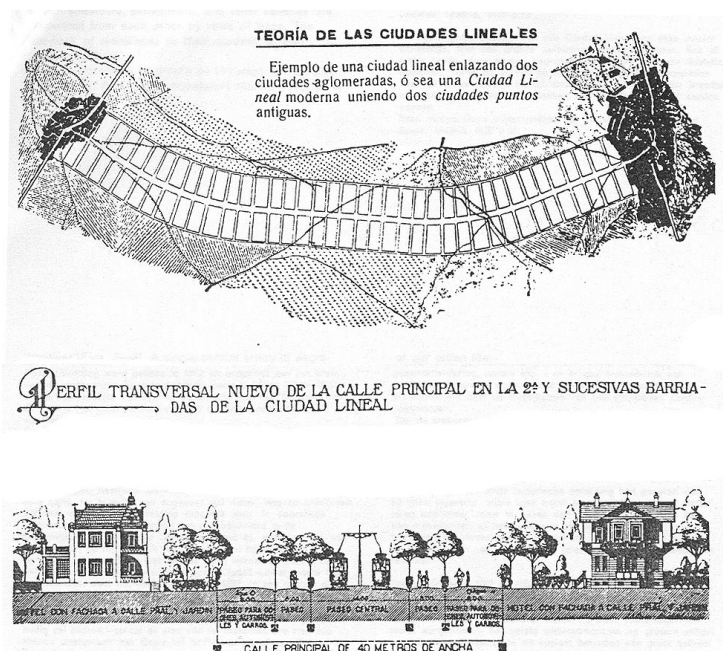
“The form of a settlement is determined by a combination of the central, linear and undetermined forces in adjustment to the landscape and in accordance with its positive and negative characteristics” (Doxiadis, *Ekistics*, 1968, p.311).

### Corridors and linear cities

For George R. Collins the ‘corridor’ and the ‘linear city’ are interchangeable concepts. Doxiadis on the other hand makes a clear distinction between the two: “Very generally urban systems will consist of major urban areas interconnected by urban corridors; but in speaking of corridors, it should be understood that these consist of urban concentrations interconnected into complex systems, and that they have nothing to do with the theoretical conception of linear cities.” (Doxiadis, 1963)

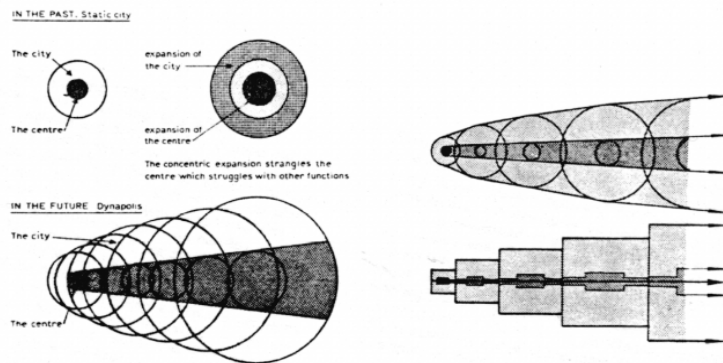
According to Collins, modern thought on linear planning starts with the designs for the ‘Ciudad Lineal’ (meaning ‘Linear City’) by Arturo Y Mata starting from 1882. Collins though is cautious of calling this an actual ‘linear city’ and speaks rather of ‘linear plan’ (Collins, 1968, p4-6). Doxiadis was more clear about this and states that Soria y Mata did not design a linear city but rather a “small scale corridor-like expansion of cities or connection of cities” (Doxiadis, 1967, p35). Doxiadis states that, however the plan is titled ‘Ciudad Lineal’, it is essentially a design for a limited extension of an existing city and that; “Soria was not thinking of cities but of parts of cities only, as well as of very long connections between distant cities. These parts of cities have no central function and therefore do not form cities.” (Doxiadis, 1967, p35).

The presence of a ‘central function’ is very persistent in Doxiadis’ view on the city and one of the main themes in his theories for (linear) urban planning and design.



15. A. Soria Y Mata, 1882. Ciudad Lineal

As can be concluded from Doxiadis' remarks on the Ciudad Lineal, he has a clear and rather strict definition of what should be considered a linear city and what not. From his article 'On linear Cities' (1967) can be derived that Doxiadis defines a linear city as a 'complete' and autonomous city of pure linearity. Soria's Ciudad Lineal was designed as a connection



16. C. Doxiadis, 1963. The static city of the past and the Dynapolis of the future

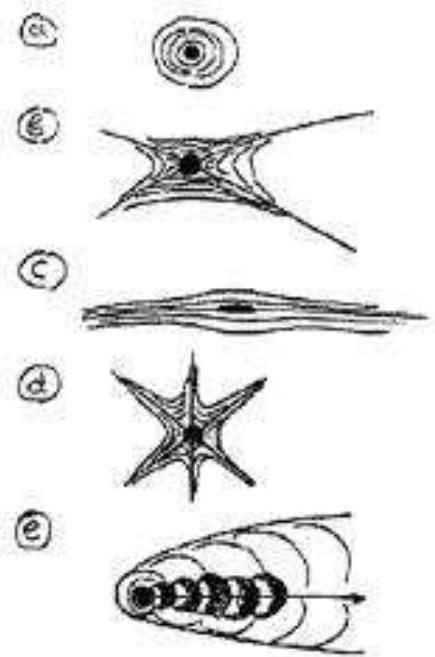
between cities and therefore according to Doxiadis not a city in itself. Pure linear urban development according to Doxiadis is impossible, because the surface of the earth is three-dimensional; "as long as we have forces in all directions of the surface of the earth we cannot have linear cities." (Doxiadis, 1967, p.36).

Doxiadis concludes that there can be linear elements of settlements but not linear cities and that there can be linear solutions for small areas where the forces in the same direction dominate the forces in other directions.

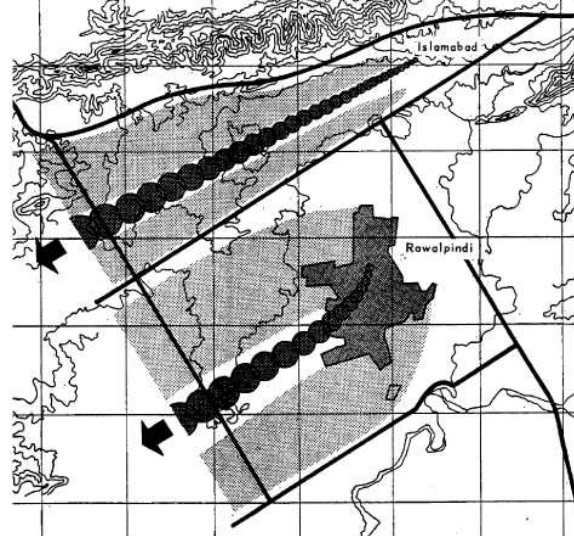
In his article 'On linear Cities' (1967) Doxiadis traces the link that is made between his work and linear cities to his concept of the parabolic 'ideal Dynapolis' (Doxiadis, 1967, p38). This ideal dynapolis with its 'moving metro-core' and its linear expansion is a.o. mentioned by Collins in his article on Linear Planning (Collins, 1968, p.12).

Doxiadis though makes a clear distinction between the 'linear city' and his 'dynamic city' and he claims that in contrast to his model of Dynapolis the linear city; can only exist for small areas, can be static, has the same dimensions and formation at every point along its axis and that it grows in both directions.

Doxiadis presents his dynapolis as an parabolic shaped [e] scheme; the development of the city is uni-directional and the city(centre) widens when it expands. Doxiadis claims that concentric growth [a], as well as linear [c] and radial (b&d) growth are not beneficial for a dynamically growing settlement because "it puts all pressures on the centre, which is strangled to death" (Doxiadis, 1965, p8).



17. C. Doxiadis, 1965. The formation.



18. C. Doxiadis, 1965. The metropolitan area of Islamabad

By using this model for urban growth Doxiadis claims on the one hand to create a city that serves both cars and people and on the other hand to facilitate both the preservation of

historic urban structures as well as new development of the city(centre). *“Instead of letting the centre grow all around where the most valuable land is, where there are the most narrow streets; let the centre grow in one direction towards the outskirts, towards the areas of less pressures and lesser resistance. Then the city will move around the new centre. Thus later we reach the outskirts and protect the area for the next phase of growth of the centre, not anymore within the city but out of it - in the areas of less or no resistance at all. Thus we can create a city which is four-dimensional, a parabolic city. This will be a dynamic city - Dynapolis.”* (C.A. Doxiadis, 1960, p.6)

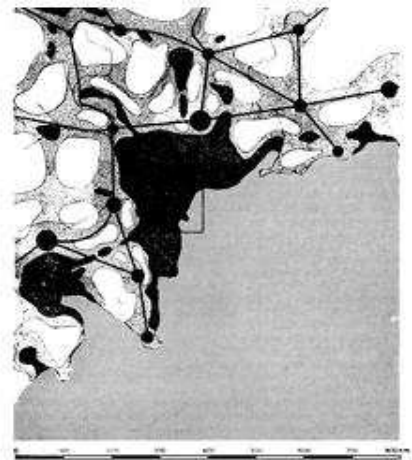
Doxiadis applied this dynapolis-theory halfway the 1960’s in his plans for Islamabad, the new-built capital of Pakistan and its twin-city Rawalpindi. The concept of the plan consists of two highways in south-west direction and two perpendicular highways connecting them. The resulting rectangle of highways formed the frame of the first stage of the masterplan. The plan for Islamabad actually consists of a plan for two cities; Islamabad as administrative capital and the nearby city of Rawalpindi as commercial and industrial centre. The cities, planned as dynamic –growing- cities, could develop in south-west direction with a synchronously growing linear centre and the parallel zones for housing and other functions. Both the centre and the adjacent zones were arranged in a grid structure and according to a strict hierarchy of functions, densities, income-groups, etc. (Doxiadis, 1965, p.1-28).

In his schemes and designs of the ‘dynapolis’ Doxiadis puts a lot of emphasis on the (proximity of the) city-centre. The citycentre he proposes however, is not a traditional citycentre but a spine-like central zone which is spread over the length of the, constantly expanding, dynamic city. Important in the model is that the main infrastructures are not concentrated in this spine-like citycentre but flank the periphery of the dynapolis.

The subject of the development and (re)location of urban centres is also studied by Doxiadis in another urban development concept; ‘Ecumenopolis’, the emerging network worldcity (Doxiadis, 1962, 1969, e.g.). Doxiadis warns that the accumulation of new wealth around the existing centres of cities will become their ‘death’ because the city ‘chokes’ due to growth of traffic and density.



Eucomenopolis as a 'Dying City'



Eucomenopolis as the 'City of Life'

19. C. Doxiadis, 1962. Eucomenopolis as 'Dying City' and as 'City of Life'

Restructuring of the city and its infrastructure according to doxiadis will only bring *“temporary relief followed immediately by a more acute outbreak of the same symptoms in another ring around the centre of the city”*. (C.A. Doxiadis, 1962) To overcome this Doxiadis suggests *“to create a new network of lines of transportation and communication which do not lead towards the centres of existing cities but rather towards completely new nodal points. Such a network with new nodal points will be adjusted to the needs*



20. VROM, 2001. Urban Networks (fragment)

*of a growing Ecumenopolis, and will relieve the centres of existing cities from pressures for which they were never meant and which they cannot stand.”* (Doxiadis, 1962).

This pleads for corridor development in which new settlements or extensions of existing cities emerge near infrastructural nodes in the network; there still is space, accessibility and visibility. Network concepts based on the idea of compact cities (e.g. urban networks described in VROM, 2001) on the other hand still tend to focus on the existing urban centres.

## **Conclusions and further elaboration**

### **Linear city or corridor**

As is shown by the work of Collins, Whebell and Doxiadis, there appear to be many similarities between the corridor and the linear city on an abstract level; the formation of urban networks, linear decentralisation, (supra)regional development, orientation on mobility, orientation on process and the combining of characteristics of ‘the city’ (mobility, culture, arousal, services) and ‘the countryside’ (recreation, rest, space, scenic beauty, romanticism).

The linear city-concept though, as described and inventoried by Collins, is mainly a modernist concept and can be regarded as urban/spatial expression of modernist (fordist) production, inspired by repetition, mass production, and the development of the train, highway and the assembly line. Analogue to this modernist paradigm at the basis of the concepts for linear cities is their rather blueprint like approach and visualisation. Besides the blueprint approach there is an approach based on scheme’s problematic is that these schemes are rarely made tangible.

The corridor on the other hand, as shown by Whebell and Doxiadis, can be regarded as an evolutionary and long-term concept for urban or regional development, taking into consideration technological and locational assets and changes.

The corridor can -though regarded by Collins, Whebell and Doxiadis as part of a historical urban pattern- be regarded as spatial expression of postmodern flexible production and decline of spatial fixation.

### **Critique on compact city and central-place**

A similarity that can be found in the theories of the three discussed urban designers/researchers is their critique on the reductionist spatial theories of central-place and compact city. As is shown in the diagrams used by the discussed designers/researchers an one-dimensional and conservative focus on the compact city is insufficient to accommodate urban development and growth of mobility. Central place and compact city approaches are regarded as too limited, incomplete or not fitting the contemporary urban condition and development. Geographical assets and the mobility of people, technology and goods resulted in urban networks shaped by both linear and nodal urban development. This connects to the Dutch discussion on corridors at the end of the 1990’s in which the corridor was presented as actual spatial development complementary to the existing urban nodes.

The notion of ‘choking’ of the city, as mentioned by Doxiadis and shown in his scheme of the ‘dying city’, can –in a less vitalistic terminology- also be found in the latest Dutch national report on spatial planning *Nota Ruimte* (English version; National Spatial Strategy, VROM,2004). In this report the compact city concept is said to be co-responsible for high density residential areas and the decline of inner-city greenspace. *“The quantity and quality of greenspace inside and around the city have declined considerably over the last decade. Partly due to the ‘compact city’ policy, much greenspace has disappeared. Sportsgrounds and communal gardens have been relocated to the fringes of the city, greenspace has been*

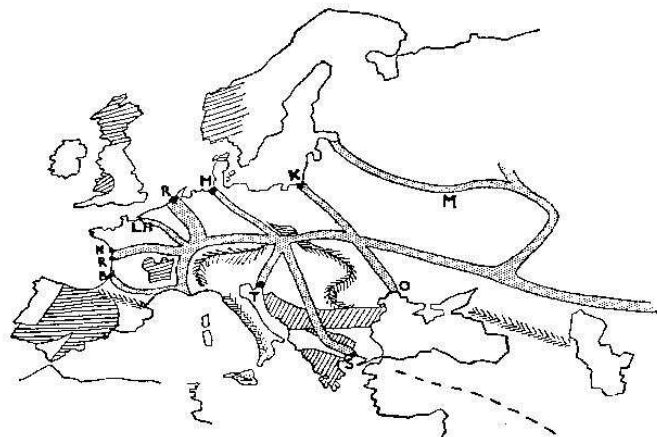
*built-on. Due to high landprices new neighbourhoods often have high densities and little greenspace.” (VROM, 2004, p.86, authors translation).*

## Evolution, growth and dynamics

Since Collins, Whebell and Doxiadis wrote their articles on linear urban development the mobility of goods, people, companies, money and data has grown considerably (e.g. M. Castells, 1996). ICT and innovations in transportation technology have resulted in flexibilisation of production and the decline of spatial fixation of both companies and people (e.g. M. Castells, 1996, Negri & Hardt, 2000). This postmodernisation of production (as Negri & Hardt call this phenomenon) results in the increasing importance of widespread urban networks and settlement along the lines and (new) nodes of this network in order to profit from a.o. the available space, mobility/accessibility and visibility from the (rail)road.

In the theories of both Whebell and Doxiadis the factor ‘time’ is explicitly part of their spatial/urban analysis and concepts. Due to innovations in ICT and transportation technology and the connected flexibility and mobility of people, goods, companies, data etc. the factor ‘time’ now has even become more important and volatile, even to the extend that is spoken about a ‘time-space compression’ (Harvey, 1990)). This notion of time-space compression has become more and more apparent due to contemporary technologies but is in fact already described by Karl Marx; *“While capital ...must strive to tear down every barrier...to exchange and conquer the whole earth for its markets, it strives on the other side to annihilate this space with time.”* (Marx, 1857, p. 538-539)

The increase of mobility and flexibility has resulted in a multidirectional spatial orientation. In urban planning and design the modernist paradigms of the (assembly-)line (e.g. Miljutins schemes for linear cities) and treestructure (e.g. Le Corbusier’s design for the European Road City) have been replaced by the postmodern paradigm of the network in which every place or position is potentially connected with every other. In this context the unidirectional development-model of Doxiadis’



21. Le Corbusier, 1942. European Road Cities

Dynapolis is untenable. Yet still movement over land is constricted to infrastructure

(cables, rails, roads), resulting in a concentration and development of functions along the main connections of networks and thereby in a hierarchical networks. The development of hierarchical urban networks meets Whebell’s evolutionary corridor theory.

## Position of the centre

As a result of the developments mentioned above a shift, spread and transformation of the (traditional) urban centres is notable, alongside the development of new types of centres.



Collins, Whebell and Doxiadis have shown several examples of concepts and schemes for corridor development consisting of both existing and new urban centres.

All three they show shifts of urban centres to new locations due to need for space and accessibility. These new centres develop outside or at the fringes of existing cities along highways and multimodal infrastructural nodes.

This movement has occurred for several decades now; companies, large shops and shopping-malls, residential areas etc. move out of the city or develop complementary to the city in search for space and the vicinity of infrastructure. Here a new urbanity emerges, dominated by mobility and accessibility, dominantly made possible by highways.

22. Urban development along Dutch highway A2, Zaltbommel

### Concept en visualisation

As described in this article, due to increasing mobility and flexibility a new aesthetic and a new urban landscape emerges. This new aesthetic and urban landscape is partly analysed by the above discussed urban/spatial designers and researchers from the 1960's. Since their studies the developing paradigm of the network (which can already be found in the studies of Collins and the concept of the Oecomenopolis of Doxiadis) has become more and more dominant. This paradigm is, however dominant in (Dutch) spatial planning, due to its relative novelty and the spatial dynamics it inherits still hard to exercise and design.

This has both resulted in reference to partly or appealingly connected former concepts and designs and in resistance against this new urban aesthetic and landscape resulting in a.o. the preference for the compact city concepts possibly merged in the concept of the networkcity. Aesthetics here can be regarded as conservative power in the paradigmshift. The conservative power of aesthetics in paradigmshifts is a.o. described by McAllister in *Beauty and Revolution in Science* (1996).

Contrary to the visualisation of most linear cities as shown by Collins, in the images of corridor-concepts shown by Doxiadis and Whebell development over time is explicitly present. The images they show are abstract but at the same time spatially indicative and showing a development-perspective.

Also in the recent Dutch images of corridor development and urban networks the spatial dynamics are under-exposed. The images show spatial relations and abstract intensions, but lack visualisation of spatial quality and dynamics which hinders adequate spatial planning and policy concerning the development of urban networks and their corridors. Further research on well chosen cases of (contemporary) corridor- and network development will be necessary to comprehend the new aesthetics and dynamics in order to support spatial planning and policy concerning these developments and to explore its urban/spatial potential.

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