

# **Future of Value Maps in European Context**

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**Key words:** value map, mass valuation, transparency, land value, real estate development

## **SUMMARY**

For every actor on the real estate market information about the property value is important for making the correct decisions. This is the case for property owners, buyers, sellers, investors, real estate agents, developers, banks, insurers, as well as national institutions and court (ARKCR 2005). Land prices are the most complete economic indicators, which combines current urban structure effects and changing factors like local conditions, technical characteristics etc. The knowledge of land values is very crucial for successful urban development in all its different strategies and projects. One powerful and significant tool for development in the field of property tax and real property market is the land value map.

The main purposes of the value map survey was to obtain information about the motivation of the governments and municipalities to create value maps, their main objectives to create them, value data sources, used software, use of mass appraisement, cost of implementation and up-dating of value maps, main users, publishing and accessibility of value maps to users etc. The results of this paper could help to show the next possible ways of value map development in international perspective. The outcome could help make suggestions to improve the system of value maps in the Czech Republic.

## **SUMMARY (Czech language)**

Hodnotu nemovitosti pro správná rozhodnutí potřebují znát všichni, kdo se pohybují na realitním trhu nemovitostí (vlastníci, kupující, prodávající, investoři, realitní makléři, developeri, banky, státní instituce a soudy) (ARKCR 2005). Cena pozemků je nejúplnějším ekonomickým ukazatelem, který sdružuje účinky stávající urbanistické struktury a vývojových faktorů (využití lokalizačních podmínek, atraktivita lokality, její vybavení, územně technické vlastnosti apod.). Znalost hodnoty pozemku a jejího ocenění je rozhodující pro úspěšný rozvoj města ve všech jeho strategických projektů. Předchozí odstavce naznačují, že cenová mapa pozemků může být neobvyčejně mocným nástrojem pro rozvoj trhu nemovitostí a daně z nemovitostí.

Cílem průzkumu v oblasti hodnotových map bylo zjištění způsobů a metod jejich vytváření a vedení, využívané softwarové prostředky, využití a metody hromadného oceňování, možnosti využití a způsob prezentace cenových map a jejich poskytování uživatelům v konkrétních zemích a v neposlední řadě také pravděpodobný vývoj cenových map v následujících letech. Analyzované výsledky průzkumu by měli pomoci ukázat možné cesty pro další rozvoj cenových map v České republice, tedy rozpoznat a poté eliminovat slabé stránky a především rozvinout a zlepšit silné stránky a učinit z cenové mapy skutečný nástroj pro zprůhlednění a zefektivnění trhu nemovitostí.

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## **1. INTRODUCTION**

Almost all decision by every company or government agency has an effect on the value of land somewhere. Changes in the local unemployment rate, crime rate, exam results at a school, train fares, planning law, building renovation next-door - all can change the market price of properties that have not themselves changed in any way. It is the locations that have changed in value. "Landvaluescape" is constantly changing over time and space. Locations change value because of human activities somewhere else, near or far away (Vickers T. 2004b).

### **1.1 Land Value map - Importancy and contribution**

As Bhagaván Šrí Satja Sáí Bába, an Indian clergyman said: "*Who the value of diamond knows, will keep it in a safe place and will use it properly.*" We can say the same about land and its value.

A significance and contribution of land value map is evident - it brings the information in a clear and transparent way about land value. The background of determining this value is not so simple and without complications. Although the contemporary data analysis methods facilitate us this role, there is a need of attendance of practised valuer in the process of determining the value. The valuer should know the locality and be able to estimate, if land value assessed by some mass valuation methods like a computer assisted mass appraisal (CAMA), relates to the reality. Of course there is a dependency on the concrete purpose of land value map.

The main users of Value maps are the administration of finance for all land tax purposes, the municipalities for urban planning and urban land management, the banks and insurance companies to give credits and mortgages, the real estate brokers for the arrangement of contracts of sale, the notaries and other public institutions for the reference of own fees. The value map could be useful not only for investors, but also for ordinary sellers and buyers etc (cf. Table 1 below).

An importance of value maps was also emphasized by Tony Vickers in his paper (2005) that the techniques for capturing, normalising and analysing property value data in surface models will improve rapidly. The drivers for future research include:

- The need to understand and exploit trends in land values for the benefit of investors;
- Governments' interest in policies that promote sustainable urban development, the need to sustainably fund public infrastructure and to understand the inter-relationships between land values and urban planning;

- Increasing digitisation and integration of the land-based information that makes up value maps and increasing power, affordability and sophistication of systems needed to process that information.

## 1.2 Who is interested in value maps, who need it, who can use it?

Value maps would provide a visual view of the actual product value, which are plotted on the map. In our case the products are real properties. Value maps break down the value from the two perspectives that cause stakeholders to make decisions and basic orientations. We need to:

- Reduce something like costs, time, effort, or risk;
- Increase something like transparency, revenue, quality, productivity, currency and accuracy

Previously we should determine, who is actually interested in use of the value map and get the benefits of it. The state and private interests on the real estate market is shown in the table below.

<b>State interest</b>	decrease the real property transaction costs effective and more fair property tax (base on the value) decision-making about territory and investment (investment planning)
<b>Private interest</b>	decrease the real property transaction costs access to land data and its value more transparent real estate market

**Table 1.** State and private interests in real estate properties and tax

### 1.2.1 Who can have benefit from the value map?

The real estate market works with properties and its value. For this purpose we have not only to estimate the relevant value of property in according its characteristics, but also know how to use it and make it available for public by reasonable method and minimize costs of this process. This fact could help to make more effective decisions related to the region primarily to next actors:

Sector	Stakeholder
state	Tax administrators
state	Urban planners
state	Politicians and campaign groups
state/private	Property investors
state/private	Property and GI data providers
private	Software suppliers
private	Insurers and underwriters
private	Business
private	Estate agents and their customers

**Table 2.** Stakeholder Groups (Vickers T. 2004c) on the real estate market

### **1.3 Cadastre and Transparency**

Eero Carlson emphasise in his real estate research (2002), that the first prerequisite for a country to develop is the *cadastral*. Information of real properties and their ownership is fundamental for establishing a functional economy. The quality of the cadastral indicates the level of development in other sector of the society.

The second prerequisite for beneficial development may be the *transparency* in real estate market. Real property sales are recorded and market information is made available. Long term development and sales prices levels are important for financing decisions for all kinds of land.

#### **1.3.1 Market transparency**

As we can see from the points below, land value maps connected to cadastral is very strong tool to improve a real market transparency. In economics, a market is transparent if much is known by many about:

- What products and/or services are available (cadastral, cadastral map)
- At what price (value map)
- And where (value map)

## **2. SURVEY IN THE FIELD OF VALUE MAPS (MAINLY) IN EUROPE**

The value map research across European countries could answer to the next questions:

- What are the factual contribution and benefits of value maps for municipalities and government?
- Where are the barriers of development of value maps?
- What are the current approaches and the possible directions of the development of value maps in individual European countries?

The attempt was previously to get the detailed information about utilize and forms of value maps in some European and a few outside-European countries.

The biggest complication at this analysis was obtaining of right contacts on relevant professionals in the field of value mapping. Data about current state of value maps in individual countries was obtained by a help of electronic mail research, further I used the city, companies, and offices web sites. The survey was performed from April until June and supplemented in November 2005.

### **2.1 Technical or Political Issue?**

Two technologies are converging and could make a huge impact on the search for policies that support sustainable land management, says Tony Vickers.

Computer Assisted Mass Assessment (CAMA) within the property valuation field, and Geographic Information Systems (GIS) more generally, have the capability of bringing the intangible reality of global and local economic landscapes to life.

### 2.1.1 Value maps, GIS and CAMA

The increasing availability of well-developed GIS systems and other IT developments have the potential to make all property tax administration and land use planning easier and cheaper. Desktop GIS are now relatively inexpensive, functionally rich, reasonably intuitive and therefore offer even the most modest of organizations the opportunity to use these new toolsets. There is now a general acceptance within the CAMA industry that Geographic Information Systems (GIS) provide a very useful toolset for modeling, for ratio studies for surface response analysis, for visualization to name but a few.

### 2.1.2 Main issue (problem)

By force of technical progress is creating, updating, administration, and publishing (all in reasonable costs) of value map much more effectively, and enables the wider accessibility thanks to Internet and web technologies. The technical task stays the most accuracy determination of land value by reflecting the market value of the parcel on the real estate market. However the political and institutional aspects<sup>1</sup> of land value mapping and value maps are far more difficult and important than the technical aspects, which are "always" resolvable.

## **3. PRESENT AND FUTURE OF VALUE (PRICE) MAPS IN THE CZECH REPUBLIC**

### 3.1.1 Current state of price maps in the Czech Republic (CR)

More than sixteen years the "modern" real estate market in the Czech republic exists. Though this market is influenced by standard market economic mechanisms, there is not enough property value information for professionals and laymen as well. Therefore the value map could be beneficial.

The correct term of a "value map" could be a "price map", because this map is based on the realised prices only in the Czech Republic. The price maps are not novelty in the Czech real estate market. Conversely they were used in the thirties in the last century (Stará H. 1996). A new discussion about price maps started after the Velvet revolution in 1989. The main reasons primarily were urban plans and real estate taxation based on value, thus not on normative value.

The notion of price map is formally established in Czech Republic through act 151/1997: "The price map of building land is a graphic representation of building lands with marked prices within the municipality territory or parts of it in the scale 1:5000, or more detailed. The value of the building lands in the price map is evaluated from prices in the contract of purchase."

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<sup>1</sup> The political and institutional aspects are handled in authors previous work (Gall J. 2006)

However, about 50 towns had already before 1995 established price maps, corresponding to approximately 1% of the number of the towns and 24% of the population in the Czech Republic (CACPA, 2006). In 1995 the Treasury department issued a new assessment ordinance, requesting that the price on the price map should be derived from realized sales. After that, about 30 of the 50 towns did not continue the updating of price maps, as predicted by May et al (1993). Of those about 20 towns, who still update their price maps, 12 make the price map available on the Internet.

### 3.1.2 Barriers

A critical demand is the collection of data. The data collection task has a legal and a technical component: The Tax offices and the Statistical Office are not entitled to share their detailed price data. Also, the technical system is missing, which could transfer data on real property (Cadastral Office) and on property value or price (Tax office, Czech Statistical Office) to the municipalities, who are proposed to have the key function.

Many specialists have emphasized the relevance of the market value based approach since the beginning of the nineties (May et al, 1993). Reflecting that, many efforts were made in trying to implement such approach to taxation of real estate, however, not with much success. As main barriers are counted the imperfect real estate market and the related rent control scheme introduced after the Velvet revolution in 1989. During the last 16 years, competition and transparency of the market has increased, but rent control still prevails.

We have the sales price property data, but it is not accessible - the disclosing this data could improve substantially the situation. There is a need of negotiation with state authorities and private associations and companies regarding data collection and connecting of existing databases and registers as well and use of a mass valuation (CAMA) system.

The arguments mentioned above indicate a need and importance of followed tasks very clearly:

- A need of deal with the lack of availability of data of property value. This deficiency definitely does not support increasing of the economic level and the stability of real estate market.
- A necessity of a new generation - transformation from price maps to the value maps of building plots by unified methodology covers all Czech territory. Therefore there is another essential - namely to revise the current price map and define its weak points and find the methods which will lead to establish effective application of value maps.

Weak points of current price maps in the CR:

- Value determined only by the comparable method could be considered in price map. The base is only realized sales of property.
- Insufficient knowledge about the utilization of price maps by municipalities, mistrust to contribution of price map
- Relatively high production costs of price maps (non effective gathering and sharing of data)

### 3.1.3 Potential of price (value) map in the Czech Republic

Municipalities use the price maps primarily for decision-making about sale and rent of the municipal property and investment. Price maps are used by: valuators for determining the property value; by real estate agencies; by ordinary people, who want to buy or sell property for their better orientation on the real estate market. However the ambitions of value maps (VM) are much more higher (Bajer V. and Lokaj J. 2005):

- VM could be the base for determine a land tax, eventually for the common level of rent
- Valuation of building parcels for transfer, gift and inheritance tax
- Support of urban and capital (invest) policy of municipality (if value maps will respect the urban planning documentation)
- Tool for investors, banks (loan, mortgage), insurance companies etc.
- VM helps by information value and accessibility to reduction of speculations (in the bad sense)
- VM could be use like a source for historic-economical studies about territory and its development in future

As we can see from table below, a value map could be rather strong tool for orientation on the real estate market.

	<b>Parcel information</b>	<b>Data source</b>	<b>Source place</b>	<b>Is it in VM?</b>
1	Technical and qualitative characteristic of real property	Cadastre	Cadastral Office	YES*
2	Possible use of land parcel in the future and expected strategies in the regional area	Urban plan	Municipality	YES*
3	Locality of the parcel	Cadastral map, or other source	Cadastral Office	YES
4	Value of parcel	Valuation of property	Appraiser	YES
		Sale contract	Tax office	
		Real estate advertisement	Real Estate Offices, newspaper, web pages	
5	Owner of property	Cadastre	Cadastral office	YES*

**Table 3.** Accessibility of the parcel information

\* If the value map is connected with relevant database - GIS (municipal IS is usually connected with Cadastral IS and other spatial registers)

## **4. VALUE MAPS IN EUROPE**

During the survey were observed following countries: Germany, Lithuania, Denmark, Sweden, Finland, The United Kingdom, Australia, and USA. The brief summaries of every country are portrayed below.

## 4.1 Germany

According to the German law, independent and self-employed land valuation boards support the transparency in the real estate market. The idea is that all transactions in the schedule of purchase prices are recorded and collected in the Digital Purchase Price Collection. The database are published and will be used for generalize price contour maps and for property market reports. (Seidel C. 2005)

Every mayor city in Germany has a value map. The creation of value maps is different between the particular countries of the Federal Republic of Germany. The Federal States in Germany has 16 states and it is very difficult to give "Germany-wide" answers. In the big cities (as Frankfurt, Wiesbaden, etc.) the land value map is a component of the city GIS. In other regions with smaller cities and villages the land value map is kept by the administration for cadastre, land management and geoinformation. The value maps is a special digital layer of the digital cadastre map.

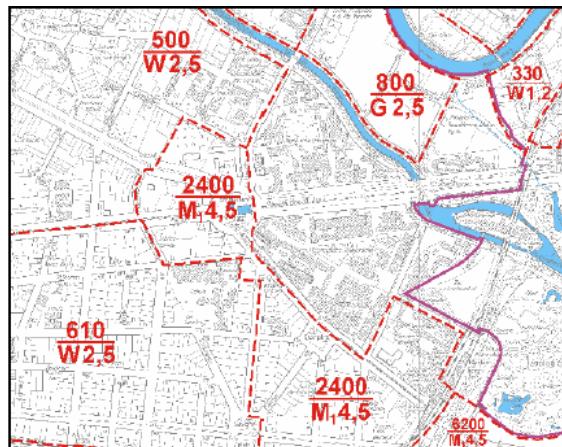
Each German county and large city has a Committee of Valuation Experts. Their activities include: official expertise and consulting, evaluation, annual standard ground values, production of standard ground value maps, real estate market reports. Their goal is to provide GIS-age, e-government, freedom of information, and the availability of digital information. Beside the valuation committees, there are independent private experts (on valuation), performing special tasks within the whole spectrum of valuation, the so-called "publicly appointed experts", appointed from associations of architects, estate agents, chambers of commerce and so on.

### Purchase price collection

In the Purchase Price collection ("Kaufpreissammlung") are all land transfers included. In the past it was an analogue catalogue. Now there is a digital frame like a Geographical Information System (GIS) with information about the purchase date, the location, the size of lot, the type of use, the year of construction from buildings etc. and the purchase price.

### Price contour maps / standard land value

Products from the Purchase Price Collection made from the land valuation board are the price contour maps. In the price contour maps you can find a standard land value. This standard land value is updated each year with the reporting date 1st January. The most common types of standard land prices are values for agricultural and forest areas, rural and urban areas, trade and industrial areas, traffic areas, and areas for public purpose like schools or hospitals



**Figure 1:** A detail from a price contour map in Berlin (reporting date 01.01.2005)  
Source: (Seidel C, 2005)

#### 4.2 Lithuania

A small, post-Communist country now in the EC but with an immature property market has adopted LVT without the encumbrance of heritage systems. It has had considerable assistance from northern European (Netherlands, Sweden, Denmark) and American property tax and surveying experts and is known to have begun introducing value maps. The Lithuanian 'clean sheet' approach will be of considerable larger interest.

The State Enterprise Centre of Register (SECR) was established and tasked with integrating all real estate records and cadastre data into a single, GIS-based, system. Data from the land register as well as data on buildings, constructions, premises, and apartments were subsequently integrated into the Real Property Information System (RPIS). Legal, technical, and geographical records have also been integrated into the system. The SECR performs appraisals of real property. This valuation system strengthens real estate markets and supports value-based taxation. GIS is an important component of its Mass Appraisal System. By accessing parcel, register, and market information from a single database, the appraisal system is used to compute mass-values for property located in territories based on prescribed principles within a defined time using updated market data. It also allows for periodic re-evaluation of property values in response to market changes.

The SECR has also developed an application for the delivery of cadastral MAPs integrated with its RPCR via the Internet, using ArcIMS technology. A user can get a variety of information about a property including an ortophoto MAP, administrative boundaries, the boundaries of cadastral units and blocks, land parcels, value zones, centre lines of streets, and so on all from his own computer ([www.kada.lt](http://www.kada.lt)).

#### 4.3 Denmark

Danish valuation and taxation system based on the market value of property, demonstrates rather high effectiveness in accordance to observed current state. This fact is based primarily on: Integrated land administration; Sophisticated system of gathering, analyses and public of market information; Data analyse - effectively of valuation is based on the use of well

developed mass valuation systems; Municipalities and counties are responsible for tax rate determination in their locality; Transparency of valuation and tax system; and finally High level of public informing and accessibility for property data and valuation

### **Data gathering and system of registers**

Several registers were established in Denmark related to property, realised sales, level of rent and other factors, which influenced the property value during 1960's and 1980's, as the Municipal Property Data System (ESR), The Building and Dwelling Register (BBR) and the Sales and Valuation Register (SVUR). Data is gathered in mentioned individual registers, which are accessible by support of one important system called the Cross Reference System. This "virtual" system enables the connection among all-important data needed for sharing and evaluation.

### **Valuation**

There are used the computerised valuation systems for support the valuation and tax administration in Denmark. In 1981 two very powerful valuation systems were established. The two systems are the Land Value System (Grundvardsystemet) and the Property Value System (CAMA) (Forslagssystemet). The two systems are very different in nature and they assist to the valuation in different ways.

The sales approach is the preferred method (where there is enough open market sales). The income method is used for rented properties where sales are infrequent, and the cost approach is used for any remaining types of properties.

During the 1960's the valuation process was supported by value maps, which were published for urban areas until 1981. It was the cadastral maps and "street prices" (land value per square meter) were written by hand on the streets. The publication of value map stopped, because the production was very labour intensive and the production took almost two years - so at the time of publication the appeals and other activities related to the valuation were finished long ago.

### **Public data**

The majority part of property information are public available through the Internet. It is enabled by Public Information server ([www.ois.dk](http://www.ois.dk)). The access for inhabitants is free of charge, only for business purposes are required to pay a minor fee.

The Danish valuation and taxation system seems to be rather effective and transparent system, which is pointing to the level of Danish e-government.

### **4.4 Sweden**

Sweden stated that valuation was regarded as an integral part of urban management. The valuation standard used in Sweden is the fair market value at highest and best use. But the municipalities have a planning monopoly so in practice the base for the valuation in most cases is present land use. The assessed value shall be 75 percent of the market value. The

point of time for the valuation is the second year before the taxation year (i.e. the 2003 assessment was based on the market value 2001).

## **GIS and Value map**

At the preparatory work for the assessment of one- and two-family dwellings in 1996 a new GIS tool was used for the first time. The GIS was used for administration of value zones and for analyses during the valuation process. All properties in the Property Register have coordinates. To start with the value zones from the previous assessment of one- and two-family houses were digitised. A system with digital background maps based on different types of available digital maps was established. In urban areas these maps contain more detailed information than in rural areas. The background maps must be sufficient for presentation of the results on screen and on paper.

## **4.5 USA**

USA belongs to the countries, where the value map is implicated in sophisticated city information system (it also depends on the individual country). In the United States are rather a number of various real estate tax and Geo-data systems on the state, regional and town levels as well. Several judicatures in the US are well known for their highly advanced processing approach and using Value maps.

The good example is the Lucas County in Ohio. They have exploited the value map as an indispensable instrument for local property market and economic development. All departments of County government use the GIS with value map extensively, especially the valuation division in Lucas County. Public real estate agents and other government agencies use it for free. Others may pay \$10 for the CD or DVD which includes almost all known property data, including aerial photos with high resolution.

Anyone may access all data on the Web for free. Anyone can download data from the CD or DVD versions to Access or any other analysis tool.

Other counties also have their data on GIS and all are required by law to perform revaluations routinely and make all data available to the public for cost only or for free.

## **4.6 Australia**

All states exhibit sophisticated cadastral mapping and land value based taxation. Two states (Victoria and Queensland) have recently re-engineered their LVT assessment systems to become fully dependent on value maps. It is thought that Australia exhibits the greatest maturity and breadth of experience of making and using value maps in the English speaking world, at state level.

The value map based on market value exists on the whole territory of Victoria county. The scale is 1:1000 and map is integrated into the cadastral map - data is connected directly to the cadastral register. Value maps are used because the valuation office in General Victoria is involved in mass appraisal system and the maps provide a quick view of overall patterns. The main aim is to audit and certify the quality of the valuations so mapping is an excellent tool. It also helps in field inspections.

The valuation data are linked to the cadastral map via a property number. The cadastral map and property number have been available for ~5 years. The map is maintained by local governments and a section of State government called "Spatial Information Infrastructure". As Valuer-General is also part of State government, they are able to get the cadastral map for free.

## 5. RESULTS OF THE ANALYSIS

The survey across several European countries take advantage of value maps attempts to outline the factual contribution and benefits of value maps for municipalities and government, observe the barriers of development of value maps and try to uncover the current approaches and the possible directions of the development of value maps in individual European countries.

Current approaches in value maps in individual countries were described (section 4) together with contribution and benefits of value maps (section 1.1 and 1.2) The barriers of value maps development were observed in section 3.1.2

The main purposes of value maps are to bring the quality, sufficiently accurate and current, and accessible information about the level of values of building plots and provide a better orientation and transparency for all actors on the real estate market.

It seems that value map will be an ordinary and indispensable tool for sustainable development in land management.

### Future of value maps

What is the future of value maps? It strongly depends on the land policy of each country, but the importancy and usage of value maps is increasing more than twenty years. In 1980, Christopher Howes published the result of his own research on value maps, concluding: "*Value maps will increasingly play a major part in research into causes and effects of changes in land and property values*". Ch. Howes had noted that, prior to 1980, value maps were generally compiled for one-off research and development projects. They were very labour-intensive to prepared without computers. He only rarely found value maps in connection with tax administration, because that would require them to cover the entire area of a tax authority.

Now, however, the countries surveyed almost all have computerised map and land ownership cadastres. All also have property taxes, with the majority valuing land separately from buildings, usually for a tax-related purpose but only rarely for a separate land value tax. About half already use or are implementing CAMA and all use GIS extensively (see Table 4. below).

The most efficient and effective way to maximize the use of value maps for the benefit of society, citizens, commerce and governments is to involve the private sector in the necessary investment and exploitation, while retaining responsibility for custodianship within a public body or bodies. Issues of pricing, licensing, privacy and data-sharing are non-trivial but should not be allowed to stand in the way of developing what seems to be an extremely beneficial tool for land policy, property markets and sustainability (Vickers T. 2005).

Thanks to technical progress the making, updating and administration a publication of value maps is more simple and effective, and it enables the wider accessibility to value maps, primarily because of the Internet and web technologies. Web pages have become a very common part of presentation of everything and everybody in the last years. It offers very effective publication and updated information to the users.

### 5.1.1 Czech Republic

The price maps, defined in valuation law no. 151/1997, do not create the strong unified system tool for arrangement of basic economic criterions in Czech territory, principally according to the optionality (voluntary) of price maps for municipalities. It follows that there is missing<sup>2</sup> a systematic approach to accessible evidence of real estate values in the Czech Republic, which could support the real estate market and increase the transparency as well as the actors involved in this market could work more efficient and with higher level of confidence.

We can conclude that there is not sufficient groundwork for making important area (land) decision in regional and local level (municipalities and counties) as well as on the governmental level in the Czech Republic, because the access to value data is not adequate. We can make the analysis of land and its development using powerful tools as GIS is, but we need a wider availability of quality land value data. There is a need to find and define the possible approaches to contribute the wider accessibility to property value information. The process of creating of land value maps together with use of mass valuation could depict the direction to achieve the transparent and well working real estate market.

Next necessary step could be a transformation from price maps to the value maps of building plots by unified methodology covers all Czech territory.

### 5.1.2 Europe

Among the countries, which have rather sophisticated systems of value maps certainly belong the following: Lithuania, Germany, Sweden, and some states in the USA and Australia. Denmark only has a property value database without graphical part.

A value map is administrated in every country who have it in a different form and way, but the general principles are rather similar, in according to my own research (2005) about value maps as well as research made by Tony Vickers (Vickers T. 2004a). All addressed countries agree in the necessity of value maps for tax purposes and transparency of real estate market. The value in value maps could be market value, but the approach to determine this value is various in different countries. Value maps are usually used for property valuation and taxation, urban planning, both included in land management, and for better orientation on the real estate market.

The most often used map-background for value map is a digital cadastral map, though a direct connection to cadastral data is exceptional (Lithuania, USA, Australia). Certain interconnection works in Denmark. Other possible map-backgrounds could be city plans,

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<sup>2</sup> Except the Tax office collect the sales price from two sources: (1) sales agreement and (2) estimate report of property value . This registration has started since 1997.

topographic maps, and orthophoto maps. If value maps are administrated in some information system (IS), we can usually choose the map-background, which we need.

Value maps usually exist only in bigger cities, but in Lithuania or Sweden they cover the whole territory as well as in Denmark. However, Denmark does not use the graphical value maps, but every inhabitant can find important value information about his or others properties in the parcels and building database, which is available on the Internet pages for anyone.

We can notice a tendency to wide usage of mass valuation methods and creation of models for real estate market, called CAMA (Computer Aided Mass Appraisal).

In according to authors' (2005) and T. Vickers (2004) survey, the CAMA system is used in the Nederland's, France, Lithuania, Finland, Sweden, and Denmark. Outside Europe are value maps used in New Zealand, Hong Kong and some countries in USA (e.g. Lucas County) and Australia (Victoria).

The most used GIS solutions are products by the following companies: ESRI (ArcGIS, ArcIMS), Intergraph (GeoMedia), Bentley (MicroStation), Autodesk (MapGuide), MapInfo (MapInfo) and MapServer (OpenSource by Minnesota university).

State	Territory	Cad.map as a backgr.	Use CAMA?	Use a market value	Utilization	Free of charge ?	Direct connection with Cadastre?
Lithuania	whole	Yes	Yes	YES (average market price)	LVT <sup>3</sup>	Yes	Yes
Germany	every main city	Yes	No	YES (standard land value)	LVT; urban planning; land management; etc.	partly	No
Denmark <sup>4</sup>	whole	Yes	Yes	Yes	for valuation and taxation purposes	Yes	no (but two registers exchange data)
Sweden	whole	Yes	Yes	Yes	property taxation; expropriation; transactions; urban planning; construction activities; mortgage underwriting (lending); accounting and auditing	Yes	Yes
Czech rep.	19 cities	partly	No	Yes	assessment of the municipal property (by sale and rental)	Yes	No
Slovakia	4 cities	no	No	Yes	assessment of the municipal property (by sale and rental)	partly	No
UK	-	No	-	Yes (transaction price)	only analyse	-	No
USA	many cities	Yes	Yes	Yes	LVT; Property transfers (sales); rents; valuation model estimates; etc.	partly	Yes
Australia		Yes	Yes	Yes	to audit and certify the quality of the valuations	?	Yes

**Table 4.** Results from value map survey

<sup>3</sup> LVT - land value taxation

<sup>4</sup> Denmark does not have a value map (they produced it during 1960 and 1980). The real property value is available in database accessible through Internet

## **6. CONCLUSION**

Land value maps are strongly related to real estate taxation - it is usually the main reason for creating value maps in many countries. Value maps can undoubtedly make property taxes more understandable. They can also make the workings of local and regional economies more transparent to citizens, commerce and policy makers. Since modern, market-value-based property taxes are good for the environment and economies, the development of value mapping must make for a better chance that such taxes will be acceptable.

The technical aspects are very important. On the other hand the political will to make a decision and have a tool like a value map enabling support the transparency and development on the real estate market is much more important. Because of no political volition all effort is useless. One of Czech expert on the urban planning says that the technical aspect is only 1% of arrangement of value maps task. The rest is a political issue.

We can generally assemble a list of necessary preconditions for well working of value maps:

- Cadastre - the evidence of properties and ownerships (we will see the British attempt to introduce value maps into their valuation and taxation system planned around 2010)
- Gathering of the property data and other important parameters and characteristic in the locality (balancing the lack of property sales in some localities - what is the most used approach to estimate the value of property)
- Gathering the data related to the value of property (sales and rents register) - connection of individual registers (cf. Denmark, section 4.3)
- Mass valuation (CAMA) seems be an effective and powerful tool, especially together with widespread GIS
- Connection of effective and fair real estate valuation and taxation - argument for persuade of citizens and politicians.
- Political will

Post-communism countries could be inspired by for example Lithuania and their approach to land valuation and taxation. They have had a courage to introduce the market-based system during the transformation process from communism to democracy. This political courage is still missing in the Czech Republic, although there was rather strong attempt made by experts to introduce this approach during 90's. The issue is not, if we will change the system based on market value, but when we will change the system.

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## BIOGRAPHICAL NOTES

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