

The UAE Federal Government's E-Participation Roadmap: Developments in UAE Empowerment Initiatives With VGI/PGIS and Location Based Services (LBS)

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Abstract

This research assesses the effectiveness of the UAE Federal Government's e-Participation Policy as used by Cabinet level organizations. Within a vision of Smart City, the UAE E-participation guidelines seem to emulate other public administration approaches to ICT, crowd source information, and interactive communication such as Public Participation Geographic Information System (PPGIS), Volunteer Geographic Information (VGI), and Location Based Services (LBS). It finds that the UAE Federal government uses PGIS in limited ways within a process intending to implement *Smart Government*, but used in a spontaneous rather than systematic way, thus less efficient in developing increased participation and empowerments. The emphasis on use of LBS linked mobile telephony and online participation tools reflect the government's forward approach to enhance participation on the road to citizen empowerment.

Key words: UAE Federal Government; PGIS; VGI; LBS; Smart Government

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INTRODUCTION

The UAE has rapidly progressed toward an information society based on a knowledge economy, smart cities with

high degrees of intellectual capital, creative industries and workforces, digital governance with citizen participation. Criteria for a networked information society starts with a smart phone enabled population majority accessing e-commerce and social networks using Location Based Services. When coupled to investments made by the UAE authorities to develop interactive e-governance services, the convergence creates a greater potential for a participatory, information network society wherein civil society, business, and government stakeholders, all benefit from greater efficiencies and accessibilities. UAE progress in this respect has earned it a relatively high international status, as the UN 2014 E-Government Development Index (EGDI), ranks the UAE 32 out of 193 countries surveyed (<http://unpan3.un.org/egovkb/en-us/Data/Country-Information/id/181-United-Arab-Emirates>).

This study thus constructs a generalized model of participatory digital relations among the UAE stakeholders and Federal Government. It assesses instrumental and functional levels of participatory e-governance among the 19 Federal Cabinet level ministries' policies and procedures according to their five-stage participation development roadmap. While stakeholder participation indexing would have contributed significantly to the study (Flak & Rose 2008), no current data exists to either identify exactly who are the primary stakeholders among UAE organizations and civil society, or to discuss relative levels of participation and satisfaction. Therefore, this study assesses participation issues as presented by UAE government documents, media reports, and the very few academic research articles published on the UAE E-Government e-participation roadmap, e.g., Al Athmay & Madichie (2013).

The e-participation roadmap evolves through the following five levels of activities and impacts:

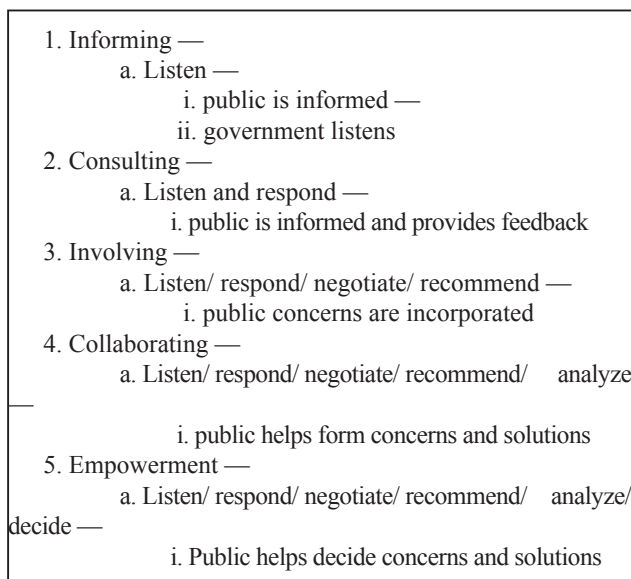


Figure 1
The Participation-Empowerment Roadmap

The e-participation roadmap model synthesized and derived from the following sources: The UAE Federal Government Web Portal (<http://www.government.ae/en/web>); the International Association For Public Participation (<http://www.iap2.org.au/resources/iap2s-public-participation-spectrum>); (Jankowski, 2011; Nyerges & Jankowski, 2009).

When assessing and discussing specific UAE Federal Government activities among organizations that are in a process of developing smart services using digital based ICT, this research relied mainly on government reports because little international academic research focused on this subject. Most research ignored participation issues of UAE smart government while failing to apply advanced theories. Some exceptions came from conference proceedings, papers, discussions, and presentations given at the many events sponsored by Arab Gulf governments. Most of these materials, however, still relied on government reports as direct fieldwork was either lacking or under government sponsorship.

With common e-participation guidelines, the governance system intended to foster both development and improvement of existing services. As an increasing amount of the information used derives from *User Generated Content* (UGC) from web-based e-commerce, e-government, and social media, it all adds to a potentially shared pool of data and databases. In the UAE e-transformation process, this mix of multisource data, or *Open Data*, includes UGC, in particular *Volunteer Geographic Information* (VGI). Conceptually, Open Data merges into a *Big Data* infrastructural build and analytics, which the UAE has identified as assets and resources for future economic development in both e-government and e-commerce, e.g., (http://www.capgemini-consulting.com/resource-file-access/resource/pdf/opendata_

[pov_6feb.pdf](#)). The *Data Turn* label attaches to the UAE Smart Initiatives to foster even greater e-government participation, as highlighted by Dubai's 2015 Smart Data Summit (<http://www.bigdata-me.com/>).

1. INFORMATION AND ITS USES IN THE MATERIAL WORLD AND CYBER SPACE

We use technologies to achieve goals and objectives that have real world presence and outcomes. As scientists continuously develop more powerful digital ICT systems that evolve around cross-sector uses, e.g., in government, industry, commerce, service sectors, consumer and civil society, certain breakthroughs shift global ICT systems toward increased efficiencies and more diverse options. Some of these innovations create intersections of technologies that shift potential socio-economic uses in a convergent direction. Such intersections have constituted a system for managing GIS, visualization, spatial information, and LBS that converge around a quartet of components (Buczowski, 2011):

- a) Service and Content providers
- b) Mobile Devices
- c) Positioning Systems, and
- d) Communication networks

This convergent technological system, its components and activities, provides the core infrastructure for Participatory Geographic Information Systems (PGIS), Volunteer Geographic Information (VGI), and Location Based Services (LBS) (Turner, 2014). Although yet to find a unifying label, the term PGIS can generically serve to label this system, except that some recent GIS theory has contested the use of 'geographic' in GIS, which implies an on-the-ground reality, whereas such activities take place in cyberspace (Graham & Zook, 2011). According to Warf and Sui (2010), the term *neogeography* "has emerged as a descriptive and analytical tool for large numbers of people outside of academia, a process catalyzed by digital mapping technologies and the social networking practices of Web 2.0." Thus a digital world (cyberspace) now exists in relation to the physical world, much as paper maps once did. Digital simulation can now symbolically represent physical places, activities and exchange of information, which has given rise to the concept of *flows* (cyber exchanges) that can be modeled, thus mapping a *geography of flows* (Massey, 2008; Castells, 2010). The global patterns of such flows, their density, routes, points of origin and destinations, are being continuously updated through multisource data input, one of which is crowd sourcing, strengthened by cloud transfer and storage.

All maps, whether paper or digital, use symbols to mark quantitative or qualitative phenomena as locational objects, visual metaphors of space, place and movement in both real world and simulated environments. But e-government seldom visits analytic theory and

methodologies, leaving such issues to academia. But across ICT sectors emerges a digitally connected and spatially aware public, including innovative application producers and consumers, that has quickly grown to constitute the largest data source that feeds into voluntary geographic information (VGI) communities. In particular, this knowledgeable public segment could provide e-governance with the highest levels of participation it seeks. But while also dependent on government-corporate ICT control over the quartet of components, it also constitutes an independent collectivity with the ability to challenge any exclusive control over data. While controversial (Wilson & Graham, 2013), the label *neogeography* increasingly finds application in the use and users of geospatial information across cyberspace. Goodchild (2009), Defines NeoGeography “as a blurring of the distinctions between producer, communicator and consumer of geographic information”. Thus emerges a digitally connected ‘open source’ community of networks and networkers seeking greater empowerment in relation to both the quartet of components and its instrumentality as well as participation in governmental decision making. The question affecting the UAE governance system’s stated desire for greater participation is whether that goal can be reached under its control or independently by a tech-savvy civil society operating in cyberspace as a *neogeographic* entity (Graham, 2008; Turner, 2009).

Leaving aside governance issues in policy and social networking, this research assessed the existing ability of e-government resources to effectively use the quartet of components as tools for greater efficiencies in e-governance and public services. The current status of UAE government ICT based GIS operations is accessible and operated by the government but used differently at Federal and Emirate levels. For example, in 2014 Dubai initiated a future oriented project called *Smart Cities*, which other urban initiatives in the region may learn from to follow similar paths for economic diversification (www.smartcitiesdubai.com/why-dubai-.html).

2. ACTIVATING THE QUARTET OF COMPONENTS

In this quartet, *Mobile Smart Devices* (smart phones and tablets) couple with *Geographic Position Systems* (GPS), and *Communication Networks* to facilitate a wide range of interconnected activities. This mobility paradigm of smart devices and users contributes to a globally ubiquitous cross sector trend. Although a fairly new field with multiple definitions, locational based information and its analysis (LBS) are used so widely that many economic activities could no longer function without those tools. In key academic writings on Geo-Information, Brimicombe (2002, 2009), defines LBS as already

dividing into three directions; *information* (internet), *mobility* (smart handheld devices), and *location* (GPS, GIS), but which together enhance public awareness of spatial factors. Correspondingly the popularity of *Google Maps* and similar applications greatly expanded public understanding of location and digital mapping. While not as yet challenging e-governmental domination of spatial information, *Location Based Social Networks* (LBSN), take a leap forward with each new generation of integrated smart device and application packages. In turn, this pushes commercial service providers, such a GSM operator to increase bandwidth, speed and consistency of transmission. This highly competitive and convergent segment of the ICT industry now provides users with powers previously available only to governments. Although GPS satellite coverage was controlled by government regulation, the private space technology sector steadily pushes competition for commercial viability by narrowing publically available positioning to under 3 meter accuracy, as of 2015 (Turner, 2014).

3. PARTICIPATORY GIS (PGIS) SPILLS OVER INTO A MULTIDIMENSIONAL USER CONTEXT

Previously, the term *public* was added to *participation*, but the PPGIS label neither defines public nor acknowledges the voluntary aspect of that participation. While PPGIS refers to “a range of topics raised by the intersection of community interests and GIS technology” (URISA, 2012), others have defined it more specifically as “a study of the uses and applications of geographic information ... systems technology used by members of the public ... for participation in the public processes affecting their lives” (CRSSA, 2010).

In general, interactive user participation in location-based mapping of spatial information shares a relatively common set of definitions and functions for which a consistent label is yet to be found. Recent discussion on GIS participation references the *voluntary* aspect of information contribution and sharing, preferring to define the process of *Voluntary Geographic Information* (VGI) as “...the harnessing of tools to create, assemble and disseminate geographic data provided voluntarily by individuals” (Brimicombe, 2002). The most common technical integer for spatial data, the API (Application Programming Interface) standard links all GeoServices, especially spatial data. Thus whether a commercial or open geospatial source product API allows voluntarism to benefit government databases as well as non-governmental databases, whether private or public. But in the final analysis, no users are obliged to participate, hence the voluntary aspect of their data contribution.

4. FROM THE GENERAL FRAMEWORK TO A GEOGRAPHICAL-GOVERNMENTAL SPECIFIC PROCESS

In assessing the United Arab Emirates (UAE) Federal Government PGIS uses, its websites, and mobile capabilities, some contextual history is necessary. Established in 1971 as a confederation of seven Emirates, each with its own governance structure and embedded leadership, the UAE has steadily progressed toward a national convergence at the Federal level. The UAE leadership has also used revenues from its considerable petroleum and natural gas resources (the world's 6th largest), to push rapid development, being aware of limits on those resources and potential for market price variability affecting income (<http://www.uaeinteract.com/culture/history.asp>).

The UAE population has expanded as rapidly as the country has developed, consequently reducing Emirati nationals to less than ten percent of the total. With a 90% majority, expatriates, thus represent a significant policy and governance factor. While mainly from within the *Middle East-North Africa-South Asia* region (MENASA), a growing segment of Southeast Asians, and increasingly East Asians, add to the expatriate diversity (<http://www.migrationpolicy.org/article/labor-migration-united-arab-emirates-challenges-and-responses>). Although fewer in numbers, European and North American expatriates provide much of the upper middle and elite classes of administrators, business executives, and professionals. This segment also plays a critical role in driving the information society, financial and property investment, international commercial development and trade. Also their advanced global awareness and abilities to use social networks has assisted in pushing the government toward greater reliance on technology, such as GIS, to compensate for a lack of national human capital (<http://www.creativeclass.com>; <http://www.cftni.org>).

The UAE is among the richest per capita counties in the world, second largest economy in the MENASA region, with diverse sectors rapidly progressing toward development at a global scale. Yet, the UAE still lags behind in producing a cadre of nationals with adequate advanced training and experience to manage a state-of-the-art administrative infrastructure.

With a few notable exceptions, globally, theoretical approaches to PGIS research and development have neglected the MENASA region. Urban governments have been the primary exception, having rapidly adopted and expanded use of advanced ICT and spatial technology to increase efficiency and productivity. A side benefit has been an equally rapid advancement in higher technical education to train nationals, which would potentially improve security while reducing demand for and dependency on expat labor. But it takes time

to educate and train an adequate number of nationals to manage existing technologies. Moreover to keep up with rapidly advancing ICT progress, accessible to an enormous number of mobile devices able to interface with government maintained location based services, requires integrating professional development with advanced postgraduate programs for nationals (<http://www.ecssr.ac.ae/ECSSR>).

For the present, each Ministry follows the E-participation guidelines provided by the Federal E-Government policy, a necessity for coordinating development and public services improvement. But within those guidelines each ministry has flexibility in implementing its participation strategy according to its specific needs. The research thus looked specifically at how UAE Federal Ministries websites approached location based information (LBI) and PGIS for public services and how at that level infrastructure government has begun to use available ICT / GIS resources as tools in the PGIS process. This is especially critical for implementing digital ICT connections and social networking through websites and mobile device applications. For building the necessary local expertise and resources that can fulfill the stated mission to become a leading smart government, investments are also needed in creating a national ICT research and development (R&D) sector. Thus alongside training nationals, for the near future importing world-class technologies and expertise will be needed to work with national institutions in knowledge transfer. How much of future ICT involves LBS, spatial information, and participatory interaction, exceeds this present research focus, but certainly as business sectors expand use, so to keep up the government will also require more management expertise and training for local staff.

In focusing on PGIS use of data as spatial information to map varied locational activities, the research also treated PGIS functions as valuable tools for producing, collecting, and analyzing data necessary for UAE development policies. PGIS acquired data is also needed for theoretical and applied research at academic and professional levels. One critical research aspect concerns assessing how well interactive information users understand the principles and pragmatics of their participation. But this initial research, however, intended a larger scale assessment of understanding priorities for PGIS use among UAE governmental levels, chose the top level, Federal Ministries, to assess departments already using PGIS: Municipalities, Transportation, Police, Planning, Land and Utilities. Further studies will link these Federal level administrative units to their counterparts at the level of each Emirate and major city.

The first criteria to assess for these service units concerns how much more they depend on spatial locations based services than do other units at that level. Second, what other reasons may affect why they have taken the

lead in applying more online PGIS in service provision. While surveying PGIS as a public service tool in all 19 UAE Federal Government organizations, this study weighs the relative importance that PGIS plays in each unit. It also assesses the varied degree to which each unit depends on websites for sharing information, and the perception held by senior staff of the utility of such information. It thus prioritizes what information each unit requires for its functions, ranking perceived needs and technical means for acquiring information on participation profiles and location services, and links with smart apps for feedback and two-way communications. This result will demonstrate the extent to which different UAE Federal level public sector units use and presently have use for PGIS as a potentially interactive participation tool to serve both the general public and their specialized clients. It will also identify usage patterns and variations in these patterns across different organizations with specific strategic participation initiatives. The central question thus concerns who uses PGIS/VGI technologies, to what degree, for what purposes, and with whom. The results also raise questions about higher level administrators' motivation to rapidly implement spatial location and interaction information for better delivery of services to their respective publics. As well, it looks across the units at how PGIS/VGI has changed, is changing, or may change service delivery in the UAE.

Concerning the study outcomes and utility to government policies, a search through current, relevant literature did not uncover any other study that specifically assesses how use of location-based service information, such as derived from PGIS/VGI, influences current public policy and future policy planning.

5. PARTICIPATORY GIS / VGI IN THE UNITED ARAB EMIRATES: AN OVERVIEW

In the UAE cutting edge technology has rapidly been adopted across both governmental and many private sectors to increase productivity, for greater efficiencies, and to reduce demand for skilled expat labor. The UAE leadership has called for more efficiency in work and from workers across all government ministries and agencies, in part, due to interaction with and learning from advanced private sector firms. This emphasis has become an important national policy issue as governmental initiatives have increasingly taken on an entrepreneurial approach to governance and service provision. Among multiple examples, Dubai's Road and Transport Authority (RTA) stands out with its introduction of a cross-platform Smartphone application for taxi service. Just shaking your phone will directly send your location information to the city's public taxi call center (operated by RTA), which will connect to the nearest available public taxi, directing the driver exactly to your location.

Your phone will then receive a confirmation call from the call center dispatch with the driver's name, taxi number, and estimated arrival time. This service is seen as a forerunner to a range of RTA and other location enabled service smartphone applications, e.g., RTA's dmParking service ... will allow motorists to pay for their virtual parking permit using their Etisalat and Du mobile phones by simply sending an SMS in a pre-defined format to 7275 (PARK). (<https://www.mpark.rta.ae/>)

Other Dubai municipality applications currently use interactive location mapping for greater mobility in a city without an easily accessible, accurate district and local street addressing system. Abu Dhabi follows Dubai in developing policies and practices for both the Abu Dhabi municipality and whole Emirate, the UAE's largest, wealthiest, and national capital of most of the governing agencies located in the municipality. Although the UAE does not currently have an integrated national police system, each individual Emirate relies on its own local police units, which have begun to register calls and complains using location information from mobile phones. Thus governmental authorities have increasingly initiated processes that use location information in delivering services, and while the UAE Federal E-Participation policy calls for user engagement in development and improvement of public service, actual resident participation of remains minimal. Future integration of government service provision from individual Emirates into a national system run by or in partnership with the Federal government remains a necessity and provisionally under consideration. Until that time, the rate of progress in developing and implementing PGIS/VGI and Location based services will continue to differ according to the resources available and allocated by each Emirate in relation to individual needs assessments.

The Federal Government represents all seven Emirates and the corresponding largest seven cities, of which Dubai and Abu Dhabi share leading roles. Taking the two together and their combined multiport facilities and associated resources such as logistics and transshipping, this formidable urban conglomerate has the overwhelmingly strongest economic advantage within the MENASA region, and a head start on any potential competition (Al Kaabi, 2015; Brownson, 2014). While serving and representing all the emirates, the decision making power in both public and private sectors resides in that conglomerate, and the government of those two cities, will continue to determine the future directions for the nation. Thus advancing the Federal governance infrastructure, especially service provision, requires a good social and technological fit between all sectors and administrative divisions, which derives from an integration of participation, LBI, and geospatial communication.

5.1 UAE Federal Public Sector

The UAE Federal public-sector organizations such as ministries, municipalities, hospitals, Armed Forces, police departments, civil aviation authorities and other

government bodies have, to some extent, all initiated use of GIS services (Touq, 2009). In the UAE, the Federal Government has set participation policies and procedures for the Ministries, and provided a manual that describes the nature, goals, roles and functions of participation. As is globally discussed in PGIS/VGI research, a central concern for e-government is the issue of accuracy, especially when location information derives from generic public sources. Such data may be adequate for non-government social networking, but it may not be accurate enough for public works. Decision-making processes cannot therefore rely entirely on such unverified data, and even integrated within verifiable sources may also skew the data sets (Sester et al., 2014).

Scientific research is thus needed to sort, filter, and classify data sources and their veracity. Given the present level of UAE national staff and limited R&D, some external expertise would be needed to develop filters that establish a rigorous framework. Limited research has suggested that crowdsourced data arrays can self correct as a process for internal verification (Lauriault & Mooney, 2014), yet it would still need to be rigorously checked against externally verified data. Using multiple sourced quantitative and qualitative methods, Lei and Hilton (2013) verified land data by developing, "A spatially intelligent public participative system (SIPPS) ... as a proof-of-concept of the framework." While interesting for long term land management with public input (VGI), such a process would prove too cumbersome for urban planning, emergency, and other government services requiring timely and accurate location information. Reviewing the discussions of research findings, the empirical material mostly concerned land based geographical issues in developing countries, or citizen participation in local, state and federal decision processes among developed urban countries. Urban related theories and methods were proven to apply best when strong citizen participation already existed in multi level governance and decision-making processes. Much of the theoretical discussion on VGI verification thus has little current application for the UAE's tightly centralized control in government decision making processes.

Since so much of the nation's primary source of current income derives from petroleum, with Abu Dhabi being the largest producer as well as the seat of UAE government, public participation government decision-making processes was limited to a select number of voters appointed to chose members of the Federal National Council. But with greater economy diversification following Dubai's entrepreneurial model, greater public interaction and inclusion in the administrative services are being judiciously encouraged. The Federal system, however, remains relatively dispersed, differentially sharing service provision with individual Emirates. As Abu Dhabi provides the majority of the UAE national budget, it has to allocate resources

across both individual Emirates and Federal sectors while continuing to invest in its own development, it therefore prioritizes national projects that have direct impact on Federal advancement.

5.2 Public Private Partnership in an Entrepreneurial State

According to IMF data, the UAE holds about four percent of worldwide petroleum reserves linking its economy to petroleum and natural gas but also motivating diversified development. Currently the second largest Arab economy with an expanding and diversified economic base it also retains primacy as the major MENASA entrepôt. Both Dubai and Abu Dhabi have major modern international seaport facilities and together constitute a regional multimodal gateway. When combined with Eithad, the new national rail system currently under construction, Abu Dhabi's new container seaport expansion, and full operations of Dubai World City (DWC, the UAE would have the world's largest multimodal port and transit facility. Thus the UAE does not yet appear to have any challenges the MENASA region for with verifiable statistics exist regarding the current status of PGIS/VGI activities. However much its natural resource wealth, as a new, rapidly emerging nation with seven independent states to unify, the UAE cannot be expected to have a fully developed bureaucracy and administrative capacity in the four decades of its existence. Nonetheless, the Emirates of Dubai and Abu Dhabi have made great strides in developing modern administrative infrastructures, which somewhat impedes development of a national administrative infrastructure.

Both Dubai and Abu Dhabi have invested heavily into advanced ICT infrastructure, and have world-class technology and foreign expertise. With a few exceptions, an excellent modern transport and communication infrastructure effectively links UAE cities and increasingly incorporates smaller settlements, providing a strong physical foundation for national unification. The equally rapid global diffusion of digital mobile technologies, especially given the power encompassed in smart phones, couples with their relative affordability in the UAE, thus creates optimal conditions for advanced location based services across all sectors, government and private. The entrepreneurial spirit that prevails among citizens and expatriate communities also facilitates flourishing links for information and technological innovation sharing among government and private sectors. In particular the urban development model followed by Dubai centers on using its advantage as a world city to become an entrepreneurial leader across all sectors including government. The entrepreneurial city model remains restricted to world cities however much other cities want into that circle. The linkages and flows through a world city merge with governance to build a smart city with a knowledge

society and economy, (Acs, Bosma, & Sternberg, 2008), a model that the Dubai has consistently developed, to become what Lindsay (2015), calls the “gateway to a megamarket”.

6. INTERNET SERVICES IN THE UAE

The UAE has expanded largely through economic and lifestyle opportunities and a stable urban society afforded by enormous petroleum revenues. The nation’s cities are relatively open to expatriates and protected by a strong security system, resulting in a building boom that attracted large amounts of Foreign Direct Investment (FDI) to finance infrastructure development and a globally significant urbanization. As the UAE, Dubai in particular, has replaced Cairo and Beirut as regional commercial hubs, due to the combination of opportunity, stability and security, major multinational firms have set up offices to manage regional trade. Along with these firms arrive international staff to fill higher-level management and professional service positions. As a result of the overall ICT infrastructure and environment have rapidly advanced to top global standards and accommodate uses that span private sector commerce, logistics, and government services. This high tech environment also attracts a creative class of expatriates skilled in professional and personal use of ICT, accustomed to communication rich environments, and global access to information. This leading expatriate element is also accustomed to a strong service oriented and efficient government sector, which further motivates investment in developing a smooth interface among service providing sectors of government and commerce. One good example of this is the integrated online portal to access the resources of the national bureau of statistics database (<http://dataportal.nbs.gov.ae/>). Behind the portal a further data collection process builds a user database that records information on the questions asked by users with a user satisfaction interface for recording feedback.

The present UAE leadership has a major concern about post-petroleum economic stability including strategies about how to phase out current subsidies and eventually introduce a balanced tax system that will not drive away investors, business, and the upper classes of residents and tourists. The ICT sector’s role in infrastructure provision and development is critical to the UAE’s future and success in transitioning from a resource exporter to a global high-tech service economy and knowledge society with sustainable urban environments. The UAE population, according to government reports from the 2010 census, currently stands at 8.3 million (National Statistics Centre). Not surprisingly, given the large number of expatriate workers in construction and related industries, males account for about 76% of the total population. But among UAE nationals the birthrate retains

a 50%-50% balanced male-female ratio, while the national education policy insures equal male and female opportunity through university. Introduction of PGIS/VGI has proved an advantage by facilitating greater access to government services and government access to location based information, e.g., receiving complaints, and responding to varied needs for infrastructure and services.

In the 2010 census, Emiratis (UAE citizens) represented 20 percent of the total population. In 2013 the estimated GDP per capita stood at \$48,800. Data on information technology diffusion in the UAE shows its leading role among Arab World states in terms of Internet availability, computer usage ratios and information technology (<http://dataportal.nbs.gov.ae/>). While in 2010, 45% of UAE households had mobile telephones by the end of 2013 there were 2 million landlines and 16 million mobile accounts in or twice the current population of 8 million.

7. METHODOLOGY

To assess development and use of location based services (LBS) as tool for PGIS the UAE federal cabinet’s 19 ministries were selected to examine their usage patterns. Each Ministry hosts its own website, all of which were analyzed for availability of the following features: E-participation guidelines provided by the Federal E-Government, e-Participation Tools, location based services, search and feedback capacity, and bilingual messages (Arabic-English). As the websites were designed to serve varying goals and address different audiences, variations existed among the different sites. The following organizations and their website URL can be accessed at the UAE Federal Government portal: (<http://uaecabinet.ae/en/UAEGovernment/Pages/FederalGovernmentEntities.aspx#.VFsfvsaBb4>). Ministries (<http://government.ae/web/guest/mgovernment>)

Eighteen public organizations in the UAE have been selected by the author to examine patterns of their PGIS as tool form public participation. The organizations include the following.

Each Ministry follows the Federal E-Government’s E-participation guidelines and draws heavily on the Internet as a PGIS tool. According to S. S. Al Hubail (2004) the National Spatial Data Infrastructure will facilitate integration of ICT systems and processes into the Federal Government GIS Spatial Data Framework to enhance performance and operational productivity. Also supporting the Federal process, and in addition to their responsibilities for the national capital and Abu Dhabi Emirate, Abu Dhabi’s Spatial Data Center (SDC) and Spatial Data Infrastructure (SDI) manage part of the technical workload for national data and network management (<http://sdi.abudhabi.ae/>).

Table 1
Eighteen Public Organizations in the UAE

UAE ministry of	Finance	No PGIS tool online
	Presidential Affairs	No PGIS tool online
	Higher Education and Scientific Research	No PGIS tool online, E-participation tab
	International Cooperation and Development	No PGIS tool online
	Cabinet Affairs	No PGIS tool online
	Economy	http://www.economy.gov.ae/English/Pages/eParticipationPolicy.aspx
	Education	No PGIS tool online, but online location school students services
	Culture, Youth & Community development	https://www.mcyd.gov.ae/en/eParticipation/Pages/eParticipationPolicy.aspx
	Justice	No PGIS tool online, but online location services
	Defense	No PGIS tool online http://www.mod.gov.ae/
	Interior	E-participation online, http://www.mod.gov.ae/
	Foreign Affairs	No PGIS tool online
	State for Federal National Council Affairs	No PGIS tool online
	Public Works	No PGIS tool online
	Energy	http://www.moenr.gov.ae/en/e-participation/e-participation-policy.aspx no PGIS tool, or location services
	Social Affairs	http://www.msa.gov.ae/MSA/EN/Pages/eParticipationPolicy.aspx no PGIS or location services, but social media tools
	Health	http://www.moh.gov.ae/en/E-Participant/Pages/PollResults.aspx no location services or PGIS tool
	Labor	No PGIS tool online
Environment and Water	http://www.moew.gov.ae/en/e-participation/social-media.aspx no PGIS or location services, but social media tools	

The AD-SDI program is a shared infrastructure of the Abu Dhabi government, initiated within the ADSIC eGovernment program. ... Numerous projects were implemented to achieve 'AD-SDI institutionalization and support' as part of its on-going operational phase (<https://adsic.abudhabi.ae>).

Data on websites for the 19 ministries addressed by this research show a strong tendency toward convergence in the main features of their websites as relates to their development of PGIS and LBS. Here too some shared functionality between Federal level and the strengths of Abu Dhabi and Dubai ICT infrastructure and expertise shows progress toward integration. According to Makky (2014), the National Bureau of Statistics both recognizes the need for geospatial tagging and mapping of statistics but is well along on the roadmap to integration.

7.1 E-Participation Guidelines Provided by the Federal E-Government

All of the 19 Cabinet organization's websites posted some information about the federal e-government's e-participation guidelines. A few cases, such as Interior, MOI and Education, MOEd, stated only having applied and conformed to e-participation guidelines. Other sites assumed that the public was already well aware of institution's identity and functions, so consequently provided minimal corporate or institutional profiles information.

Across all 19, their current method for public services deliveries relied on smart phone applications along with access to their internet website for interactive service information. Overall, all 19 appeared to be differentially maintained, e.g., the ministry of defense website was not working, while the health, education, and public housing websites are active and integrate with a mobile application, to which they inform the user about where to download for different operating systems. Some outdated information also indicates a need for regular service maintenance, perhaps assigning a webmaster to more frequently update site information. As well, uneven status reports on feedback indicate a need for organizations to capitalize on e-participation to monitor how public perceptions of their services vary. Likewise website identity profiles posted for each of the 19 organizations also varied in quality and quantity of information. But some leeway should be expected according to how well mission statements were synchronized to declare objectives, and the deep breadth of the organization's public outreach.

7.2 Transparency

Assessing all 19 websites shows a consistent commitment to openness and transparency in dealing with the general public. The huge volume of information embedded in those sites seems to underscore organizations' keenness on fostering two-way communications with the public. Some

of these organizations, i.e., Health (MOH) posted quite detailed information about its organizational structure. Other sites provided free online public access, some even with full-text, downloadable publications, e.g., research reports, staff profiles, financial reports and community feedback.

7.3 Location Based Public Services

While only a few sites overtly stated use of LBS processes or displayed some summary data, many included hyperlinks social media sites such as Twitter, Facebook and Instagram with potential for some location based data collection. Electronic services were well represented, including payment of utility bills, traffic violations, etcetera, and some basic online commercial transaction facilities. Those more interactive sites were designed to foster public awareness of the organization's commitment to public service and open communications.

7.4 Two-Way Communications and Feedback Facility

All sites assessed by the research included a visitor feedback link allowing the public both options to sign in and make comments, or anonymously post their views on issues pertaining to the organization's objectives, functions or implementation. Some sites, such as Interior (MOI), attained ISO 9001 status as early as 2008, and was commended for allowing posting visitor comments to remain open for social viewing and further comment, thus initiating potential dialogue on issues within its organizational responsibilities.

7.5 E-Participation Tools and Location Based Services

Concerning participation and empowerment, all these organizations are well positioned to share information with the public in the development and improvement of services. Clearly all sites follow the Cabinet guidelines on e-participation and show policy and intent as well as implementing some functional practices to facilitate greater degrees of responsive e-government services to the people. The overall direction of the cabinet seems to genuinely stress transparency and accountability, But based on each organization's current resources and responsibilities they seem to have interpreted and implemented the guidelines in a manner more consistent with their particular functions.

8. A FINAL NOTE AND SUGGESTIONS FOR FURTHER RESEARCH

The preceding process of gathering and assessing information on how well cabinet level government ministries functionally implement participation policies was generalized across the 19 organizations, and their websites. Generally, government services to public organizations (G2G) combined some factors of PGIS into

a more comprehensive package of integrated services. Such features, the research concludes, were attempts to address issues through a range of public participation channels, (social media), such as Twitter, Facebook, Youtube and Instagram. How effective these e-participation channels have been remains an open question. Therefore the theory under which this research was conducted has proven somewhat useful in assessing the practices of Cabinet level organizations, the results of which, however, inconsistent, show progress. The research found that differing internal organizational factors affected practical application of the e-participation guidelines, in particular how much each organization had direct contact with the publics they serve. Thus further research should disaggregate the cabinet level ministry organizations, and study each one under its own specific goals and conditions, and how much similar entities, such as ministry of transport in comparable (GCC) countries have developed e-participation. This result should then be compared with universal best practices standards, such as the UN EPI top 10 performers disaggregated to specific organizations, i.e., national transport agencies. Similarly, stakeholder issues should be investigated and compared in terms of quality and quantity, and assessed as to how much success e-participation is internally or externally driven. This comes to the final question about UAE stakeholder management, how much is internally driven by good government practices, and how much is externally driven by individual and crowd-sourced stakeholders or by related stakeholder organizations. The question of good governance is thus not specifically one of the degree to which e-participation builds stakeholder empowerment or the degree of perceived empowerment. Rather, as e-government increasingly merges with e-commerce and other Web2.0 social networked stakeholder processes, how well do those entities serve the stakeholders? Specifically, how satisfied are stakeholders with the overall integration of services to meet their material, cognitive, and emotional well-being in a world largely managed in cyberspace.

In conclusion, the future of any smart city, or smart government, depends on a successful stakeholder participation process, but to what degree is such a process driven by government outreach or by stakeholder demands? All nation-state systems of governance create internal administrative divisions corresponding to geographical and functional differences. Thus the UAE needs to be assessed in terms of its own historical geography, cultural traditions, administrative divisions, and societal development in relation to aspirations for a sustainable future as a knowledge-based, smart system. Amid rapid growth, the UAE leadership has high aspirations that consume large amounts of resources and demand all forms of capital investment within a shifting dynamic of societal stakeholders. Although the challenges are great government efforts are equally committed to institutional e-transformation of governance to better the

lives of all citizens, residents and visitors. Thus reaching the goals of this process will be greatly enhanced by further development and integration of interactive e-participation in providing location based information (LBI), crowdsourced and independent voluntary geographic information.

As a long term research into public participation by volunteering spatially linked information (LBI), and its integration into the spatial data systems supporting better informed national policy and practices, the next phase of the project faces a fork in the road. Either it disaggregates the cabinet level ministry organizations to make a closer inquiry into each one, or it turns to the next layer of government, and assesses parallel and associated organizations at the level of each Emirate. For the following reasons the research will take the second option. First the cabinet organizations are still in process of continual development and improvement of e-government service through implementation of e-participation processes, so that it would be better to wait until they hit a plateau prior to reaching the 2021 goals. Secondly as LBS and e-participation processes develop either more or less rapidly at the level of the two large urbanized emirates, Dubai and Abu Dhabi, that will also have an impact on Federal Government management of e-government policies and practices. Therefore the next step will be to apply a similar approach to each of those two Emirates before returning to reassess Federal government practices.

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