Advancing the Hi-Tech Ecosystem in the Periphery:

The Case of the Sea of Galilee Region

|  |  |
| --- | --- |
| Yael Dubinsky  Software Engineering Department  Kinneret Academic College  Jordan Vallee, Israel   yael\_dubinsky@mx.kinneret.ac.il | Orit Hazzan  Education in Science and Technology  Technion – Israel Institute of Technology  Haifa, Israel oritha@technion.ac.il |

ABSTRACT

We applied Design Science Research (DSR) principles to define the Sea of Galilee (SoG) method. The SoG method aims at harnessing existing and new technological initiatives in the periphery and creates a socio-technological network upon which hi-tech activities can be initiated and maintained. The SoG method is composed of a set of principles, stakeholders’ network, and actual hi-tech initiatives including their infrastructure and practices.

The three cycles of DSR, the *Relevance*, *Rigor*, and *Design* cycles, lays out a research framework to sharpen the requirements, collect case studies’ data, and refine the SoG method iteratively based on the existing knowledge base. We believe the SoG method fits to be deployed by regions’ councils that wish to be considered *smart region* extending the notion of *smart city*.

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the owner/author(s).

*ICSE’22, May 2022, Pittsburgh, PA USA*

© 2021 Copyright held by the owner/author(s). 978-1-4503-0000-0/18/06...$15.00

https://doi.org/10.1145/1234567890

CCS CONCEPTS

• Social and professional topics ~ User characteristics ~ Geographic characteristics • Software and its engineering.

KEYWORDS

Design Science Research, socio-technological initiatives, Sea of Galilee (SoG) method, periphery.

1 Introduction

This research work deals with the challenges of developing a technology ecosystem in peripheral areas. The research goal is to provide peripheral regions’ councils with a method that connects the various stakeholders and initiatives into a coherent socio-technological ecosystem. Specifically, we wish to present a method that enables mapping the stakeholders’ network in the periphery and their expectations, and with which actual hi-tech activities can emerge and thrive in the peripheral area and extend the area’s hi-tech ecosystem. These activities are used as kind of glue that interconnects among stakeholders and increase their network stability and robustness.

Hi-tech companies tend to concentrate in certain central geographical areas, frequently in urban metropolises e.g., San Francisco, London, Beijing, and Berlin [1, 2]. This phenomenon has many advantages, both for the companies themselves and for the regional economy. The companies inspire each other with technological knowledge, exchange skilled human capital, and attract investors. This trend has been grown in recent year due to a) the increasing technological complexity that needs greater collaboration and b) the increasing attraction of workers to vibrant urban areas. More than 50% of venture capital investment in the world is concentrated in only ten urban metropolises [3].

Focusing on Israel, the technology ecosystem is concentrated predominantly in the Tel Aviv metropolitan area [1]. More than 60% of all hi-tech jobs in Israel are located in the Tel Aviv and central regions, and as Figure 1 illustrates, approximately 77% of the tech companies in Israel operate in this area. This trend has intensified in recent years with the growth in hi-tech employment in Tel Aviv, constituting approximately 70% of the total increase in this sector in Israel [4].

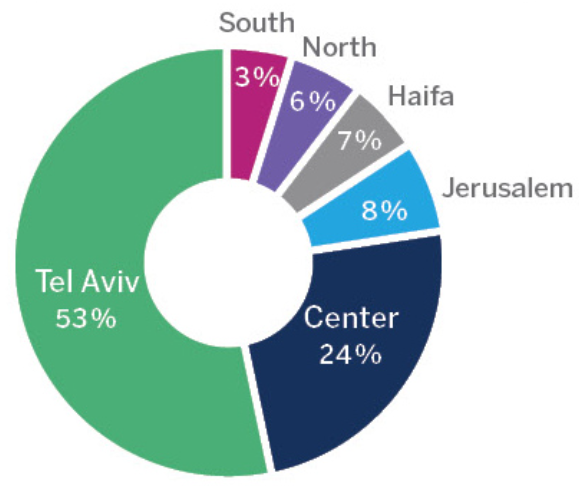


Figure 1: Startups in Israel by region - 2018

The Israeli Innovation Authority encourages local entrepreneurship in the periphery via local entrepreneurship incubators, with special emphasis on an affiliation with regional anchors, such as academic institutions and centers of industry, agriculture, and food [1]. These incubators promote the establishment of local startup companies by local entrepreneurs while connecting them to the needs of local industrial, agricultural, and food companies and to regional applied research centers. The incubators thus contribute to the development of a local innovation ecosystem. In [18], the authors suggest to policy makers to create a vibrant environment i.e., a fruitful environment that features hundreds of events per year in a small geographical region, typically, a single city, when events include lectures, workshops, conferences, informal meetings, social events, and parties around technologies, business, financing, marketing, etc. The authors claim that the city of Tel-Aviv is currently doing very well in this aspect but other regions in Israel are not.

Several general questions can be asked when dealing with hi-tech emerging in the periphery: How can we build upon the peripheral national anchors to create meaningful hi-tech business groups and companies? What operational activities should be done to make it happen? Specifically, in this work, we explore such an operational activity that is an actual hi-tech activity and a significant component of the SoG method, and measure its effect on the various stakeholders operating in a peripheral area. This activity led us further to suggest the SoG method as an enabler to govern a *smart region* following the notion of a *smart city*.

The contribution of this work includes a) the detailed SoG method that can be used in similar peripheral situations; b) application of Design Science Research for large-scale artifacts; c) knowledge that can form the basis for further design cycles of scientific research.

In Section 2 and 3, we describe the research setting and the research method, respectively. In Section 4, we present the artifact named the SoG method as emerged in this research. In Section 5, we extend the existing knowledge base using our work, and we conclude in Section 6.

2 Research Setting

Kinneret Academic College is an Israeli higher education institution founded in 1965 on the southern shores of the Sea of Galilee also called Kinneret. Between 2004 and 2010, several engineering departments were founded including the Software Engineering Department that was founded on 2010. The college promotes a multicultural educational philosophy, social involvement and continued development of the region. Students study for B.A., M.A. and B.Sc. degrees in the Achi Racov Faculty of Engineering and in the Faculty of Social Sciences and Humanities. The college, with more than 7,000 graduates, fosters diversity and an intellectual environment, developing leaders who inspire future generations and serves a diverse student body, through a combination of academic and non-academic continuing education programs.

The main aim of the Achi Racov Faculty of Engineering is to contribute to the development of society and economy in Israel, particularly in the peripheral areas of the Galilee, the Golan Heights, the northern and eastern valleys of Israel, the Jordan Valley, and the cities: Tiberias, Beit Shean, Katzrin, Hatzor HaGlilit and Safed, by training engineers in the hi-tech fields. Engineering education includes a strong foundation in the basic of the engineering sciences, knowledge in the engineering fields, with an emphasis on complex and multi-disciplinary systems, and professional-engineering training in engineering projects in collaboration with industry.

In 2018, the Kinneret Innovation Center (KIC) was founded as a partnership of the Kinneret Academic College and Zemach Regional Industries Ltd, a cooperative owned by 27 agricultural communities in the Jordan Valley. KIC aims to attract and develop new talent, ideas, entrepreneurs, investments and enterprises to the Sea of Galilee region. In order to create new economic advantages and rewarding employment opportunities in the Northern region, KIC leverages the extensive assets of its founders, strategic partners and the agricultural heritage of the area. In addition to the physical space and the rich history of its regional assets, KIC is building a thriving innovation community consisting of a good mix of academia, established industry, international corporations, entrepreneurs, NGOs and investors. This diverse KIC community interacts, challenges and explores opportunities for collaborations which may lead to ground-breaking innovations in the agro-tech, water-tech and food-tech fields. In addition, KIC leads a non-profit accelerator program in the agro-tech, water-tech and sustainability fields, and maintain a regional forum of Chief Executive Officers, the CEO forum, with more than 60 CEO’s of organizations in the region. KIC provides a nurturing environment for startups who aim to transform Israel into a cutting-edge technological leader in these fields. Beyond ideas, the KIC also connects people and provides a place for collaboration and building upon new ideas.

In October 2020, the first author founded the *KIC Development Business Unit* named KIC-Dev. KIC-Dev is a business unit inside KIC. The main goal of KIC-Dev is to strengthen the cooperation between the Kinneret Academic College and KIC and to provide the college staff and students an infrastructure to connect with the hi-tech and the regional ecosystem. We suggest that the KIC-Dev has a major role in the SoG method that is shaped in the research work presented in this paper.

3 Research Method

We adopted Design Science Research (DSR) [5] to create the SoG method in the context of Information Systems. According to Hevner [5], DSR is an embodiment of three closely related cycles of activities: Relevance Cycle, Design Cycle, and Rigor Cycle. Figure 2 shows the DSR framework including the references to the appropriate sections of this paper.

**The Relevance Cycle:** The Relevance Cycle is the first cycle, which involves defining the problem to be addressed, the research requirements, and the criteria for evaluating the research results.

In our research, we address the *problem* of a peripheral community that wishes to extend their hi-tech ecosystem i.e., to increase the number and size of hi-tech companies operating in the area.

Diagram

Description automatically generated

Figure 2: The framework of Design Science Research (including references to paper sections)

We focus on growing software organizations and define the following *requirements*:

* (R1) Map the local stakeholders’ network that owns the resources required to create local hi-tech business activities.
* (R2) Create R&D groups that employ local college students, graduates, and senior developers.
* (R3) Establish a learning mechanism to improve constantly according to the evaluation criteria.

The *evaluation* criteria, as sown in Table 1, are derived from the list of requirements, and are based on on-going measurements.

Table 1: Evaluation criteria for the requirements’ coverage

|  |  |  |
| --- | --- | --- |
| Req. | Evaluation criteria | Subjects of measurements |
| R1 | * Network attributes * Resource utilization | * College management * Innovation center * Local industry |
| R2 | * Project metrics * Level of engagement | * Students, alumni and academic staff * Local developers * Customers |
| R3 | * Retrospective process | * Management of development unit * College management * Innovation center * Local industry |

**The Design Cycle:** The central Design Cycle involves the development and evaluation of artifacts and/or theories used for solving the identified problem. It iterates between the core activities of building and evaluating the designed artifacts and processes / theories [5].

Our proposed artifact is the SoG method that is presented with details in the next Section. The core component of the method involves the establishment and management of the KIC-Dev business unit in the SoG region. The SoG method is evaluated and shaped in an on-going process, based on case studies of development projects each of them developed for a specific customer in the KIC-Dev business unit. These case studies are presented in Section 4 for illustration while presenting the internals of the SoG method.

**The Rigor Cycle:** The Rigor Cycle refers to knowledge generation and use. Rigor is achieved by using foundations and methodologies from the research knowledge base, and adding knowledge generated by the research that in turn contributes to the growing knowledge base [5]. The main foundations we use are the literature on building ecosystems and qualitative analysis of case studies. Important knowledge and experience has been gained also by the actual execution of the development projects described in the case studies as part of KIC-Dev. Research participants include the KIC-Dev customers, development teams, and the management boards of the college and KIC. We used researchers’ notes and interviews as data collection tools.

4 The SoG Method

Facing the challenge of creating hi-tech activities in the periphery, the resulting artifact of this work is the SoG method built based on existing literature and accumulated exploration of case studies. The SoG method guides a systematic process that aims at building a technological ecosystem in the periphery, leaning on regional and governmental anchors, such as a college institute and an innovation center. The SoG method is the result of the Rigor Stage of DSR conducted so far in two iterations in one year.

The SoG method is composed of 1) a set of principles that guide the ongoing process of maintaining and advancing the hi-tech in the periphery region; 2) a stakeholders’ network that includes the various organizations and people that are part of the ecosystem in the region and the relationships among them; 3) a collection of actual hi-tech business activities that serve as the glue among stakeholders and further add new stakeholders.

In what follows, we describe the SoG components: the principles, the stakeholders’ network, and one instance of a hi-tech business activity that is part of the SoG collection of activities. This activity is the establishment and management of the KIC-Dev business unit. We also use the KIC-Dev for illustration of the two first components of the SoG method in order to set the ground for the KIC-Dev example.

4.1 Principles

The SoG principles can look trivial when talking about advancing local hi-tech in urban areas of a certain country, still, when arriving to peripheral areas, these principles should be discussed on a regular basis (as shown in Section 5 based on existing work).

The first principle is: *The techno-social ecosystem should form a win-win situation*. In the case of KIC-dev, the ecosystem win-win situation was first defined as an enabler for the college students and staff to be engaged in hi-tech development activities. The definition states that a project can be considered for acceptance only if the development team has at least 50% regional footprint. After a few months, this definition was extended to include the exposure and the relationships with the CEO regional forum. The region’s managers of local organizations now better aware how they can win by outsourcing (when applicable) the developing of their projects. Four CEO’s already outsource their projects to KIC-Dev. At the end of a successful project, the Chief Information Officer (CIO) of the local organization said that “now there is a way of working together with the hi-tech development division [KIC-Dev] in our region. We have another vendor in our vendors pool.”

The second principle is: A*cademia mechanisms should connect directly to hi-tech activities*. In the case of KIC-Dev, the college management agrees to allocate encouragement scholarships for students to engage in hi-tech activities.

The third principle is: *Pursuing the regional business to emphasize hi-tech activities and companies.* In the case of KIC-Dev, the target focuses on dealing with software projects, system projects, and projects that require data science skills, while when it was established, no other development house in the area offered system and data projects. Further, based on our data, hi-tech companies in the area are not perceived by local stakeholders as such. A work should still be done to position KIC-Dev correctly and increase awareness of its existence and spirit.

4.2 Stakeholders’ Network

There are several stakeholders when establishing development business units. In the case of the KIC-Dev, we defined the list of stakeholders and their expectations, as shown in Table 2.

Table 2: SoG stakeholders’ expectations

|  |  |  |
| --- | --- | --- |
| Academia | Hi-tech Industry | Other Sectors |
| Kinneret Academic College  Increase number of students in the college  Increase student & alumni engagement in hi-tech activities in the area | Hi-tech organizations  Increased number of projects  Lean on local human capital | Kinneret Local municipalities  More funds  More residents  Increase younger population |
| Kinneret Students  Hi-tech experience  Hi-tech jobs | Ecosystem  More startups in the area  More funds | Tourism industry  Increased number of visitors  More jobs |
| Kinneret Alumni  Hi-tech jobs in the area  opportunities to stay living in the area | Kinneret Innovation Center  Increase activity  Increase engagement with students and faculty  Increase of salary levels in the area |  |

The expectation list has led us to define a set of success criteria. At the beginning, we defined the following success criteria:

* Triple the number of software engineering students in 4 years.
* Increase academic acceptance threshold by 15 points every year.

As we progress, improving our understanding of the demographic and social situation in the periphery, this success criterion was omitted since we realized that the relatively low threshold to enter academic studies is essential in the periphery.

* Increase the number of ‘staying-in-the-area’ alumni graduates per year.
* Increased number of startups launched by alumni.

4.3 Projects’ Infrastructure and Practices

Establishing a new business unit for development projects usually sets business, technological and social challenges.

Challenges relate to the business aspect address questions such as: Are some initial investments needed? where will customers arrive from? where will the developers come from? why will customers trust us? what is the best business model? etc. All these questions exist in any location but are more significant in the periphery.

Technological challenges address questions such as: How can we maintain quality of development and quality of continuous deliveries? Again, these questions exist in any development unit.

Social challenges are probably a part of every development unit, still, these are the ones that lead the unit activities in the periphery. In order to grow the unit, we must provide concrete answers to questions associated with the social challenges e.g., how many developers from the SoG area work in the tech industry in the area? what are the social criteria of accepting a certain project to be developed in KIC-Dev? etc.

To answer these questions, two main phases took place during the first year of research. The first one is *the Encouragement Phase*, and the second one is *the Pilot Phase*. In what follows, we describe these research phases, using some projects as illustration for the infrastructure and practices created and defined as part of the SoG method.

*4.3.1 The Encouragement Phase.* In the *encouragement* phase, we searched for projects and customers to start with when no investment was available. We had the support of the board of directors and the KIC management. At this stage, the most important support arrived from the college management that agreed to allocate encouragement scholarships to students to enable them to experience their future practice in hi-tech activities. Our first customer was found by a 4th year software engineering student who lives in the area and is familiar with a manager in one of the companies in the area. This customer is a global company with twelve sites in Israel and abroad. The project includes building a unified vendor database merging all sites databases and provide an assessment tool to assess and recommend vendors to work with. This was the first project we developed using voluntary hours for project management and four encouragement scholarships for a team of four students.

The second project that arrived is a strategic project that is still under development and has the potential to become the future R&D unit of the customer’s company in the SoG area. This customer was found by an experienced educator who lives in the area and was familiar with the customer activities. While the SoG area is in the north of Israel, this customer is from the south periphery of Israel which shares the same challenges. This customer selected KIC-Dev specifically because of the expertise of KIC-Dev management in the product domain, and the effect of closeness of KIC-Dev to the college academic staff as for experts, and the students as for future potential employees in their north branch. One of the customer’s goals as was announced at the beginning of the project is to “cooperate with the academia in order to develop business and social impact in Israel and in the US.” The project includes the development of an advanced LMS (learning management system) that includes the ability for educators to build and edit content, and the ability to view and guide educational activities, in both LMS and in class, based on AI-engine that analyses learning and teaching data.

As the infrastructure for the unit management and specifically for the projects’ management, we selected the Monday tool [6]. It serves as a communication channel with the KIC management for activities, such as, managing the pipeline of potential customers, and follow up valid projects, vendors, and personnel. For example, Figure 3 shows the Monday board for managing the different projects according to their status; Figure 4 shows several columns maintained for the projects in the group of Active Projects.

From the perspective of one specific project, we use the Monday tool for boards that reflect the Agile methodology [Refs] implemented in KIC. Figure 5 illustrates the iterative manner of task management and Figure 6 delves into one development iteration, where we can see some of the board columns that we use for project management and follow up.

Graphical user interface, text, application

Description automatically generated

Figure 3: Monday view for projects’ overview

Graphical user interface

Description automatically generated

Figure 4: Maintaining active projects

A picture containing graphical user interface

Description automatically generated

Figure 5: Monday view of the development iterations

A screenshot of a computer

Description automatically generated with medium confidence

Figure 6: Monday view for task management

The practices we use are derived from the Agile set of principles that suit the characteristics of the development unit. We defined a business model that answers the needs of our stakeholders and customers and deploy the practice of *short iterations*. This model includes the practice of 2-week development iterations in which the customer approves the tasks for each iteration before the next iteration starts, meets with the senior development team every week to ensure alignment, provides feedback for the delivery at the end of the iteration, and so on. Every month, that is, after two iterations, only of the customer provide a business approval, the project continues. Every three months or fiscal quarter, we conclude a business phase and examine with the customer the next phase. This process intends to reduce the business risk as much as possible.

The main practice we have established during the encouragement phase is the *team empowerment*. We started to create development teams for each project, each one is composed of senior and junior developers as well as software engineering students. Following our win-win principle described in Section 2, we refer to as many as possible stakeholders’ expectations while building the teams. This enables us to propose an attractive business offer and to build a professional team, that can embrace software engineering students into hi-tech development activity. We suggest that the classic model of directly engaging students with hi-tech employers [e.g., in ref #ladder] is difficult to deploy in the periphery mainly because of socio-economic parameters [Ref Israel statistics]. Therefore, in our case, we build and supply the environment in which such engagement can be operated by experts in both development and management manners.

*4.3.2 The Pilot Phase.* After a few months of work, we have managed to convince the KIC board of directors that there is a reason to further explore the SoG method and specifically, to give the KIC development unit time for its pilot stage until the end of the fiscal year of 2021. In the *pilot phase*, our goal was to convince customers who are located in the SoG region to work with us. For this purpose, we initiated two directions. The first is named *North4.0* aiming at projects that relate to industry 4.0 and specifically, projects like data harvesting and predictive maintenance. We have today one such customer. The second direction is named *North stays at the North* that calls customers not to move their development budget to other areas but leave it in the SoG area. We have today three such customers. During this phase, we strengthen the relationships with local organizations and better define their role in the stakeholders’ network.

While increasing the number of projects, hence the number of developers, vendors and students involved, we continue to increase awareness to KIC-Dev in the academic college. This way, we received a development project from one of the faculty members in the college who had a fund to develop a mobile application for multi-lingual professionals. The academic year was ended, and we succeed in involving two graduates who live in the area as developers. And finally, a new collaborative marketing activity is established between the academic college and KIC-Dev.

4.4 The SoG Method Evaluation

In Table 1, we described the evaluation criteria for the examination the extent to which the SoG method addresses three requirements (Section 3). In what follows, we present the evaluation for each requirement of the SoG method using measurements and results associated to each requirement. Based on qualitative analysis of data collected during two design cycles, we share representative results.

*4.4.1 (R1) Map the local stakeholders’ network that owns the resources required to create local hi-tech business activities.* The evaluation of the first requirement includes the criteria of network attributes and resource utilization.

The implementation of the SoG method includes a network of more than 60 organizations from different types that reside in the SoG region and that have clear incentive to foster the hi-tech eco-system in the region. We succeed in increasing the awareness to KIC-Dev and its activities. Still, there is a work to be done to explore the connectedness of the network entities and potential ways for collaboration. After one year, we see that some stakeholders’ expectations were partially met:

* 18 students acquired hi-tech experience
* 2 alumni won freelance jobs
* 9 development projects for customers were managed, 6 of them are for local industry

Students’ engagement times in the activities of the innovation center, were increased by 10.

Resources allocated by the college and the innovation center were used to enable KIC-Dev activity. Based on interviews with participants, most of the senior practitioners see themselves pioneers in bringing hi-tech activities to the region.

The value proposition for the main stakeholders is constantly discussed. Since KIC-Dev is a new initiative which is more a bottom-up initiative rather than a top-down strategic activity, we can say that the stakeholders are still learning the extent of the values that the SoG method can bring. We are working to better frame it in the second year of activity.

*4.4.2 (R2) Create R&D groups that employ local college students, graduates, and senior developers*. Evaluating the second requirement includes the criteria of project metrics and the level of engagement.

In its first year, KIC-Dev has 7 in-development projects and 2 completed projects. The customer organizations are varying from education, consulting, food and agriculture to cyber physical systems. Interviews with customers, who represent the industrial pool of stakeholders, show that they as well relate to the social aspect of KIC-Dev and are proud to be part of it. One of the customers said that “This is about two organizations – we and KIC – that bring academic knowledge and practical experience, each in its domain, together with an agenda of strengthen the periphery and bringing the news that innovation emerges here. An excellent combination between our characteristics and agendas.”

*4.4.3 (R3) Establish a learning mechanism to improve constantly according to the evaluation criteria*. Evaluating the third requirement includes measurements of retrospective process [Ref books, paper].

The iterative manner the SoG method that is derived from the iterations of the business activity of KIC-Dev, provide us an on-going retrospective process that takes into consideration the SoG stakeholders, the customers, and the development teams.

At the end of the first year of defining the SoG method, the college management use it for marketing, the customers see us as friends with the same vision, the local senior developers are happy that there is a new hi-tech place, and the students emphasize the advantages of experiencing teamwork and working with customers. One of the students who graduated at the end of the year said that “Experience the hi-tech activity as a students while studying gave me the confidence to know that I can cope with it, I graduate with more experience, knowledge, things that are not received in the academia, until I worked and experienced it, I didn’t know I capable of.” Another student said that “I learned how to deal with a project and how to plan it, product processes, working with customers, how to deal with problem solving, how to deliver a project, and many more things!” One of the customers said that “There are no customer and vendor here, but rather cooperation among experts and friends on the go.”

5 SoG Method Extends the Knowledge Base

We review some of the literature that relates to the context in which the SoG method can be applied, focus on literature that deals with implementing digital transformation, smart solutions and innovation processes in regions, towns, and rural areas. For completion, we examine cities as well as and further examine the concept of smart city since technology is at the core of initiatives in such cities and we wish to bring at least some of these initiatives to the periphery area. This Section is the result of the Knowledge Base Stage of DSR.

According to Forrester report, the smart city is a city that uses information and communications technologies to make the critical infrastructure components and services of a city — administration, education, healthcare, public safety, real estate, transportation, and utilities — more aware, interactive, and efficient [9]. A smart city or a smart town should be considered as an innovation ecosystem empowering the collective intelligence and co-creation capabilities of user/citizen communities [15]. With respect to stakeholder involvement, towns have an advantage over cities as they are characterized by smaller sizes, sparser populations, and more interlinked relations between citizens and communities [13].

In such a city, public services, like higher education provided to the citizens, on which we focus in this paper, is an example to where smart solutions are required. Educators and administrators recognize the power of new technology to improve the efficiency and effectiveness of the academic institutes. They are increasingly interested in leveraging new technologies to both increase access to educational content and improve collaboration among students and faculty. In the case of the SoG method, we refer to the cluster of cities, towns, and settlements in the region as the ‘smart SoG region’. One of our main stakeholders is the college management who after a year sees KIC-Dev as an engine to increase hi-tech activities in the region, continue to provide encouragement scholars and considers it as a kind of *glue* for creating stable connections on the stakeholders’ network.

Research regarding towns in the digital age is yet in an early stage and rather immature as digital technology remains a niche topic in rural studies [8]. In [7], the authors describe the challenges that need to be considered when implementing smart solutions in towns, among them mainly the importance of considering local context factors, ensuring local stakeholders’ involvement as well as gathering solution information and identifying and aligning suitable technological solutions. Cities and towns are entities that can be regarded as an overarching system of stakeholders [9]. A study of seventy cities investigates the role of various context variables e.g., economic, urban, demographic, and geographical variables, and their impact on the development of a smart city [11]. They found that the evolution of smart cities largely depends on its local context factors. In [12], the authors highlight the importance of place-based approaches for regional development and argue that context factors in terms of social, cultural, and institutional characteristics really matter. Still, they note that policies should also be people-based when we wish to foster innovative ideas through the interaction of insiders and outsiders thus to foster the improvement of regional development efforts. In the case of the SoG Method, the network of stakeholders and its relationships are an essential component of the method, and according to our experience in the first year of the KIC development unit, the relationships among stakeholders are what makes the challenge possible to meet.

There is no one-size-fits-all approach without consideration of the context [14]. The various types of cities and regions require their own terms for innovation activities and processes. Understanding the right context data and identifying the specific needs of an area are important steps, and then priorities should be set for the actions according to the overall development plan of the city and their innovative vision [10, 15]. While understanding the context of cities already constitutes a major challenge when implementing smart solutions, this becomes even more relevant and difficult when addressing towns [7].

The digital development of towns by means of applied innovation depends, to a large extent, on its local context factors, e.g., economy, geographical variables, or density of population, and other specific impact factors [11]. Towns therefore require stronger guidance on grasping relevant context factors and defining appropriate strategies [7]. According to [10], citizens and communities are the human engine. They have to engage constructively with the relevant stakeholders and strive to high levels of community participation. The roles of the participants during innovation processes create the bonds and dependencies and enable smart projects development [16, 17]. We need participants who can become the leaders and can initiate and maintain the smart city solution process [10]. Such leaders should ensure zero or little competition and conflicts among stakeholders [9]. In the case of the SoG method, we wish to grow the next leaders of the SoG area who will further increase the smart SoG.

In general, any smart city or town concept depends on the correct and meaningful application of digital technologies to the city life [7, 9, 13]. The same applies for smart towns. Once the context of the city or town with its individual characteristics, strengths, and weaknesses has been scrutinized and understood, the ‘smart’ dimension becomes a key factor in problem-solving processes and smart solutions. In this regard, digital technologies can be seen as important prerequisites, still without acute engagement and collaboration of relevant stakeholders, there is no smartness [13].

The common gap and mismatch between technology orientation and actual needs of cities constitutes a major challenge of smart cities [15]. Despite the diverse and individual challenges of cities, smart city solutions emerge rather from a technology push than a city pull perspective [9] (elaborate on the difference between push and pull). Further, smart towns have to be able to evaluate and monitor the potential benefits of such partial solutions with regard to the bigger picture. The challenge is to assess smart ideas and technologies and to understand which ideas may prove to be most effective in terms of fulfilling the needs of citizens, users or other stakeholders [7]. In the case of the SoG method, we actually ‘push’ technology to the area by providing more hi-tech activities and we evaluate the method from three perspectives that are the stakeholders, the development projects and the learning mechanisms.

6 Summary

We present the SoG method to be deployed in periphery regions for advancing the region hi-tech footprint. Specifically, while mapping the stakeholders’ network and lead the start of actual hi-tech business activities is the focus of the SoG method.

Starting the second year of research we aim at exploring the *glue* notion of connecting stakeholders and examine the business aspect and its effect on the major stakeholders.

REFERENCES

[1] Gabay U., Linzen N., Aharon A. 2018. An Innovation Driven Economy in the Periphery, A National Priority. In State of Innovation in Israel 2018, Israel Innovation Authority. 86-95.

[2] Katz, B. and Wagner, J. 2014. The Rise of Innovation Districts: A New Geography of Innovation in America

[3] Florida, R. Oct 3, 2017. Venture Capital Remains Highly Concentrated in Just Few Cities. Citylab.

[4] CBS Data, Labor Force Survey, High-tech sectors excluding communications sector.

[5] Hevner AR (2007) A three cycle view of design science research. Scand J Inf Syst 19(2):87–92.

[6] Monday.com.

[7] Hosseini, S., Frank, L., Fridgen, G., & Heger, S. (2018). Do not forget about smart towns: how to bring customized digital innovation to rural areas. Business and Information Systems Engineering, 60(3), 243-257.

[8] Roberts, E., Anderson, B. A., Skerratt, S., & Farrington, J. (2017). A review of the rural-digital policy agenda from a community resilience perspective. Journal of Rural Studies, 54, 372-385.

[9] Bélissent, J. (2010). Getting clever about smart cities: New opportunities require new business models. Cambridge, Massachusetts, USA, 193, 244-277.

[10] Zygiaris S (2013) Smart city reference model: assisting planners to conceptualize the building of smart city innovation ecosystems. J Knowl Econ 4(2):217–231.

[11] Neirotti P, de Marco A, Cagliano AC, Mangano G, Scorrano F (2014) Current trends in smart city initiatives: some stylised facts. Cities 38:25–36.

[12] Barca F, McCann P, Rodríguez-Pose A (2012) The case for regional development intervention: place-based versus place-neutral approaches. J Reg Sci 52(1):134–152.

[13] Nam T, Pardo TA (2011) Conceptualizing smart city with dimensions of technology, people, and institutions. In: Bertot J, Nahon K, Chun SA, Luna-Reyes L, Atluri V (eds) the 12th Annual International Digital Government Research Conference, pp 282–291

[14] Tödtling F, Trippl M (2005) One size fits all? Towards a differentiated regional innovation policy approach. Res Policy 34(8):1203–1219.

[15] Schaffers, H., Komninos, N., Pallot, M., Trousse, B., Nilsson, M., & Oliveira, A. (2011, May). Smart cities and the future internet: Towards cooperation frameworks for open innovation. In The future internet assembly (pp. 431-446). Springer, Berlin, Heidelberg.

[16] Pierce P, Andersson B (2017) Challenges with smart cities initiatives—a municipal decision makers’ perspective. In: Proceedings of the 50th Hawaii International Conference on System Sciences.

[17] Stahlbröst A, Bergvall-Kareborn B, Ihlström-Eriksson C (2015). Stakeholders in smart city living lab processes. In: Proceedings of the 21st Americas Conference on Information Systems.

[18] Kon, Fabio and Cukier, Daniel and Melo, Claudia and Hazzan, Orit and Yuklea, Harry, A Panorama of the Israeli Software Startup Ecosystem, March 1, 2014.