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The Development of Web-Based Geothermal Learning Community

Nenny SAPTADJI, Zuher SYIHAB, SUTOPO, Nurita Putri HARDIANI, YB Agastyo NUGROHO, Ariya DWINANTO

Geothermal Laboratory, Master Program of Geothermal Technology, Institut Teknologi Bandung, 40132, Indonesia

nurita_putri@yahoo.co.uk; selamatpagi@geothering.com

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ABSTRACT

Geothering or Geothermal Sharing is a website designed for geothermal communities of scientist or engineers, students or lecturers, professionals or public, to share their ideas, knowledge, and data, as well as to provide solutions and resolve issues, in an integrated system. Using a tagline of "Embracing Ideas, Engaging Community, Drawing Solutions for Geothermal Energy", the website is expected to serve as a mean of communication bringing together the communities in a collaborative responsibility and work for a substantial development of geothermal energy. The website enables the internet users to share their knowledge, discuss any issues, teach each other, as well as learn from each other in a forum that is structured for a collaborative work from various sectors which fundamentally discuss the notion of the enhancement of geothermal energy. The website also serves as a database. The awareness of the data quality and reliability should be raised since it is the underpinnings of a qualified science and engineering study. The underlying motive of having a better data management is that it is crucial as the basis of investment decision making, national resource management, and as a well-defined roadmap for the geothermal contribution to the national energy portfolio. This database itself is still continuing to grow to find a better structure for the network system. The foremost challenge is to involve community which comes from many disciplines and institutions as many data and research generated are difficult to access. Ultimately, numerous research efforts should be seen to have the long-term value for future generation to easily utilize these data for their next research which results to innovative findings as awaited.

1. INTRODUCTION

The emergence of the internet coupled with the rapid development of information technology opens up the opportunity for anyone to obtain any information with ease anytime and from anywhere. For academics, the internet is a source of knowledge whose existence almost replacing the "traditional" library. Through the internet, academics can easily update current knowledge related to their field of study by downloading paper or journal available online. Also, sometimes lectures delivered by professors from distant universities can be followed for free through a video that can be downloaded from the internet or via streaming. Every learner who is able to utilize this information technology has a better chance to have a better knowledge.

At the beginning of the information technology development, there was a web-based learning community which reform the learning method developed previously. They have been defined as groups of people who share common interests and needs and who come together online (Hagel & Armstrong, 1997). The beginning of their emergence is when these internet users bring any issues into a discussion on the internet which so quickly becomes public consumption and then getting a response by other internet users with great eagerness in seeking solutions to the problems that are being discussed (Rheingold, 1995). This is then referred to as collaborative learning which, in principle, a community that has similar interests come together in a forum to share knowledge and solutions to problems faced by other members of the community. Eventually, the value of knowledge collected from this community is far greater than the knowledge possessed by the individual because member has the opportunity to share knowledge and simultaneously acquire new knowledge from other members in the community. Learning community is formulated to support the social construction to share ideas, solutions, or constructive evaluation of the work created by the community member itself. Furthermore, the learning community is a community characterized by voluntary sharing of resources (knowledge), open to any ideas, and able to establish regular internal communications among them to collectively discuss solutions to the problems that arise. According to Nachmias et al. (2000), a learning community is described as a new educational system that is built with a combination of three things: the social dimension (community), the dimension of technology (internet), and educational dimensions (integrated learning system).

2. GEOTHERMAL MASTER PROGRAM

Education – Research – Community Services: the three pillars of higher education system, also known as three responsibilities of higher education institution requires a collaborative effort from not only its institution, but also government, lectures, students, alumni, industry, etc in order to be implemented.

Geothermal Engineering Program - ITB has formulated plans to increase its capacity to support the three pillars as illustrated in the following figure. One of the agenda is Research, Database, & Software Development as part of Research Consortium building in collaboration with the Geothermal Industry in Indonesia.

Development of a web-based network of community geothermal energy has become one of the agenda that is being pioneered by Geothermal master Program-ITB as part of the plans to increase capacity (capacity building) in order to prepare students applying their knowledge of geothermal in a real field.

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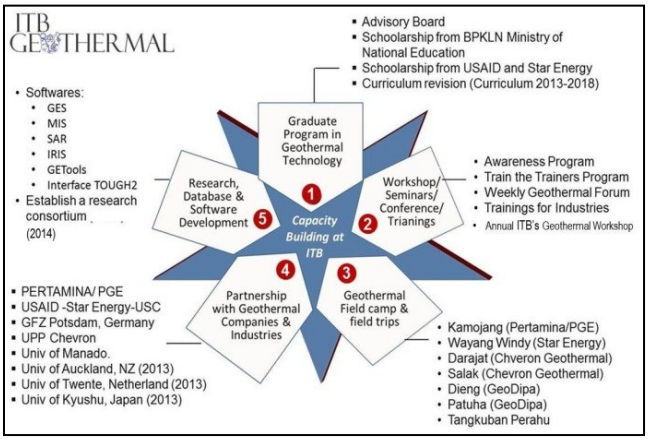


Figure 1: Geothermal master program of ITB

Currently, we are developing a website which is called Geothering to support our program in capacity building. Geothering or Geothermal Sharing is a website designed for geothermal communities of scientist or engineers, students or lecturers, professionals or public, to share their ideas, knowledge, and data, as well as to provide solutions and resolve issues, in an integrated system and attractive way to learn. As academics, we realize that many people are not aware of geothermal potential in their areas as this new energy may not be as popular as other energy resources. As we experienced conducting seminars in many cities in Indonesia, from Aceh on the west to Manado on the east, we received many questions regarding geothermal energy, beginning the question with what geothermal is? For the local people who live near geothermal area, the question raised was particularly about the environmental issue. It awakes us that more and more people should be educated and given the right information of geothermal energy development. One of many ways to spread that information is through internet, therefore the information or knowledge can be learnt in an extensive way.

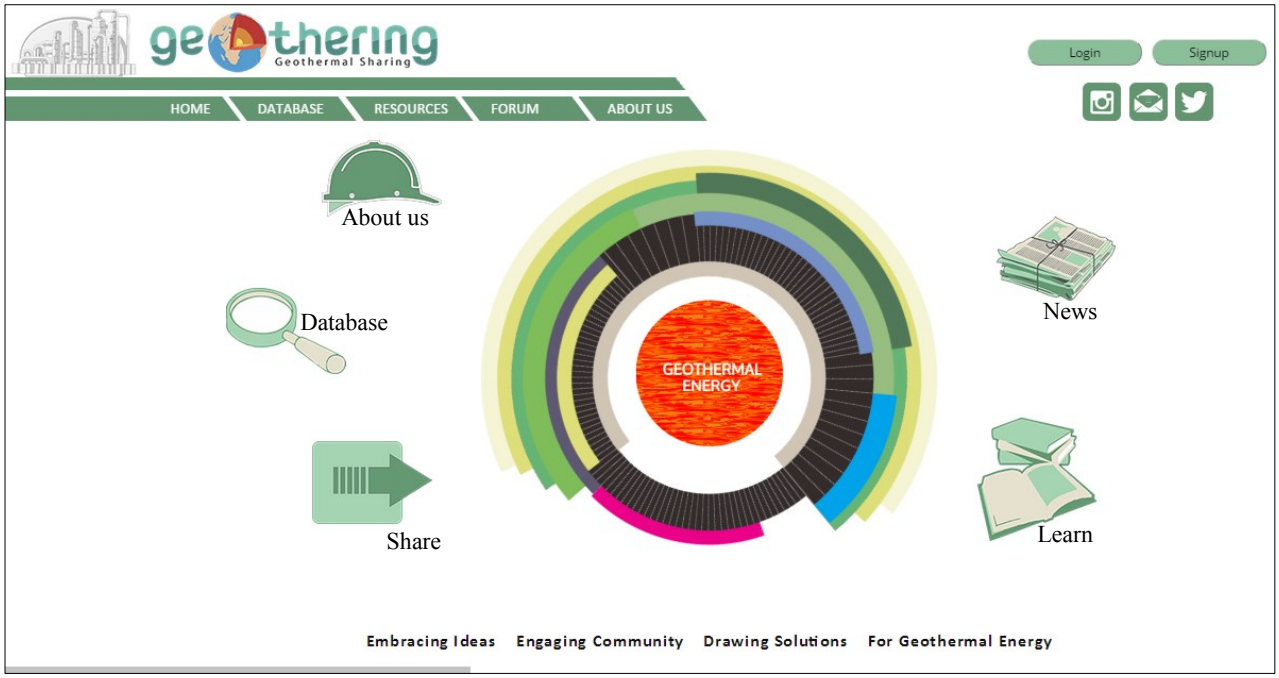


Figure 2: Homepage on geothering.com

3. GEOTHERING MENU

3.1 Database

In the menu of database, there are three submenus, i.e., Interbaseline (Indonesia Geothermal Database Online), Geoscience and Reservoir Directory, and Publication. Figure 3 shows the map of geothermal working areas and brief information of them. The more detailed information of the area also can be downloaded from the website.

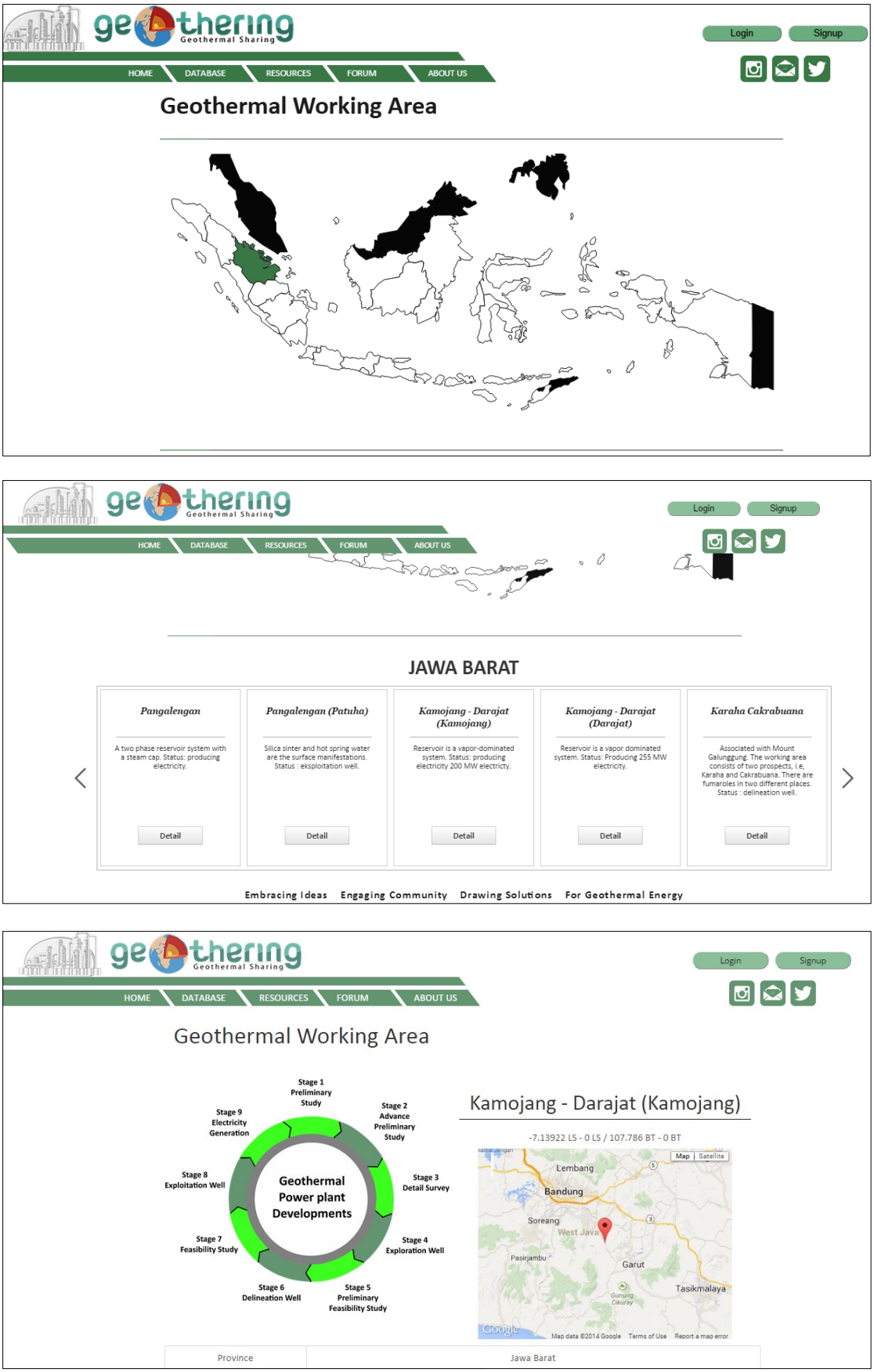


Figure 3: Feature in Interbaseline

The awareness of the data quality and reliability should be raised since it is the underpinnings of a qualified science and engineering study. The underlying motive of having a better data management is that it is crucial as the basis of investment decision making, national resource management, and as a well-defined roadmap for the geothermal contribution to the national energy portfolio. This database itself is still continuing to grow to find a better structure for the network system. The foremost challenge is

to involve community which comes from many disciplines and institutions as many data and research generated are difficult to access. Ultimately, numerous research efforts should be seen to have the long-term value for future generation to easily utilize these data for their next research which results to innovative findings as awaited.

Other submenu, i.e. Geoscience and Reservoir Directory is intended to support learning material for our students which includes data from all disciplines of geothermal knowledge, form Geology to Power Plant (Fig. 4). It shows Pressure Temperature (PT) data from Well AHA-1 in shut-in condition which can be further analyzed the profile of its well. This collection of data gained from real field helps students practice with real data which expectedly can meet the qualification that industry demands. It serves to provide content by presenting the students with a real-world challenge which they may encounter when they are practitioner one day.

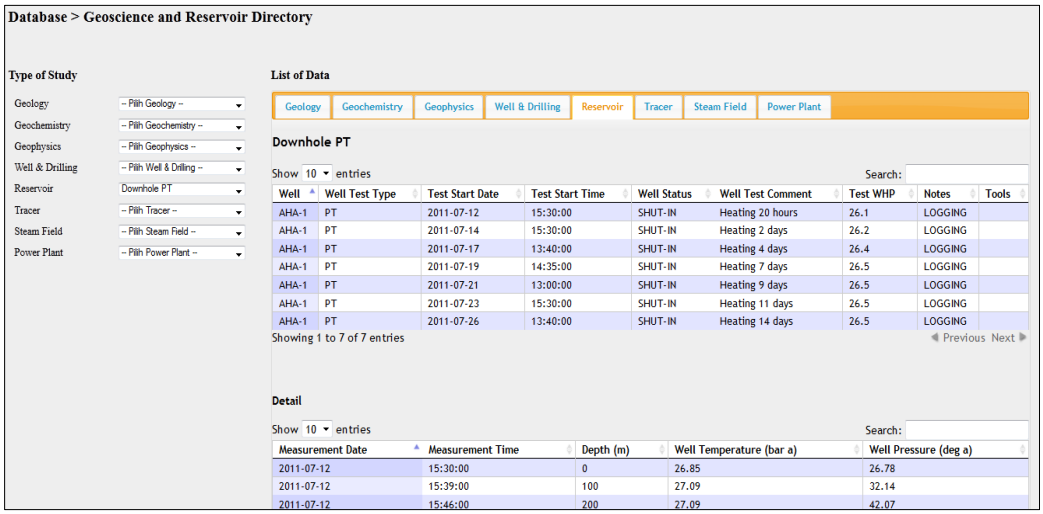


Figure 4: Feature in Geoscience and Reservoir Directory

3.2 Resources (Geothermal Knowledge)

The progress of geothermal energy can pretty much be summed up in a single word: Dynamic. We put a spotlight on geothermal development worldwide and deliver any updates on the website. On this page, people can share (download or upload) their articles as classified into 9 categories, i.e., Geochemistry, Reservoir, Regulation, etc. This feature also enables people to give comment or questions on any issue brought in by the members.

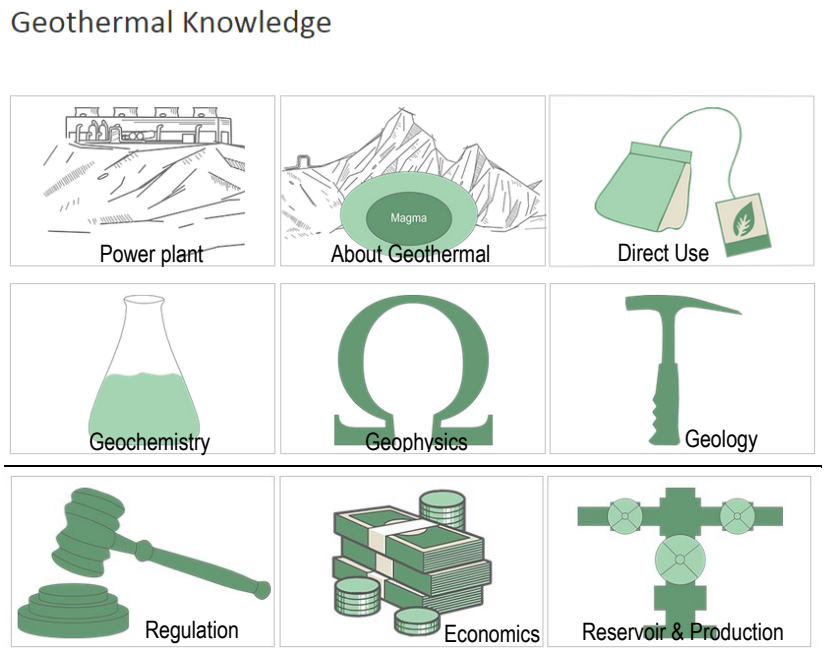
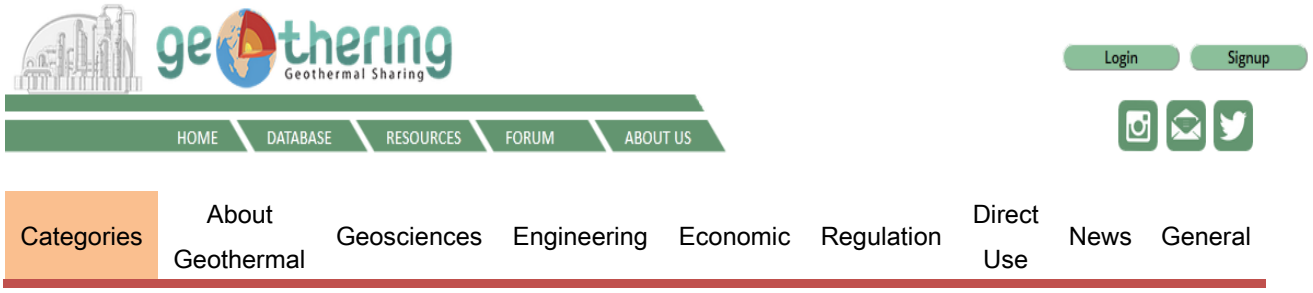


Figure 5: Submenus in Geothermal Knowledge

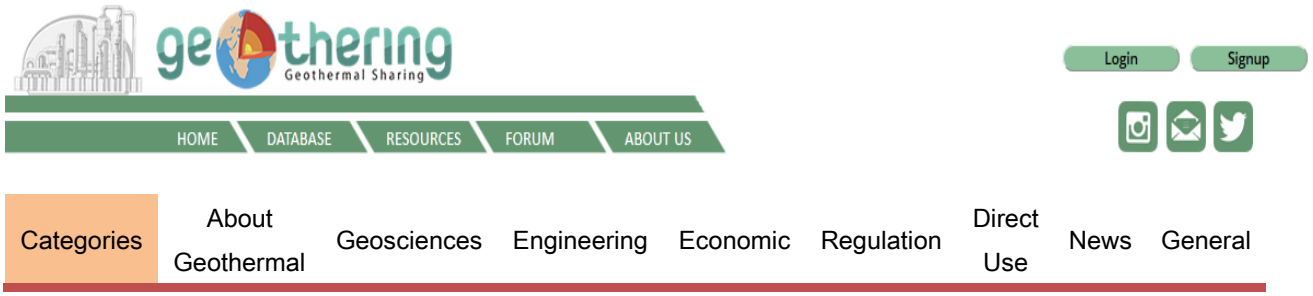
3.3 Forum

Like any other internet forum, geothering forum provides online discussion which allows users to post articles, messages, or comments on other posts or articles. They can share their own writings and ask for feedbacks from other users. Users in particular students are encouraged to write and share their knowledge or maybe opinions in an educative atmosphere as a strongpoint.



Article	Date/by	Status
Snyder, W, et. al.: Building a Community-Based Data Network for Geothermal Energy, *Proceedings,* 37th Workshop on Geothermal Reservoir Engineering, Stanford University, Stanford, CA (2012).	Date: 2012 By: Snyder	5 replies
Saptadji, N: Geothermal Education for Supporting Geothermal Development in Indonesia, *Proceedings,* World Geothermal Congress, Bali, (2010).	Date: 2010 By: Saptadji	5 replies
Chatzinotas, S, et. al: A Web-Based Architecture for Empowering Learning Communities Through The Learning Object Paradigm, University of Piraeus.	Date: - By: Chatzinotas	2 replies

Figure 6: Public Forum



Article: Economic Calculation: A brief discussion	Date/by: March 21, 2014/Sintha	Status: 3 replies
Andi (March 22, 2014) wrote: Berapa besar IRR untuk geothermal project pada umumnya?		
Sintha (March 23, 2014) In response to Andi: Sekitar 15%.		
Agung (March 25, 2014) wrote: Mengapa IRR untuk geothermal project hanya sebesar 15%?		

Figure 7: Public Comment Section

4. NEXT DEVELOPMENT

Our next development is to add webinar (Web-based seminar), online reserve calculation and data processing. Currently Geothering is only able to provide raw data storage from various disciplines in the menu of "Geoscience and Reservoir Directory". However, these features can only be used to store raw data and cannot be used to process data into graph or other display. If someone wants to analyze the data, the raw data must be processed independently in other applications. It is expected that the future applications of this feature can be added to the processing of data hence students and the public can know how the output is supposed to be realized from the sets of raw data available.

5. CONCLUSION

By this approach, we aimed to construct the community collective knowledge by allowing the collaborative discussion and observation in which the members of the web-based learning communities retrieve and offer knowledge from/to the community. We always owe a huge thanks to our community for joining us on this website. We also encourage you to be part of our community hence more and more people can get inspired by each other from different areas of knowledge through our community-based learning culture designed in this website. Looking forward to reading some ideas or insights from you on this website.

REFERENCES

Snyder, W, et. al.: Building a Community-Based Data Network for Geothermal Energy, *Proceedings,* 37th Workshop on Geothermal Reservoir Engineering, Stanford University, Stanford, CA (2012).

Saptadji, N: Geothermal Education for Supporting Geothermal Development in Indonesia, *Proceedings,* World Geothermal Congress, Bali, (2010).

Chatzinotas, S, et. al.: A Web-Based Architecture for Empowering Learning Communities through the Learning Object Paradigm, University of Piraeus.