

Using of crowdsourcing in a modern creative economy

Uso del crowdsourcing en una economía creativa modernas

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Abstract

The methodological basis of crowdsourcing was investigated and the using of different services and platforms, provided crowdsourcing services were analyzed. Grouping types of crowdsourcing according to the scope of use were designed. The list of advantages of using crowdsourcing was given. The most popular Amazon services which were categorized by purpose were composed.

key words

crowdsourcing, creative economy, platform, cooperative networking

Resumen:

Se investigó la base metodológica del crowdsourcing y se utilizaron diferentes servicios y plataformas, siempre que se analizaron los servicios de crowdsourcing. Se diseñaron tipos de agrupación de crowdsourcing según el alcance de uso. Se dio la lista de ventajas de usar crowdsourcing. Se compusieron los servicios de Amazon más populares que se clasificaron por propósito.

Palabras clave

crowdsourcing, economía creativa, plataforma, redes cooperativas

1. Introduction

The modern development of the world system is characterized by a new stage, indicating the transition of developed country economies to the post-industrial type, based on the domination of knowledge, services, intellectual work, the achievements of science and culture, innovation, global information systems and the latest

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technology in business. At the moment, they are striving to move to the stage of creative development of the EU and China, while Japan, the United States and South Korea are at this stage.

Highlighting the features of the "new economy" need to talk about the production of new knowledge as its foundation. And then it is quite logical to transition to the concept of the economy of creativity - an economy based on the production of new knowledge.

2. Methodology

2.1. Essence of crowdsourcing

The creative economy covers the activities aimed at creating market-oriented goods and services, providing job creation and obtaining economic benefits (wealth) through the use of creative abilities. But creative abilities become an economic resource if they are expressed in ideas that turn into a product demanded by the market or in ideas that will conduct the promotion of an existing product, increase competitiveness, improve quality, etc.

In other words, "raw" ideas turn into knowledge and are included in the paradigm of individual, organizational or social behavior, expanding and thus changing the existing knowledge [Dubina, 2009]. In this sense, the creative economy seems to sphere of activities that have as a main factor creative potential and intellectual capital (Nazarova, 2018). These include, in particular: advertising, architecture and design, film production, book publishing, concert and entertainment business, software production, television, radio and other media, video and commercials, R & D, fashion industry (Nazarova, 2018).

It is estimated that the US "creative class" in the early 2000's provided more than 30% of jobs (more than the entire sphere of industrial production) and more than half the wages of all employed in the US (about \$ 2 trillion) [Florida,2007].

The analysis of the scale and dynamics of the creative sector of the economy can be based on traditional economic indicators: the share of GDP (the contribution of the creative economy to GDP), employment and wages in the creative sector, sales (including exports and imports), the concentration of business in this sector, territorial distribution (creative-innovative clusters), and others.






However, the obvious and difficulty of such analysis is that employment in the creative sector can't be formally taken into account. It is difficult to take into account the added value of creative products (the cost of materials for their creation may be negligible, and the sale price is very high). In national statistical systems, not all areas relating to the creative economy are taken into account (for example, the computer game industry is not individually reflected in the statistics of many countries). In trade, materials are mainly taken into account, not "creative" products (for example, diamonds, but not decorations, CDs, but not their contents).






The creative economy has become a leading component of trade and the economic growth of developed countries, as well as a field in which their interaction and integration are taking place, and is becoming an increasingly important factor in the development of transition economies (Nazarova, 2018). Particularly dynamic changes that take place in the field of computerization, cyber security, development of digital technologies, network communication, Web 2.0 and other technological innovations are important for their development. These changes, acting as a determinant of knowledge-based economy, accelerate the implementation of the principles of Open Access model in the process of development of science and R&D (Maistrenko, 2017).

Contemporarily, the norms of open science promote rapid diffusion of the latest knowledge and invite broader stakeholders to participate in the discovery of new knowledge and innovations [Chesbrough, 2015].

One of the most modern technologies for the integration of human and intellectual resources is crowdsourcing, the spread of which became possible only with the active spread of Internet technologies to all spheres of society's life (Howe,2002). Internet technologies have transferred the process of communication and coordination of people's activities to a qualitatively different level. They contributed to the emergence of a large number of new social and cultural phenomena, occupations, ways of solving social and personal problems. The latest Internet technologies and hardware have substantially transformed the system of value orientations and methods of achieving the goal in the modern world. Services of crowdsourcing presented in the table 1 could be available for the broad number of users only by Internet [Kariy, Panas, 2016].

Table 1
Services of crowdsourcing

Internet-services	Purpose
Services for finding solutions to various problems with the participation of professionals	
	Social network to search and establish business contacts. In LinkedIn has registered more than 85 million users that representing 150 branches from 200 countries, which makes it possible to attract necessary specialists to discuss the problem <i>How to use social media crowdsourcing effectively (2019)</i>
	A web group of scholars who explore and decide on the presented organizations problem. <i>Portal of croud services</i>
	Platform for discussion by communities and enterprises opportunities to improve products and services. <i>Portal of croud services</i>
Services for finding solutions to highly specialized problems	
	Internet forum on Urban themes. The forum is dedicated everything related to architecture, construction, design, infrastructure, geography, tourism and arrangement of cities and countries in general. <i>Crowdsourcing: the main sites in Russia and their analogues in the West,</i>
	№ 1 - a platform for graphic design, in particular design logo, web design and other design contests. <i>Crowdsourcing: the main sites in Russia and their analogues in the West,</i>
Services to raise funds	

Internet-services	Purpose
	<p>Web service to raise funds for the implementation of individual's projects. <i>Portal of crowd services</i></p>
	<p>Grants from Pepsi for projects that will get the most website visitors support. <i>Portal of crowd services</i></p>
Social networks	
	<p>Allows you to create a closed or open group for discussing a problem by constantly informing users various means of discussion, new materials. <i>How to use social media crowdsourcing effectively (2019)</i></p>
Boxes for improvements of the area	
	<p>http://www.yourcountryyourcall.com - Ireland. Began as a project searching for ideas for modernizing the country's economy. Currently reviewed and local projects. <i>Portal of crowd services</i></p>
	<p>http://gorod.mos.ru - Moscow. Easy to use portal where you can submit your suggestions for improving the city and complain about the poor condition of urban infrastructure. <i>Crowdsourcing: the main sites in Russia and their analogues in the West.</i></p>

Source: author' computations

“Crowdsourcing” is a term first introduced by writer Jeff Howe and editor of the Wired magazine Mark Robinson [Howe, 2009]. To date, in the literature there is a large number of approaches to understanding this term, primarily depending on the scope of its use. Let us dwell on the use of this term in more detail in the works of domestic and foreign scholars (table 2).

Thus, we can conclude that there is a wide range of use of this term, according to which there are some differences in interpretation, but common to all authors is that they define crowdsourcing as a way of combining a wide range of participants to solve a problem at the micro or macro level. Then, it might be appropriate to interpret that the term involves a flexible process of receiving the feedback from the end user.

Table 2
Services of crowdsourcing

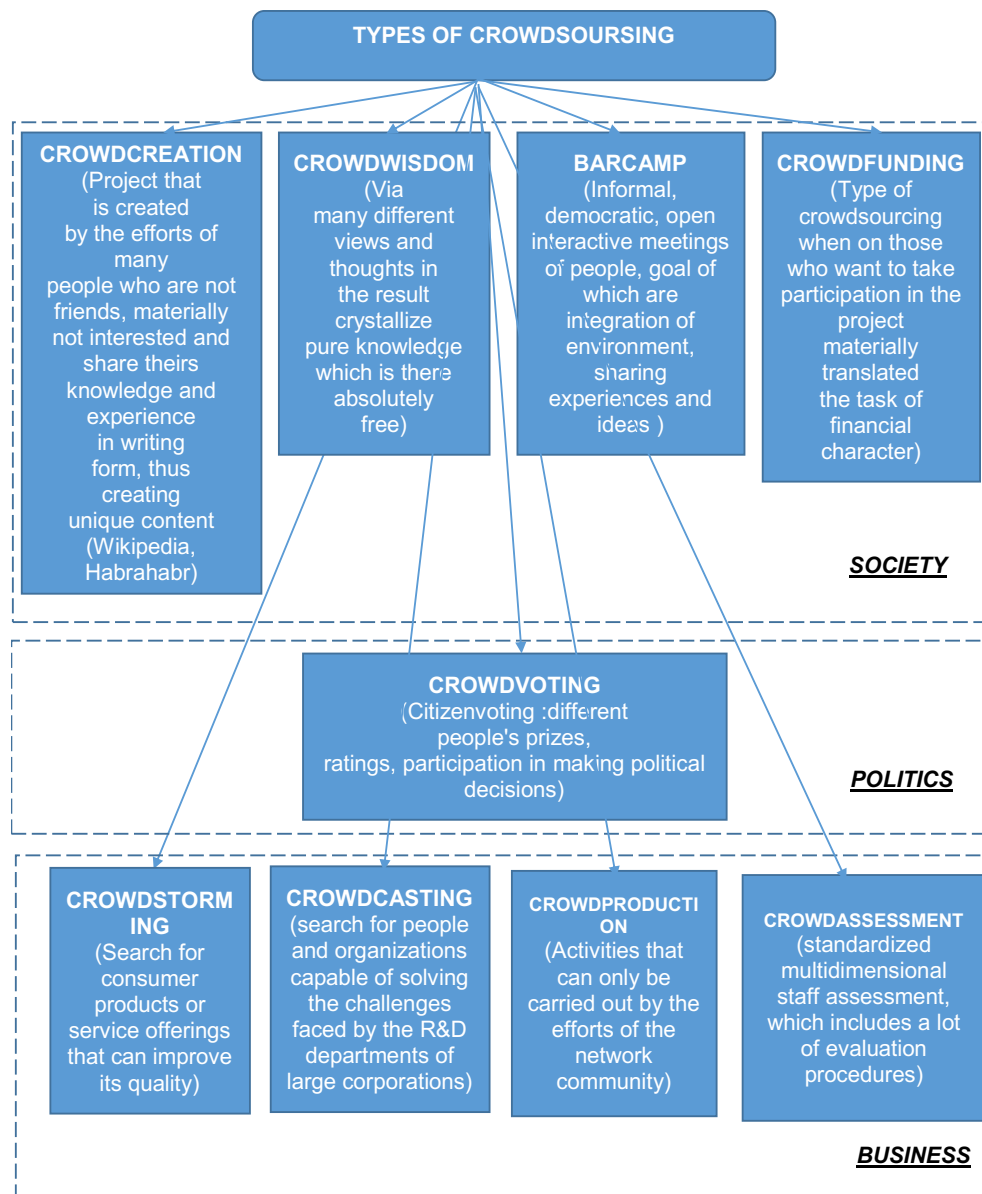
Author	Definition	Sphere of using
Moss A.	The transfer of certain functions for the creation of consumer values, and then, in this regard, and other marketing functions to an indeterminate number of people from among real and potentials of their consumers on the basis of a public offer (offer) by the firm-manufacturer [Moss, 2013]	Marketing
Andreeva Yu.	Solving the tasks facing the business, the state and society as a whole [Andreeva, 2014]	Politics
Pankrukhin A.	The practice of obtaining the necessary services, ideas or content through requests for assistance addressed to large groups of people, especially the online counterpart unlike regular employees or suppliers [Pankrukhin, 2011]	Marketing
Majstrenko O.	One of popular buying strategies and interesting original decisions and formation of relations between organizations and their clients [Majstrenko, 2017]	Management
Kalinina H.	Innovative universal technologies that implemented through the Internet through actors of civil society in public, commercial and state interests [Kalinina, 2015]	Public sector
Karyi I., Panas Ya.	Combination of the idea of self-help and modern technology for solving local problems with wide public participation [Kariy, Panas, 2017]	Public sector
Agafonovas A., Alonderiene R.	Narrower term compared to open innovation or co-creation innovations, as the latter two encompass any inflows or outflows of innovation in any way. It is focuses more on inflows from efforts of single individuals or small groups [Agafonovas, Alonderiene, 2013]	Creative sector

Source: author' compilations

2.2. Classification of crowdsourcing

The analysis of the terminology apparatus allows us to conclude that there are three main areas of the use of this technology: business, solving social problems, or participation in the political sphere. Let's try to group all the various types of crowdsourcing that exist in modern society and their use (Fig. 1).

Figure 1
Grouping types of crowdsourcing according to the scope of use



Thus, there are a large number of varieties of crowdsourcing that are successfully used in the political, social and business sectors. It is especially relevant and expedient to use the technology of crowdsourcing in the formation of creative clusters, as evidenced by an analysis of the work of domestic and foreign scientists. So, Katarina Kowalska (2016) defines a list of advantages of using of crowdsourcing:

- Creative collaboration beyond the boundaries of organizations;
- faster design and prototyping, higher quality, greater elasticity;

- Reduced lead time to market for new products and services by transforming the fuzzy frontend of new product development;
- Access to new sources of external talents;
- Flexible virtual network model for innovation;
- Better engagement and retention of internal talents;
- Lower costs R&D, including experimentations while simultaneously improving the quality of output;
- Blending the best aspects of open source philosophy and the benefits of global business (including its outsourcing component);
- Offering individuals in the crowd a chance at entrepreneurship, or at the very least an outlet for creative energy and creativity training;
- Generating value from otherwise inaccessible creative expertise and critical items, as well as from increased execution capacity and bargaining power, non-mutually exclusive types of value;
- Can be used not only for idea generation but for a whole range of tasks;
- Helping to resolve challenges across products and processes, markets and business models;
- Unrefined ideas can be converted faster into crystallized ideas that are aligned to product strategy by making them transparent across the enterprise, assisted by automation;
- Helping to track ideas and make them visible to the right stakeholders early in the product development cycle for efficient collaboration;
- Improving the success rate for new products and services by aligning innovation with customer expectations and strategic business priorities;
- Encouraging to generate and develop ideas in order to create a culture of innovation – across the extended community of cluster including employees, partners, suppliers, and members through a system of incentives, collaboration and gamification.

2.3. Frameworks

The ability to deploy crowdsourcing involves the use of various platforms such as Google Cloud, Microsoft Azure, Amazon Web Service, Ushahidi, Crowdmap, Onebillionminds, Ideaken, En.eyeka, 99designs, Challenge, Chaordix, Bridgenetwork.

The choice of the platform should be made at the capacities currently offered in the information services market. The focus should be on the use of cloud technologies and services that can be used to build infrastructure, as well as the development of automation components for the automated deployment of developed infrastructure.

Cloud technology is one of the first technology industries to grow in the 21st century. This is due to the fact that it has experienced the fastest implementation in the business direction. Growth has also been accelerated by the ever-increasing number of mobile devices having access to the Internet.

The main reasons that cloud computing has become an integral part of any field of life and business:

Accessibility – access to resources and data from anywhere in the world and from any device connected to the Internet;

Cost savings – cloud providers offer their customers scalable computing resources, meaning the user pays only for the resources they use, this approach is much more convenient and cheaper than buying and maintaining their own computing;

Security – the security of your information is provided by the best experts in the data centers of providers (but the provider cannot be responsible for the security of third-party software or the security of the client's software decisions);

Scalability – cloud computing is the best option for businesses with volatile workloads, with each provider offering their infrastructure scaling solutions based on system load and business needs.

Each provider has a set of services for use in different object areas of use:

- client can choose which type of infrastructure they need more than public clouds, private or hybrid;
- choosing the type of services, providers can offer different types of service IaaS, PaaS, SaaS [Information about AWS regions, 2019]. The main platform type available know on digital IT market (table 3)

Table 3
The main platform types

Platform type	Purpose
IaaS (Infrastructure as a Service)	This type of service is the basis for any service (except DCaaS), because it allows clients to lease full infrastructure, scalable, infrastructure refers to networks, processors, storage, storage, virtual networks. These physical devices are serviced by the provider. The client pays for the resources only when he uses them. As soon as the customer ceases to use them, he may stop paying for them. IaaS is the most flexible service model because it is used to develop and deploy SaaS, PaaS.
PaaS (Platform as a Service)	Platform as a service operates at a lower level than SaaS. PaaS refers to cloud platform services that are used to develop, deploy, test, store software solutions, and microservices. PaaS does not require the client to worry about infrastructure, hardware, server status, and the like. All these functions are performed by the obedience provider. For example, to deploy an application in the Java programming language, the developer may only need code.
SaaS (Software as a Service)	Software as a Service. In other words, it is a way of delivering software to users over the Internet. The software runs on the cloud service provider's infrastructure, not the user's computer. One of the most striking differences, from other types of services, is that the user does not need to install software, perform routine work, such as updating it, or providing software security operations. The software is available at any time. SaaS accounts for the largest percentage of the cloud market among other services.

Source: author' computations

Let's look at the leaders in the field of cloud computing – Amazon Web Services (AWS), Microsoft Azure, Google Cloud Platform (GCP), as well as the services and solutions that these providers provide to work.

AWS - the most complete and widespread cloud platform in the world, originally developed for internal use by Amazon, it includes more than 165 different services [Azure regions, 2019], combines a set of different types of IaaS, PaaS, SaaS. It is a leader among all cloud providers, among its clients as large banks, startups, large IT companies and government agencies.

AWS offers a wide range of global services for business, corporate clients, academics, developers, students and enthusiasts, including database storage, large data analytics, private networks, mobile services, development

tools, with the payment model. Amazon was one of the first providers to start using the pay-as-you-go payment model, meaning a customer doesn't spend money on resources he didn't use.

Amazon Web Services datacenters are located all over the world, a global infrastructure designed and built to provide the most flexible, secure, scalable and secure computing environment with the highest quality global network available from anywhere in the world. Each component of the AWS infrastructure is designed and built for redundancy and reliability, from regions to network links to load balancing to routers and firmware.

AWS infrastructure consists of the region in which it is located, each region will consist of an "availability zone", that is, an accessibility zone, in each region from 2 to 5 zones, such as one of the closest to our country, regions is Frankfurt or the name used in the technical description, "eu-central-1", in this region 2 zones eu-central-1a, eu-central-1b.

Each region is completely independent. Each accessibility zone is isolated, but the accessibility zones in the region are connected through low latency links.

In general, the most popular Amazon services can be categorized by main purpose (table 4)

Table 4
The most popular Amazon services

Services	Definition
Cloud Compute Services (services aimed at calculating, that virtual machine or tool)	
EC2 (Elastic Compute Cloud)	virtual machine in the cloud. You can run this cloud server whenever you need it.
EKS (Elastic Container Service for Kubernetes)	this service allows you to use the Kubernetes cluster without installing it.
AWS Lambda	this service allows you to run functions in many languages in the cloud. The tool is very economical because you only pay when your functions are done.
Storage (services related to storage of information, the most common of them)	
Amazon Glacier	extremely inexpensive data storage service. It offers secure and fast storage for archiving and backup of data. But if you need to get some data, then you will have to wait a while, and there is a fee.
Amazon Elastic Block Store (EBS)	service that stores information at the block level for use in Amazon EC2 instances.
Amazon Elastic File System (EFS)	service that provides a simple, scalable, resilient file system for mounting between EC2-based instances of Linux, EFS runs like a regular network file system on NFS.
Security Services (services that focus on security when working with other services, the most common of them)	
IAM (Identity and Access Management)	the most common security service, no project is right-handed, IAM helps manage users, set policies, create groups to manage multiple users, and restrict access to resources.
Certificate Manager	The service offers free SSL certificates for your domains managed by Route53 (a DNS configuration service).
KMS (Key Management Service)	Security helps you create and manage encryption keys that allow you to encrypt data.

Services	Definition
Database Services (services for storing information)	
Amazon DynamoDB	fast, fully managed NoSQL database service, the service enables cost effective storage and retrieval of data. It also allows you to handle any number of requests and can handle large amounts of traffic.
Amazon RDS	easy to set up and scale relational database.

Source: author' computations

Microsoft Azure is a platform for public cloud computing. Azure provides services such as infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service (SaaS) [GCP regions, 2019]. The platform services can be used for cloud computing, data analytics, data storage, and building infrastructure solutions of any size. Like other competitors, the platform provides the flexibility of computing resources, scaling down and down as needed, reliability and availability of services and deployed software 99.95% of the time, and 24/7 customer support. The economical pay-what-you-use model is also used.

Azure has more global regions than any other cloud data provider - allowing you to offer services and services as close to your target audience and users as possible, reducing response time and increasing resiliency. Azure has 54 regions, each available in 140 countries.

The region is a set of data centers, they are connected through a dedicated low latency regional network. Just like Amazon Azure has accessibility zones, in the context of this platform, these are physically separate datacenters in one region. Each availability zone consists of one or more data centers, each with independent power, cooling, and networking.

To achieve high reliability of services and reliability of storage, regional pairs and availability zones can be used for disaster recovery and data backup.

Microsoft Azure is used by many large companies and brands, including GE Healthcare, Dell, Pixar and many others, which demonstrates the high quality and affordability of the services they offer. Examples of the most popular services observed in (table 5)

Table 5
Most popular services of crowdsourcing
used in famous companies

Services	Definition
App Service	makes it easy to create and deploy web applications, mobile applications and APIs from virtually any common platform. It offers continuous integration and other elements of DevOps practices. Flexible with customization, you can run your solutions in a secure and isolated App Service environment.
Azure Virtual Machines	service allows you to deploy virtual machines up to 128 CPU cores, up to 6 TB of RAM, machines can be both Windows and Linux-based
Azure DevOps Projects	service automates setup of a whole continuous integration of CI/CD processes with other Azure services. It just requires a program code, DevOps Azure facilitates rapid deployment of this program to various services such as virtual machines, App Service, Azure Kubernetes (AKS), Azure SQL databases or Azure Service Fabric.
Azure Active Directory (AD)	directory and identity management service, this allows companies to manage user credentials and create a secure access policy for mid-sized companies. AD allows users to run all their cloud applications from the web access panel or mobile

Services	Definition
	application using a single ID, regardless of the device it will run on platforms such as Windows, Mac, Android and iOS. It also allows companies to safely engage with users outside the company without risking sensitive data.
Azure Kubernetes Service (AKS)	just like AWS, Azure has its own Kubernetes (K8s) service.

Source: author' computations

GCP – is a public cloud computing platform offered by Google. The platform includes a number of services for calculating, storing and developing applications that run on Google hardware [AWS Python SDK, 2019].

Like other providers, GCP resources are available in the context of regions and zones, such architecture is designed for increased resiliency, it is recommended that you deploy your solutions in multiple accessibility zones to keep the system or software solution functioning in the same region.

GCP provides services for cloud computing, data storage, private networks, big data, machine learning, and Internet of Things (IoT) security tools. The main cloud computing products in the Google Cloud Platform include (table 6)

Table 6
The main cloud computing products in the Google Cloud Platform

Services	Definition
Google Compute Engine	an infrastructure as a service (IaaS) service that provides users with virtual machine instances to deploy infrastructure, web applications, and more.
Google App Engine	platform as a service (PaaS) service that gives software developers access to the scalable deployment of software in most common programming languages. Developers can also use the Software Development Kit (SDK) to develop software products that run App Engine.
Google Cloud Storage	cloud repository service designed to store large, unstructured datasets. Google also offers database storage options, including Cloud Datastore for NoSQL non-relational storage, Cloud SQL for MySQL, fully relational storage, and Google's own Cloud Bigtable database.
Google Container Engine	as with previous providers, GCP has a service for managing and orchestrating Docker containers. It should be noted that the orchestration tool was developed and maintained by Google, so the implementation of the service in this case may take precedence over other services provided by other providers.

Source: author' computations

3. Results

In the analysis of available solutions or frameworks proposed to use the Responsible Unit AWS SDK for Python, also known as boto3 [Python documentation, 2019].

Python is a programming language interpreted, that is, the program code is not first translated into machine code to be executed as in compiled languages, but is executed line by line using an interpreter, object-oriented programming language, with dynamic typing. Python supports modularity and packages, allowing you to render individual code to modules and reuse it many times [Rouse, 2019].

Boto3 – Amazon Web Services (AWS) Software Development Kit for Python programming language that allows Python developers to write software that can use any Amazon service such as Amazon S3 and Amazon EC2 [Python documentation, 2019].

When writing infrastructure code is important to follow the concept IaC (Infrastructure as a Code) [Terraform, 2019].

Infrastructure as a Code (IaC) - concept following which developers or engineers operating automatically manage infrastructure or other software components and provide the technology stack for applications using software rather than manually configure operating systems and software solutions. Infrastructure is sometimes referred to as programmable or software-defined infrastructure.

The concept of infrastructure as code is similar to the software scripts used to automate IT processes. However, IaC tools are mainly used to automate a series of static steps that need to be repeated multiple times on multiple servers. Infrastructure as code uses a higher level or different descriptive languages to encode more diverse and adaptive provisioning and deployment processes, such as YAML, JSON, HCL.

To write the infrastructure code, we recommend choosing a tool from HashiCorp called Terraform.

Terraform – is a tool for creating, changing, upgrading and upgrading your cloud infrastructure safely and efficiently. Terraform can manage existing and popular service providers as well as its own solutions. The tool is open to contributors to GitHub, written in Golang programming language [Working with Terraform, 2019].

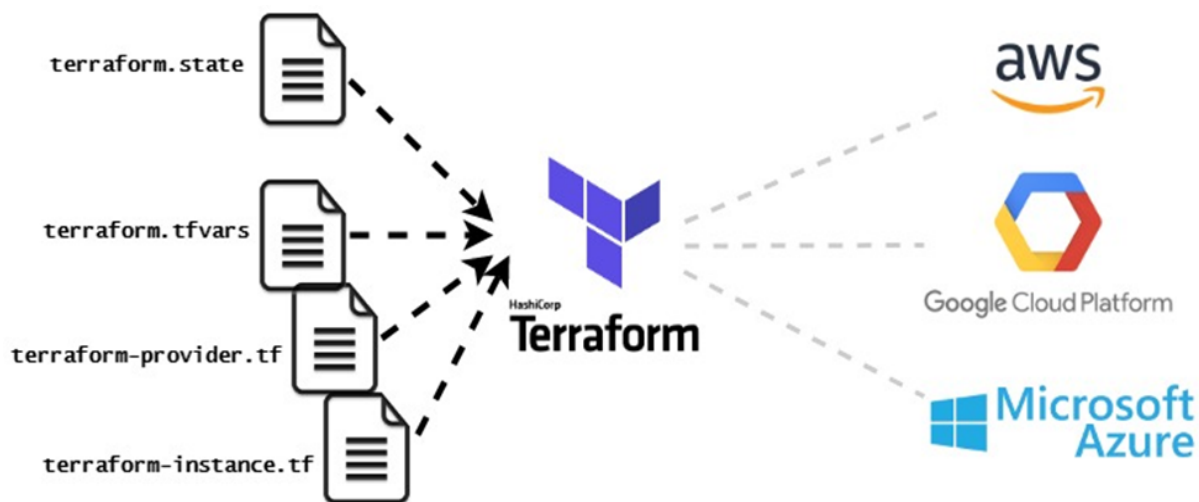
The main features of Terraform are:

- Infrastructure as a Code - Terraform configuration syntax is called HashiCorp Configuration Language (HCL).
- Execution Plans. Terraform has a planning phase in which it forms a plan for working with the provider's resources. The execution plan shows what Terraform will do during the call. This avoids any errors in the described or in the logic of construction and avoids surprises, such as the destruction of some of the old infrastructure.
- Resource schedule. Terraform schedules all of your resources and concurrently creates and modifies any independent resources. Because of this, Terraform builds the infrastructure as efficiently as possible, and operators gain insight into the dependencies on their infrastructure.
- Change automation. Big infrastructure changes can be implemented with minimal human interaction. With the aforementioned execution plan and schedule, the operator knows exactly what Terraform will change and in what order, avoiding many possible human errors.

The main disadvantages of the tool are:

- The product is rapidly evolving, with versions frequently changing, which causes some features to become obsolete;
- Using different versions of the tool on the same code may cause different errors.
- The configuration files describe the Terraform components required to run a single service or all data processing infrastructure [Working with Terraform, 2019]. Terraform generates an implementation plan that describes what it will do to achieve the desired state, and then executes it to build the described infrastructure. When you change your configuration, Terraform can determine what has changed and create additional execution plans that can be applied. Features of the work are presented at (Fig.2)

Figure 2
Work scheme of Terraform



Source: author' computations

4. Conclusions

Thus, the use of crowdsourcing technology in the creative economy becomes a flexible mechanism for reaching feedback from the end-user, allows to involve as many stakeholders as possible in the process, transfer the necessary information to all stakeholders without the involvement of third parties and establish efficient communication channels.

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