The EPUM Platform: A Novel Collaboration Paradigm

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Abstract. In this paper we present an innovative collaborative online platform developed in the context of the EU funded project EPUM (Emerging Perspectives on Urban Morphology: Researching and Learning through multiple practices). The platform attempts to eliminate research and institutional barriers in educational cultures through the development and use of digital resources, structured under Collaborative Learning Activities, a novel concept proposed in this work. CLAs offer an innovative way for collaboration in the education system, by making available resources accessible, not only to those enrolled in higher education programmes, but to anyone wanting to access training regardless of their geographical location, educational culture or ability to travel.

Keywords: Collaborative Learning Activities · Blended learning · EPUM platform · ICT tools

1 Introduction

A variety of approaches on understanding urban form[1], both theoretical and operational, have been developed in the past decades to respond to a variety of forms of socio-spatial patterns and increasing social, economic, and political fragmentation in contemporary cities, strongly related to their urban form. However, these are characterized by specific disciplinary and geographical trends and have seen the emergence of separate schools of thought. Each approach tends to be associated with a main research centre or with certain individual researchers and, despite some exceptions, they have traditionally been applied in isolation. The teaching of urban form analysis in higher education institutions across Europe is also addressing contemporary cities' issues from often isolated perspectives based on the aforementioned different schools of thought, either reflecting specific national educational trends or opting for a globalized approach cutting the knots with local specificities. There is still a lack of learning spaces which foster a multidisciplinary thinking about contemporary cities' issues and which enable

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[1] The physical patterns, layouts, and structures that constitute an urban center.

the participation of all relevant stakeholders in the debate about contemporary cities' problems and solutions.

EPUM identified the need to establish a network linking the different approaches, developing learning platforms that foster the exchange of knowledge, providing opportunities for contact between members and encouraging the dissemination of findings. The coming together of researchers, educators and learners from different geographical areas and disciplines will provide the basis for a multidisciplinary exploration and the opportunity to establish common theoretical foundations for the growing number of urban form studies in many parts of the world. It will provide the means to engage all stakeholders currently within introverted disciplinary, institutional and geographical boundaries, in a fruitful discussion through a collaborative open learning curriculum (OLC). The mode of learning which proved to be suitable for such an OLC is one that facilitates both face-to-face activities, so as to allow institutions to work independently, with on-line activities which enable the synchronous or asynchronous collaboration and learning across institutional barriers offering a blended learning system.

The EPUM platform aims at supporting a blended learning approach, breaking down research and institutional barriers in educational cultures through the development and use of digital resources, structured under specific activities in various thematic areas proposed by both professors and students. The activities are represented by "learning environments", referred to as Collaborative Learning Activities (CLAs). CLAs offer an innovative way for collaboration in the education system, by making available resources which are accessible, not only to those enrolled in higher education programmes, but to anyone wanting to access training regardless of their geographical location, educational culture or ability to travel. The innovative framework and tools proposed comprise a visual index to students' work, providing them with the capability to upload data files to assignments, incorporating their peers' feedback and review, as well as tutors' feedback to students for their work, and the ability for discussion around any of the topics or works. Furthermore, the add-on tools provide the capability to visualize a network of activity interactions and present it in a way that it is appealing and understandable to different stakeholders, both registered and non-registered users.

In Sect. 2 we present related work in terms of collaborative blended learning approaches in urban form studies, as well as in collaborative ICT platforms. Section 3 describes the methodology used, while Sect. 4 presents the technical implementation of the EPUM platform. Section 5 describes the evaluation of the EPUM platform with end-users, Sect. 6 discusses the evaluation results and concludes the paper with future work.

2 Related Work

2.1 Collaborative Blended Learning Approaches in Urban Form Studies

Blended learning, which generally speaking refers to a learning environment which combines face-to-face instruction with computer-mediated instruction, has gained much popularity in higher education in the past years. However, a number of studies [1,

2] suggest that blended learning implementations are most often used for the purposes of efficiency and supplementation, with only a low number fully exploiting the potential of this mode of learning to enhance the learning experience and initiate collaborative activities, particularly in the field of urban form studies. Even though we can find examples of intertwining a specific learning style with blended-learning [3] there still is not much investigation either about the relationships between both or the potential to foster collaborations.

As Garrison and Vaughan [4] point out, the value of blended-learning transcends the mere application of ICT for teaching and learning, "recombining concepts that were previously considered contradictory, such as collaborative-reflection and asynchronous community" [4]. Other components which might become blended also include learners, learning styles, academic programs, subject-matters, disciplines, and institutional frameworks [5]. This possibility to combine learning activities which can be carried out at different times and in different places (on-line, in the classroom) combined in interaction with other learning resources, requires specific pedagogic methodologies which take advantage of their collaborative potential and point to the creation of alternative learning environments. Such a learning environment was suggested by Punie [6] to describe ICT-enabled educational spaces which transcend existing limits, physical, conceptual and institutional. Punie highlighted the potential of such environments to place students at the centre of the learning, enabling the personalization of learning as well as social interaction at different scales (from learning individuals and communities to learning cities and regions), while being flexible enough to integrate various learning styles, teachers' skills, and curriculums, gradually becoming informal platforms to share expertise and knowledge across organizations. In the OIKONET project, the term learning space to pursue goals which are in line with those described by Punie has been initiated in the field of housing studies [5].

The EPUM project, identifying the lack of such collaborative, blended learning environments in the field of urban form studies, explored the potential to link different approaches to the study of urban form in different parts of the world, through the development of learning platforms that aim at fostering the exchange of knowledge cutting across institutional and geographical boundaries.

2.2   Collaborative ICT Platforms

In the context of Computer Supported Collaborative Learning (CSCL), learning takes place through social interaction by using computers. CSCL software systems are collaborative learning environments that utilize technology to facilitate user (teacher to learner and learner to learner) interaction and communication, as well as learning coordination [7, 8]. An effective collaborative learning environment is one that effectively and efficiently supports knowledge sharing in a formed learning group [7]. A number of literature works have contributed towards the development of such learning environments.

In [7] the authors propose using semantic web technologies to build a software tool for knowledge sharing through the usage and management of multimedia annotations in CSCL. Four annotation categories are supported: definitions (descriptions and explanations), comments, questions, and associations (e.g., links to other resources).

Users are able to annotate web content and link documents and other resources to their annotations. The experimental evaluation showed that students doing collaborative group reading using this system achieved on average much higher scores than students doing group reading using other methods. In addition, the study showed that students in the first group have used collaborative multimedia annotations that contributed to enhanced knowledge sharing.

In case of multidisciplinary learning groups, the authors in [9] proposed an algorithm for composing optimal learning groups in situations where people have different domain backgrounds. The algorithm is integrated in an ontology-based e-learning system that creates self-built educating communities: trainees that participate in the education process gain points through achievements and ultimately become trainers. User profile information is explicitly acquired by having users filling forms. Based on this profile, users are assigned to (or are recommended) learning groups by maximizing the diversity within a group and minimizing the diversity between groups.

In the subject of exchanging data between learner groups, the authors in [10] propose an XML-based procedure using web-services for CSCL data exchange. The data to be transferred from one learner group to another include Moodle forum discussions, online chats and votes. This allows learner groups to not having to start their discussions from scratch, without any reference of other groups' discussion. The positives of having other learner groups' data available is that the preceding discussions could effectively be used as scaffolding information to participate in the discussions [10]. In addition, the preceding discussions and the information shared provide adequate cognitive workload for the learner to be able to participate in the discussion [10]. A negative point is that the process of actively collecting information and discussion itself is a collaborative learning process in which the user does not participate.

On another dimension, regarding open source available platforms, Moodle's[2] Assignment activity provides a space where students submit assignments in different formats and teachers are able to provide feedback, comments or grades for them. However, it does not provide the opportunity for students to provide feedback on fellow-students assignments, to discuss about the topic, or to upload and access helpful material. These tasks can be related to separate Moodle activities such as forum, and lesson. Nevertheless, the material from all activities will not be packed together as in the CLAs concept, even if they are under the same course, as they may be mixed up with different other topics and material. In like manner, MOOC platforms incorporate collaborative tools that can be independently added to promote community-based learning, likewise the separate Moodle activities.

The EPUM platform facilitates collaboration by offering collaborative spaces, the CLAs. CLAs, among other, make resources widely accessible, promote and share students' work while also enabling their peer review, as well as facilitate discussions and interactions. Each EPUM CLA contains information around a specific topic, a space for assignments submission, a discussion about the specific tasks, and additionally allows both students and teachers to provide feedback, all into the same collaboration space. Each CLA is a place meant to enhance and promote complete

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[2] https://moodle.org.

collaboration in the context of a specific topic, between the participants in a specific task. CLAs are described in the following sections.

3   Methodology

The first phase of the project focused on the development of a collaborative open learning curriculum through a pedagogic model which can facilitate a flexible interaction between courses included in the academic programs of the participating institutions in relation to different approaches to the analysis of the urban form and collaborative learning activities. The pedagogic model proposed, regards the implementation of a blended learning environment which enables various learning activities and learning tasks to be executed across institutions. The methodology of aligned learning and teaching [11] proposed by Biggs along with Bloom's [12] approach of taxonomies inform the development of the pedagogical model implemented in the project, aiming at blending different components such as subject-matters, delivery formats, learners from different institutions and levels, learner styles as well as physical, institutional and disciplinary barriers.

The open learning curriculum includes both theoretical and practical learning material and focuses on (a) aligning complementary approaches to develop a comprehensive analysis of urban form and social phenomena and (b) combining on-line (digital platform) and on-site (courses and seminars taking place at the participating institutions) Collaborative Learning Activities, CLAs. Such a pedagogic model enables the development of an open learning and teaching space that cuts across institutional and research boundaries. Building on the precedent of OIKONET, the key (to the learning process) is to intertwine the activities that can be carried out within the programme at each institution with the collaborative tasks amongst the institutions, either synchro-nously or asynchronously [5]. The sequences of tasks (or assignments) can evolve in an open-ended manner and include both online collaborative activities and tasks (through the digital platform) and face-to-face activities and tasks (intensive programme workshops).

The blended learning approach adopted and supported by the digital platform, proved extremely important for the implementation of this project resulting in the creation of a number of Collaborative Learning Activities among partners throughout Europe, facilitating a community of inquiry which is constituted above and beyond institutional and physical barriers, at the same time allowing multiple levels and types of instruction to be adopted. In that sense, it provided the adequate conditions for the implementation of a free and open dialogue, critical debate, negotiation and agreement between different, and often isolated urban form approaches in the participating institutions. Such context therefore, offered an open educational practice which helped partners to share through their teaching, freely and openly, ideas, knowledge, tools, approaches and materials used in urban form studies. At the same time, it enabled participating institutions to keep their own academic program, structure and curriculum; in other words, it enabled the participants to work independently and collaboratively. The small-scale learning activities facilitated by the project enabled the gradual establishment of a network of relationships among the courses, students and topics

facilitating the study and exploration of Urban Morphology; exposed students and teachers to other approaches across geographical areas and prepared students and teachers for large-scale activities involving both online pre-workshop activities and onsite intensive workshops with target groups and stakeholders.

4 Technical Implementation

The EPUM digital platform functionality was broken down into components, that were developed as plugins on top of a WordPress [13] Content Management System (CMS) instance, the basis for the development. The CLA management plugin constitutes the EPUM platform's innovative functionality. Additionally, a few existing plugins were used, e.g. the Ultimate member plugin was used for user management functionality, including a set of GDPR requirements. Additional plugins were developed to enhance the platform's GDPR compliance, as it handles the personal data of both teachers and students.

In Fig. 1, the architecture of the EPUM platform is presented. Users can access the platform through the web with their devices. Four plugin components are connected to the core WordPress CMS: the Ultimate Member Plugin, the CLA Plugin that includes a set of functionalities related to collaborative activities, and two plugins developed in the GDPR context.

Figure 2 presents the functionality of the platform that is available to users, either visitors or logged-in users. The CLAs Calendar, some static information, and the Data Processing Privacy Policy are made available to all visitors of the platform. On the other hand, in regards to maintaining and managing user registrations and accounts a User Management Mechanism is embedded. Registration and login are available to all
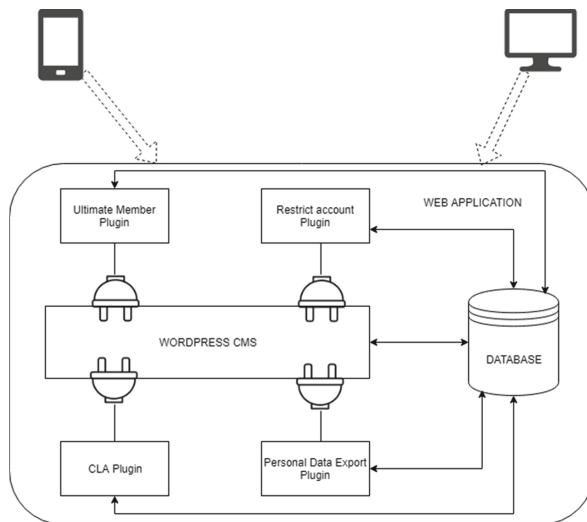
Fig. 1. The EPUM platform architecture

visitors. Login will only succeed upon providing correct, existing credentials. Registration needs to be accepted by a platform admin. Finally, an additional social mechanism is incorporated, i.e. a discussion forum for logged-in users.
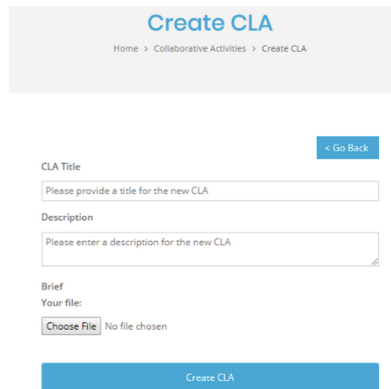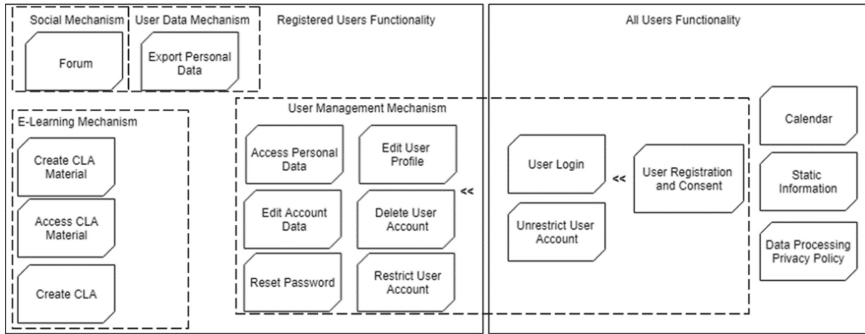

Fig. 2. EPUM platform functionality overview

Collaborative Learning Activities. CLAs constitute the main functionality of the platform. Each CLA is conceptualised as a distinct space within the platform, with its own title and description, an author, content, and member users. CLA functionality is accessible through the top bar menu of the EPUM platform, providing different user interfaces, different capabilities, and different information to users depending on their role: teacher or student.

Table 1 displays the functionalities available to each role. CLAs can only be created by teachers by filling-in the respective form (Fig. 3). The author is granted editing access to the specific CLAs resources, discussions and memberships. CLA details can be edited only by the author. Other users can be assigned (or unassigned) membership to a CLA by its author, by clicking the "Add/Remove users to the CLA" button. All users are able to view the title and description of all CLAs and request access to any of them. The respective author will be notified by e-mail. Users can also create an event for a specific CLA to which they are members. The author of the event can edit or delete it.

Table 1. CLA functionality per role (T:Teacher, S:Student)

Functionality	Role	Functionality	Role
Create CLA	T	Edit Members (if author)	T/S
Edit CLA	T	Preview Members List	T/S
Create Resource	T	Start Discussion	T/S
Edit Resource (if author)	T	Start Peer Review	T/S
Delete Resource (if author)	T	Create Event	T/S
Create Student Work	S	Edit Event	T/S
Edit Student Work	S	Delete Event	T/S
Delete Student Work	S		

An innovation of the CLAs is their ability to provide a set of resources to their members. Resources are created by teachers and are perceived as learning resources to the students and other teachers, as well as informative material to courses, events, etc. They are available to all members of the CLA. Students are not allowed to upload any resources, but are instead enabled to upload their Student Work.

Fig. 3. Create a new CLA

Both teachers and students may view all resources and student works of the CLAs they are members of. This includes the option to download any files, if available. CLA members are able to take part in discussions regarding the CLA, as well as conduct peer reviews on student works by selecting a student work and posting their comment at the corresponding section below. Reviews may be conducted by both students and teachers.

5   Evaluation

In order to develop an innovative, usable and effective platform that could bring to life the promised benefits of the envisioned CLAs within a virtual environment, it was imperative to pilot-test the methodology of how a CLA is experienced within the platform.

A Big Scale Activity (workshop) was organized within the project, where students and tutors interacted on collaborative activities. During the pre- and post-workshop phases, participants had collaborated and interacted through the platform. During the workshop, collaborative activities were conducted, which included both onsite physical collaborative activities but also on-line interaction on the platform.

The workshop was organized in Nicosia, Cyprus, and the main goal was to effectively combine different morphological approaches – historico-geographical approach, process-typological approach, space syntax and relational approach – in the analysis of a physical form and determine the main challenges that form faces today. Drawing on the results, the combined approaches were ultimately applied, not

only in the analysis, but also in the design of one particular area in the city of Nicosia. It should be noted that tutors had applied each of their morpho-logical approaches in isolation.

Features incorporated into the design of the platform, such as support for collaboration, offering accessible and available resources, offering a visual index to students' work, capability to upload data files to assignments, incorporating peers' feedback and review, as well as tutors' feedback to students, support for discussion/debate around any of the topics or work, and capability to visualize a network of activity interactions and present it in a way that it is appealing and understandable to different stakeholders, both registered and non-registered users, were thus experienced, exhibited and evaluated in the Big Scale Activity of Nicosia.

Following the completion of the Big Scale Activity, the participating students and tutors completed an online 5-point scale questionnaire that assessed their overall experience. Responses were collected from 7 tutors and 18 students, coming from the 5 institutional partners involved in this project, based in London, Nicosia, Porto, Rome and Wien. Moreover, the results from the questionnaire helped in refining the learning activities, processes and environment of EPUM. Responses were entered anonymously into a database and analysed. In the following paragraphs the key results are presented, which indicate the value of CLAs and the platform.
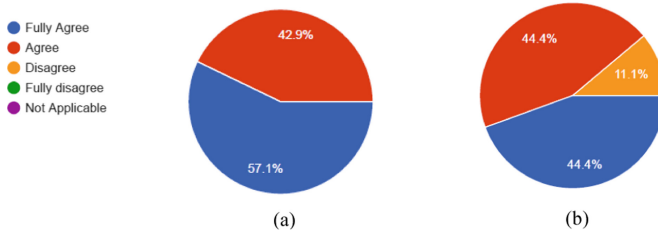
– Questionnaire item: **The whole teaching experience was positive/good (Fig. 4).**
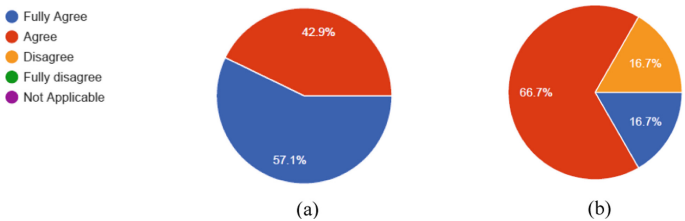
Fig. 4. (a) Tutors (b) Students

From the responses of the tutors, it was established that they were positive towards the collaborative teaching experience which was blended in nature and consisted of both on-line and on-site collaborative activities (see Fig. 4a where 7 out of 7 responded Fully Agree and Agree). From the responses of the students, results were similarly positive (see Fig. 4b where 15 out of 18 responded Fully Agree and Agree). There were 3 students however, that responded Disagree, without offering any additional comments. Besides these 3 students, holistically, the experience was very good for tutors and students.

- Questionnaire item: **The materials provided by all tutors to the students (reference literature, maps) were useful for the workshop implementation.**

Fig. 5. (a) Tutors (b) Students

From the responses of the tutors, it was established that the materials were useful and thus important for the collaboration activity (see Fig. 5a where 7 out of 7 responded Fully Agree and Agree). From the responses of the students, results were similarly positive (see Fig. 5b where 16 out of 18 responded Fully Agree and Agree). Two students responded Disagree, without offering any additional comments. Holistically, the materials were useful, and deemed important in the implementation of such collaborative activities. Resources being available online are therefore critical.

- Questionnaire item: **Interacting with other students/teachers (e.g., in the Facebook group "EPUM Intensive Workshop Nicosia 2019") has been a good experience.**
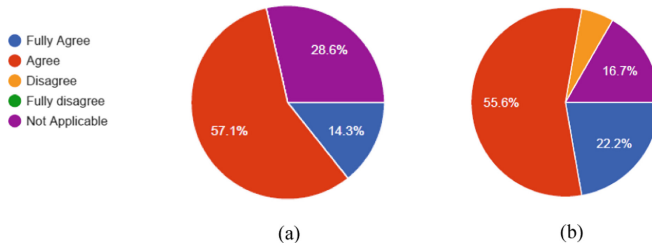
Fig. 6. (a) Tutors (b) Students

From the responses of the tutors, it was established that the interaction between students and/or tutors in online environments, such as FB and the platform itself was positive (see Fig. 6a where 5 out of 7 responded Fully Agree and Agree and 2 out of 7 responded Not Applicable). From the responses of the students, results were similarly positive (see Fig. 6b where 14 out of 18 responded Fully Agree and Agree). There was one student however, that responded Disagree, and three responded Not Applicable. A couple mentioned that they used/would have preferred to use WhatsApp instead of FB for example.

– Questionnaire item: **Please respond to the following questions regarding the workshop.**

Table 2. Student (S) and tutor (T) views on aspects of the workshop

		Fully Agree	Agree	Disagree	Fully Disagree	Not Applicable
The studio activity was well aligned with the workshop theme	S	3	10	5		
	T	4	2	1		
The tutoring activities were useful for the work in the Studio activity	S	4	10	3		1
	T	4	1	2		
The Interim Critique sessions were useful	S	1	15		1	1
	T	4	2			1
Working collaboratively with students/teachers from other countries has been a good experience	S	8	9		1	
	T	4	3			
I was able to communicate effectively with the other members of my group	S	3	11	2	2	
	T	3	4			

What can be summarized from Table 2 is that there is strong support in aligning a studio activity with a workshop theme (for tutors 6 out of 7 responded Fully Agree and Agree, whereas for students 13 out of 18 responded Fully Agree and Agree) and ensuring that tutoring activities are useful toward the execution of a studio activity (for tutors 5 out of 7 responded Fully Agree and Agree, whereas for students 14 out of 18 responded Fully Agree and Agree). The importance of critiques sessions was evident for both students and tutors (for tutors 6 out of 7 responded Fully Agree and Agree, whereas for students 16 out of 18 responded Fully Agree and Agree).

Regarding the student-tutor multicultural collaboration being a good experience, this was also evident (for tutors 7 out of 7 responded Fully Agree and Agree, whereas for students 17 out of 18 responded Fully Agree and Agree). Moreover, effective communication was achieved to a large extent in the online and onsite group collaboration activities (for tutors 6 out of 7 responded Fully Agree and Agree, whereas for students 14 out of 18 responded Fully Agree and Agree).

6 Conclusions and Future Work

The preliminary results of the survey showcase the potential of the EPUM platform, and demonstrate the usefulness and benefits of CLAs on students' learning experience. Based on the aforementioned results of the evaluation, the design of the platform adheres to the CLA requirements of participants as follows:

- Large size related resources (e.g. studio activity information, maps) for a specific CLA can be added to by tutors and shared with its members (tutors and students).
- Critique and peer review on students work submissions by both fellow students and tutors are supported through comments.
- Collaboration and discussion are supported through the specific CLA discussion area.

The CLAs methodology implements a collaboration approach, incorporating all stages relating to a specific task, topic or assignment. All participating organisations play an active role in the design of CLAs in order to identify the educational needs for the effective delivery of training on each different approach of urban form analysis. It can include an archive of key resources, material, discussion, instructions, assignment submission and feedback from both students and teachers. This approach will eventually create and formulate an online community of practice [14] where the active membership of learners and teachers will facilitate an educational social praxis. In that sense, learning "involves co-construction and co-evolution of knowledge" ([15] p.179) among partners and often isolated schools of thought in the study of urban form. Future work includes conducting a large-scale evaluation of the capabilities of the EPUM platform with students and professors from many different Universities from many countries.

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