

Integrating Advanced Distributed Learning into Multinational Exercises

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ABSTRACT

Armed forces around the world face similar challenges regarding exercises and live training. The context is increasingly multinational, and operations and supporting systems are more complex, all requiring more extensive training. To thrive in these volatile, complex and evolving security environments, military personnel also require an expanding range of competencies and at higher levels of proficiency, and the quick acquisition of new knowledge and skills to confront novel multi-domain challenges. In resource constrained systems, this outcome must be achieved without significantly increasing training and education time or costs. Operational integration of Advanced Distributed Learning (ADL) into multinational exercises is one step toward this goal.

As computer-aided exercises increase in number and scope and educational systems go online, the ability to produce ADL training and education becomes a critical capability. ADL has been a supportive learning concept in the Viking series of computer-aided exercises since 2003. The ADL-concept for Viking 2018 expanded the scope and scale of learning resources to include assets of both pre-training and operational value, and highlighted analytics on a common dashboard with data from both the Learning Management System and the Command and Control system. Thus, it was possible to compare pre-training data to data from the execution phase of the exercise, including data from the designated evaluation team and exit interviews with participants.

Based on previous lessons identified and data from Viking 18, this paper shows that ADL, blended into a computer-aided exercise, produces more effective and efficient outcomes. To bolster the effort of integrating ADL into future exercises, the paper also describes an outline for a multiyear design-based strategic plan to achieve operational integration of ADL across a suite of joint and national exercises to support and enable readiness.

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INTRODUCTION

The aim of this paper is to review the Viking 18 Computer-Assisted Exercise (CAX) and to highlight the challenges and implications of implementing new methods of learning (training, education) into this longstanding triannual multinational enterprise. The paper specifically describes our experience in blending Advanced Distributed Learning (ADL) capabilities into Viking, including e-learning and learning analytics, and it includes a roadmap for maturing these types of capabilities over future events.

The Viking Exercise

The Viking exercise series was announced at NATO's 50th Anniversary Summit in 1999, as a Swedish and U.S. initiative. Viking is co-hosted by the Swedish Armed Forces and the Folke Bernadotte Academy, the Swedish government's agency for peace, security and development. Viking 18 marked the eighth event in the series (conducted in 1999, 2001, 2003, 2005, 2008, 2011, 2014). Roughly 2,000 individuals from 61 countries and 80 organizations participated across nine physical sites, located in six different countries. The exercise execution spanned 10 days in mid-April; this was preceded by a month of asynchronous pre-training and nearly three years of planning (SAF, 2018a).



Figure 1. Exercise participations at Viking
Photo by Lenny Ericson/Swedish Armed Forces

Viking is the world's largest multinational civil-military training exercise. Its aim is to train and educate participants – civilian, military and police – to operate together for multidimensional crisis responses and peace operations. In 2018, this included a particular focus on leadership, sex perspectives, protection of civilians and planning and conducting a United Nations–mandated peace operation in an unstable environment (see *Charter of the United Nations*, Chapter VII). Given the breadth of the training goal and assortment of the audience, the Viking exercise scenario incorporated a wide range of themes, including establishing a safe and secure environment, protection of civilians, irregular forces, cooperation and coordination, rule of law, humanitarian assistance, internally displaced people and refugees, human rights, state building, air space control and maritime security. The exercise scenario was designed to be accomplished via a comprehensive approach, focusing on cooperation and coordination across all of the relevant actors. This was a multidimensional, multifunctional and multinational event, with an emphasis on realism and current operational concepts (SAF, 2018b).

The e-Learning Effort in Viking 18

In one of the first examples of its kind, Viking 18 exercise organizers built Advanced Distributed Learning (ADL) capabilities into this large-scale, multinational collective training event. While military training frequently involves online learning, most exercises – particularly large, international ones – don't integrate it as a core element. (The exception is the U.S. Joint Staff J7's Blended Learning–Training Program, which serves as an exemplar for the blended ADL capabilities in Viking; see Fautua, Schatz et al., 2014.)

The ADL effort in Viking 18 was meant to be the first step in integrating and maturing these sorts of capabilities throughout multinational exercises. The project involved three main goals:

1. **e-Learning:** Provide e-learning resources to enhance pre-training, just-in-time and after-action learning
2. **Learning Analytics:** Connect pre-training data with performance data from the execution phase
3. **Roadmap:** Identify lessons for further development of the basic concept, to inform a roadmap

(1) e-Learning in Viking 18

The success of a training event depends, in part, upon its return on investment, that is, how well it prepares the participants, given the time and available resources. In many exercises, the planning team must allocate significant time to get the training audience up to speed – time that could otherwise be spent on activities that would enhance the learning experience and development of the exercise. This is particularly true in multinational events, given the assortment of participants, their wide ranges of background knowledge and prior experiences.

Automated e-learning courses offer a natural solution for enhancing both the efficiency and effectiveness of an exercise. Clearly, e-learning can support the pre-training phase, helping to orient the training audience more quickly. However, it's also useful during and after the exercise, as just-in-time learning and after-action refresher materials (Fautua, Schatz et al., 2014).

In order to provide relevant and effective e-learning assets, the core planning team formed a multinational e-learning working group that could manage the e-learning integration, provide existing national/NATO assets and, to some extent, produce new, exercise-specific content. The e-learning working group consisted of participants representing the Swedish Armed Forces ADL Centre, Swedish International Centre (SWEDINT), NATO Allied Command Transformation (ACT), U.S. Joint Staff J7's Joint Knowledge Online (JKO), Finnish International Centre (FINCENT) and individuals supporting the exercise core planning team. Preparation and integration for this endeavor occurred over six-months and also involved significant contributions from the Partnership for Peace Consortium (PfPC) ADL Working Group; Regional ADL Initiative (RADLI); Nordic Defence Cooperation (NORDEFECO); Center for Civil-Military Relations at the Naval Postgraduate School (NPS); U.S. ADL Initiative; and other U.S. Defense agencies.

The e-learning working group decided early in the process to tailor the content for the different organizations within the exercise, while at the same time making all e-learning assets available to all participants. The overall concept used was to divide the courses into three different levels:

- Level 1: Mandatory course(s)
- Level 2: Recommended courses, tailor-made for different parts of the exercise
- Level 3: Course repository available to all participants

For the delivery of the courses, the working group decided to use a separate instance of the existing SAF Learning Management System (LMS). By using a separate instance, they were able to separate the Viking participants from the existing users on the LMS, supporting better cyber security and information assurance. It also gave an opportunity to restructure the LMS interface to match the requirements of the exercise.

Six nations contributed a total of 29 e-learning courses to the exercise. This included 27 legacy courses that met different Viking 18 themes and learning objectives as well as two purpose-built courses. Exercise participants had access to the courses a month prior to the exercise, they could refer to them during the execution for just-in-time learning and the courses will be available until January 2019 for further use and reference.

The working group decided only to have one mandatory (L1) course, *Introduction to Viking*. This particular course was developed especially for Viking 18 and included an overview of the exercise organization, the basic scenario and a description of the road to crises. The main aim of the L1 course was to familiarize participants with the exercise organization and context, making them better prepared at the beginning of the event. Participant had the opportunity to complete between one to eight different L2 courses, assigned based upon on their different role assignments in the exercise. The L3 courses, including all other e-learning assets, were optionally available to all participants.

In total, over 700 course completions were registered and an additional 1,000 courses were initiated but not completed. The *Introduction to Viking* course was by far the most popular, with 588 initiations, 369 completions and 342 completions before the exercise began (Presnall & Radivojevic, 2018).

(2) Learning Analytics in Viking 18

The Experience Application Programming Interface (xAPI) played an important role in Viking 18. xAPI is a technical specification that lets learning technologies better record, aggregate and analyze learning performance data, particularly across different learning experiences.

For Viking 18, integrating xAPI into 29 varying e-learning courses presented a challenge. While the premade courses already conformed to the SCORM specification, they followed different versions, came from assorted authoring tools and were often deployed on legacy platforms. As a result, in most cases the e-learning team couldn't use the readymade "SCORM to xAPI wrapper" (a JavaScript library developed to automatically convert SCORM basic run-time data into xAPI statements). However, they found creative ways to implement the wrapper's functionality across the collection of dissimilar courses. This enabled relevant data, such as learners' test scores and completions, to be collected across the 29 courses and aggregated into a single Learning Record Store.

To make use of the accumulated data, the e-learning developers created a web-based data visualization. This dashboard not only analyzed the aggregated xAPI-conformant data but also ingested the non-xAPI data from the exercise's management system. This meant that exercise organizers, and other stakeholders, could trace trainees' performance across different times and technologies – specifically correlating e-learning activities with performance in the exercise scenario – and unlocking the potential for deeper insights into the exercise training outcomes.

The use of xAPI in Viking 18 was considered a success. For a more in-depth description of the learning analytics effort, supported by xAPI, refer to Presnall and Radivojevic (2018).

(3) Collecting Lessons for the Roadmap

Finally, our third goal for the Viking 18 ADL integration was to identify lessons, to determine whether – and if so, how – blended learning capabilities can, and should, be matured in future multinational training events. The following sections describe the method and results of the associated data collection, and an early description of the future roadmap is included at the end of the paper.

METHOD

Data Collection

Since one of the main reasons for making the e-learning effort was to collect data and identify lessons for further development, the e-learning team sought to compile data from multiple sources. In order to get a wide variety of information, ranging from strategic issues down to low-level questions, such as the number of learners in a given e-learning course, we collected data from the following sources:

- Data from the built-in reporting tool in the Viking LMS
- Data from the exercise management system
- Post-event interviews
- Participation in the Viking 18 Exercise Evaluation (EXEVAL) process
- Close collaboration with the designated ADL-evaluator
- Data from the final exercise evaluation form
- Lessons identified from the Viking 18 e-learning working group
- *First Impression Report – Viking 18* (Swedish Armed Forces FM2018-9496:2)

Organizational Setting

The training audience arrived on Monday (16 April) of the first week, starting their pre-training and build routines for

the staff work until Wednesday (18 April). The main exercise scenario ran for six days, from Thursday (19 April) of the first week to Wednesday (25 April) of the second week. The training audience consisted of temporarily assembled staff from different nations, many of whom had never met before.

Observer, Tracker, Trainer and Monitoring Teams (OTTMs) helped guide the event. OTTMs have a direct, pedagogical influence on the training exercise and offer important support for the training audience. The observers, in particular, sit with the staff headquarters sections and observe their work, giving feedback and advice. The observers are the main instrument for helping the training audience during the exercise. They are experts on all elements of staff work and most of them are experienced officers and civilians from the participating nations.

In addition to the standard OTTMs, Viking 18 included a designated ADL evaluator within the EXEVAL-team, with a special task to see how the ADL-effort influenced exercise performance and outcomes. Furthermore, a physical “ADL Lab” was set-up at the main site in Enköping to provide just-in-time access to the e-learning content and support the participants’ use of the e-learning assets; the ADL Lab primarily targeted the training audience but others involved in the exercise could also use it. The ADL Lab offered both pedagogical and technical support, and helped facilitate easy access to the courses, especially the mandatory course, *Introduction to Viking*.

Pedagogical Setting

Viking 18 was created for individual and team training at the tactical and operational levels. The training audience was divided into a number of staff headquarters, based at different locations in Sweden and abroad.

All exercise learning activities in the staff headquarters sections focused on the completion of certain tasks. The staff team were evaluated based upon completion of their assigned tasks within a specific time frame and the quality of their work products. Completion of each task required contributions from several working or coordination groups as well as decision points from leadership – which basically functioned as quality controls, where teams’ work products be rejected or approved.

The central pedagogical method used in the Viking exercise series is on-the-job training, meaning that the training audience receives a time-framed task for which they generally have no prior experience. At the end of each day, all staff sections have a debriefing session (“Hot Wash Up”), which is an organized activity for discussion and reflection aimed at improving the section’s staff work. These debriefing sessions are typically led by the section commander and one or two observers, who give oral feedback on the section’s work.

Survey

At the end of the exercise the participants completed a digital survey using the exercise management system. The overall results for the exercise were very good when it comes to exercise usefulness for professional development (see Figure 2).

The survey also included two questions related to e-learning. The first e-learning question was: “Were the e-Learning courses you took relevant and useful?” (See Figure 3.) The Likert-style scale went from “1-No, not at all” to “6-Very useful.” It also included a non-applicable option, i.e. “I didn’t take any courses.” (Also, 1.3% of respondent did not answer this particular question at all.)

As Table 2 shows, more than 32% of the exercise participants (who took the survey and responded to this question) report not taking any e-learning courses. Hence, the second e-learning survey question asked about participant’s awareness of the e-learning materials. It asked: “Did you receive information about the mandatory e-Learning courses?” (See Figure 4.)

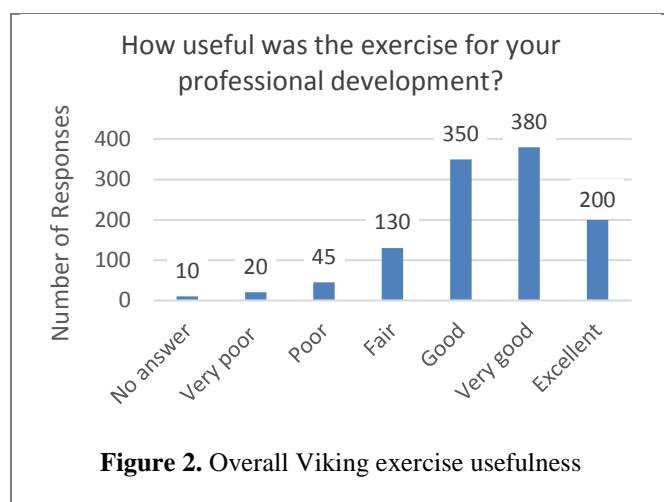
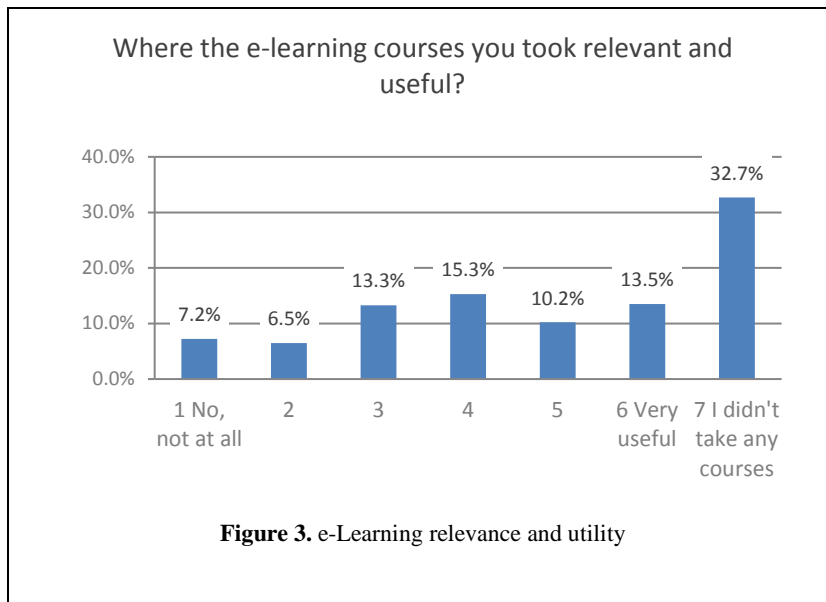


Figure 2. Overall Viking exercise usefulness



While nearly 38% of respondents reported not knowing about the e-learning courses, it is possible that these results underreport the lack of knowledge on the availability of the mandatory e-learning. The question wording is essentially “did you know about the mandatory thing,” which might lead a normal person and – especially a normal soldier – to respond in the positive, even if he/she was unsure.

Interviews

During the exercise, we conducted 30 short interviews with participants representing four organizational units in the event: United Nation Multi National Brigade (UNMIB),

Exercise Control (EXCON), EU Integrated Border Management Mission in Bogaland (EUTAM), and the NATO Force in Bogaland (BFOR).

We asked three different questions:

1. Did you receive information about the e-learning possibilities?
2. Were the e-learning courses you took relevant and useful?
3. What did you think about the layout and accessibility of the Viking LMS?

Did you receive information about the e-Learning possibilities?

The first question was asked to all 30 participants. Half ($n = 15$) of them had not received any information about the e-learning possibilities. Of the remaining half, 12 reported seeing the paragraph concerning e-learning in the exercise announcement (i.e., “Calling Message”), and three (3) only learned about the e-learning offerings during the exercise, e.g., from the signs guiding them to the e-learning lab (see Figure 5).

Were the e-learning courses you took relevant and useful?

Only the interviewees who had completed e-learning courses were asked this question. Most of the respondents found the courses they took relevant and useful, but they lacked content in different areas depending on which part of the exercise the respondent represented. Overall, UNMIB and EUTAM had less relevant content than EXCON and BFOR. Some of the respondents also chose not to take some courses that were relevant due to the courses’ length. However, all of the respondents liked the idea of having the L2 courses tailored to their positions in the exercise.

What did you think about the layout and accessibility of the Viking LMS?

Again, only the interviewees who had completed e-learning courses were asked this question. Most of the respondents found the LMS easy to use – *once they were logged in*. The main problem concerning accessibility involved the user accounts. First, users had to create accounts about one month before the exercise. At that time, creating an account on the LMS required participants to first create a separate account on the planning exercise (PLANEX) portal. For some participants, it took a long time to get an account on PLANEX. Others noted that requiring separate accounts for PLANEX and the Viking LMS created confusion.

DISCUSSION

The number of users of the Viking 18 e-learning was lower than expected, and the available courses were under-utilized. After analyzing the survey, the interviews and the exercise management system reports, the main reason for this was a lack of information about e-learning throughout the whole planning and pre-training process. In the *First Impression Report* (Swedish Armed Forces FM2018-9496:2, page 4) the EXEVAL team concludes:

The lack of clearly understood minimum requirements of the pre-training and WUST [Work-Up Start and Training], also led to that some elements of the pre-training material being developed explicitly for the exercise was not used to its full potential. For example, the use of the e-learning modules was very low.

Another reason might involve the accessibility issues. Participants reported some problems early on to get an account on the PLANEX site, which was the only portal available to access the Viking LMS. To add another layer of challenge, at the start of the exercise most of the content on PLANEX (although not the LMS) was moved to another system (CIX) which made the PLANEX site more or less obsolete for most of the participants during event execution – when just-in-time use of the e-learning resources should have occurred.

Considering almost 40% of the participants were not aware of the e-learning availability, a total of 773 learners gives ADL a +60 % hit rate among those who reported that they did know. However, even a 60% hit rate is much too low, especially considering one of the courses was highly recommended for exercise orientation. Hence, strategic communication about the ADL offerings needs to be addressed in future concepts and planning.

Those participants who did use e-learning found it “useful” to “very useful” (on a six-point scale, 39% rated usefulness the usefulness between 4-6 [more useful], with 27% rating it at the 1-3 levels [less useful]) which is in line with previous studies (Gallagher et.al., 2017). Using e-learning, especially in the pre-training phase, is a cost effective and flexible solution that, when properly used, can help improve participants’ understanding of the exercise, the scenario, gaming method, central themes of the exercise and position-related knowledge. By making the minimum requirements of the pre-training and WUST clearer, refining the content to more fully align to all exercise goals and delivering the content in a more accessible manner, these numbers would probably be a lot higher.

The e-learning courses used in Viking 18 were mostly legacy courses, assembled from multiple sources. As a result, they only covered part of the exercise’s themes and training objectives. For future exercises, it would be preferable if more of the content could be tailored to match the training objectives and also made in smaller chunks that allow participants to access part of a module without requiring them to sit through a lengthy e-learning course where only small parts are of interest, due to the learners’ previous knowledge and/or position within the exercise. One solution may be to make part of the content available as micro-learning using mobile devices, supporting both easier access and promoting just-in-time learning during the exercise. Micro-learning combined with a mobile capability would also support anywhere/anytime delivery of e-learning content at home, while participants travel to the exercise, in their hotel rooms or barracks at night and/or within the exercise execution area.

All: Did you receive information about the mandatory elearning courses?

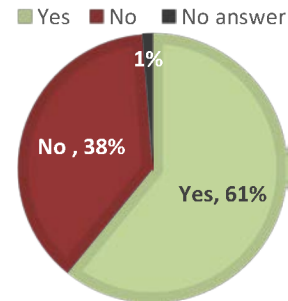


Figure 4. e-Learning awareness



Figure 5. Sign to the Viking 18 e-learning lab

The concept of dividing the content into Mandatory (L1), Recommended (L2) and a general Content Repository (L3) was considered helpful and can be used as a basic model to build upon for future exercises. When time is of the essence, the participants preferred that someone had made an effort to recommend relevant content (L2) based on their position in the exercise without limiting access to all available resources (L3) – which participants could skim through when they had available time.

Using e-learning during Viking 18 was in part an afterthought. The e-learning working group was formed after the initial planning conferences and meetings. Not being part of the planning in the early stages had several consequences. For example, one of the main setbacks was that it was difficult to get funding for producing and updating courses. Another consequence was that we put a lot of effort into setting up the LMS solution so it would be as automated as possible. The initial plan was to import all the participants from the manning list and thereby automatically create accounts and to adapt the initial landing page to each participant's position, giving them immediate access to their L1 and L2 courses. Quite late in the process we found out that the manning list did not include e-mail addresses for the participants, a requisite for automatically creating accounts. This created a lot of extra work and required many work-arounds. Had ADL been an integrated part of the planning process from the beginning, we probably would have realized this at an earlier stage, thus being able to include e-mail addresses in the manning list.

LESSONS IDENTIFIED

The following are key lessons identified from the Viking 18 e-Learning effort;

Formalize:

- ADL must be an integrated into all exercise phases (pre-training, WUST, execution, evaluation, postex)
- Make ADL part of the core planning team for future exercises
- Form a core planning team mandated e-Learning working group early in the planning process.

Communication:

- Improve strategic communication about ADL to leaders, trainers and trainees
- Make sure Exercise Guidance, calling messages and the exercise plan clearly state that participants are required to do mandatory e-learning before the exercise
- Plan how to reach out to partner heads and their participants and make sure partners are properly mandated

Learning resources:

- Key content should be tailored for the exercise and aligned with training objectives and exercise themes
- Recommend content for different elements in the exercise
- Quality trumps quantity when it comes to content; make the courses modular and as short as possible

Access:

- Access to the internet should be provided as close to the participants' workstations as possible
- Consider micro-learning and mobile access as part of the concept
- Ensure ADL-system usability

Evaluation:

- Make sure ADL is a part of the exercise evaluation effort
- The evaluation team should have full and immediate access to the exercise learning analytics dashboard.

WAY AHEAD: ROADMAP

On 29–30 May 2018, eighteen representatives from defense organizations in Georgia, Slovenia, Ukraine, the U.S., and NATO Allied Command Transformation (ACT) met to discuss an after-action review of the integration of ADL in Viking and to compile recommendations for maturing this sort of blended learning capability across a series of multinational activities.

The meeting opened with briefings on the U.S., Sweden, and NATO experiences in developing and implementing blended learning in Viking 18. Then meeting participants developed a notional five-year roadmap for implementing

and incrementally improving blended learning across a series of multinational exercises and activities. This five-year roadmap includes high-level actions and milestones for enhancing the associated policy, strategic communication, learning content, delivery systems, data analytics and visualizations, and user-experience. It also includes possible implementation targets, such as Bold Quest, a U.S.-led interoperability experimentation event, the Resolute Support Mission training is delivered by the NATO Joint Force Training Centre in Poland, and the Combined Joint Staff Exercises and interrelated Viking events led by Sweden.

SUMMARY

The e-learning effort in Viking 18 was meant to be the first step in integrating and maturing ADL in multinational exercises. There were three main aims: Integrate ADL into a largescale, multinational exercise; implement learning analytics across the ADL resources and the exercise scenario; and identify specific ways to continue to mature these capabilities across other, future multinational exercises.

During Viking 18, the e-learning team assembled a wide range of resources that helped meet learning objectives; these resources were generally considered relevant and useful by the participants. By being a part of the planning process from the start, and by using a well-founded approach to integrating ADL into exercises, the resources provided could be even more useful, relevant and accessible.

With a lot of work and by finding creative ways of implementing xAPI to dissimilar legacy e-Learning courses, the e-learning team was able to successfully connect results from the pre-training phase with performance data from the execution phase. Being able to do this at scale with data from multiple sources, visualized using a dashboard solution, will open up some really interesting possibilities for learning analytics in order to get even deeper insights into training needs and training outcomes.

By working collaboratively, the e-learning team and partners have identified a lot of different lessons during the whole process. Some of the lessons have already been put to use in the continued effort of further maturing the concept of integrating ADL into multinational exercises. Developing the concept collaboratively has also strengthened interoperability and partner capacity.

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