NATO ACT Microlearning Proposal

IMPLEMENTATION PLAN

Version 1.0
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1 Introduction

1.1 Recap of Problem Statement
NATO currently hosts and offers 110 online courses to 30,000 users throughout NATO global network. NATO’s eLearning program manager recognizes the need to utilize the most effective, efficient, and engaging learning methods, and has therefore noted benefits associated with the use of microlearning in delivering training in e-learning/mobile learning formats. In order to fully commit to using microlearning, the director has issued an RFP for projects that demonstrate how microlearning can be effectively utilized to meet NATO ACT needs.

1.2 Proposed Solution
We propose to use Cognitive Task Analysis and the ARCS model to address NATO’s learning needs. Cognitive Task Analysis helps understand the cognitive processes required to complete tasks, such as problem solving. It goes beyond the restricted scope of traditional task analysis and is motivated by the notion that “tasks have become more intricate, knowledge-intensive, and subject to increasingly integrated forms of technological support” (Barnard & May, 2000, p.147). But breaking down the task itself is insufficient. Many instructional models fail to account for learner needs. ARCS is a motivational model that will ensure that learning models are customized to learners’ individual needs.

We will operationalize this microlearning model by creating a mobile learning app as a vehicle that will extensively address learners’ goals in modular forms, allowing for just-in-time sequencing of discrete, bite-size 10-minute learning objectives (Johnson, 2017). This design will integrate learning into NATO employees’ regular use via a familiar learning management system (LMS) that allows access to available resources both on and offline and encourages collaboration among peers. Through this mobile app, NATO will enhance productivity among its personnel as they will be able to confidently tap into the information they need when employees perform their respective tasks at a time and place most convenient to them. In return, employees will feel empowered to take charge of their own learning anytime, anywhere.

The following sections outline the instructional design models that will guide this project, as well as the proposed development strategy for the mobile app. We then detail evaluation strategies for microlearning and learner performance improvements, resource requirements for designing and implementing microlearning. Last, we present our implementation project plan template, projected timeline, estimated cost and conclusion.

1.3 NATO Needs
NATO is an international organization, with learners spread across a variety of locations and with varying expertise required for a bevy of different projects. Consequently, NATO learning needs are equally diverse. To better understand these, we researched and compiled needs from NATO websites, various public reports and presentations. These are summarized into 5 sections, elaborated below.

A. Training and Education
- Use existing material to enhance learning through improved delivery (e-learning or mobile learning (m-learning)).
- Use new trends to improve delivery of training for all moments of need in e-learning/mobile learning (m-learning).
- Provide training that caters for a wide audience, different educational levels, learning styles and is multicultural.
- Provide mobile learning that is “Specialist delivery-not reformatted” (Thurkettle, 2014, slide 4) and customer driven.

B. Stakeholders
- Meet various stakeholders’ needs. These include NATO and non-NATO members.

C. Ability to Adapt
- Adapt to changes in technology and new challenges.

D. Efficiency and Cost Effectiveness
- Offer cost effective training
- Be efficient

E. Cognitive
- Stimulate thinking that “can result in higher levels of retention due to extensive learner participation” (E&ITD, 2015, p.P-6)

In addition to these needs, it is important to have complementary e-learning programs. Currently, NATO ACT has jADL, Computer Based Training (CBT), Immersive Learning, collaboration portals, mobile learning (m-Learning) and STANAG 2591. These may be easily perceived as silos and not as integrated products that all work together to fulfill NATO ACT mission. We propose to bridge these different training programs through a microlearning hub, housed in the proposed app. This hub will work through providing technological services that communicate using a common standard to share data with the existing e-Learning programs.

2 Instructional Models

2.1 ARCS Model
The ARCS model was created to “stimulate motivation to learn” (Keller, 1987, p.2). It was originally based on the premise that learners engage in an activity that is perceived to be connected to fulfilling their personal needs (Keller, 1987). ARCS stands for: Attention, Relevance, Confidence and Satisfaction (Keller, 1987). Attention looks at using techniques that grab the learner’s attention using visual aids, such as humor. Relevance focuses on using examples that learners easily resonate with. Confidence centers around boosting learners’ confidence by setting achievable objectives. Success refers to awarding effort displayed, this may be through different mechanisms such as badges of motivation for recognition. Table 1 below indicates how the use of this model assists in meeting NATO needs.
### Table 1. ARCS Model

<table>
<thead>
<tr>
<th>ARCS Model</th>
<th>Major Categories and Definitions</th>
<th>Process Question</th>
<th>NATO Needs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attention</strong></td>
<td>Capturing the interest of learners, stimulating the curiosity to learn</td>
<td>How can I make this learning experience stimulating and interesting?</td>
<td>Training and Education</td>
</tr>
<tr>
<td><strong>Relevance</strong></td>
<td>Meeting the personal needs/goals of the learner to affect a positive attitude.</td>
<td>In what ways will this learning experience will be valuable for my students?</td>
<td>Stakeholders</td>
</tr>
<tr>
<td><strong>Confidence</strong></td>
<td>Helping the learners believe/feel that they will succeed and control their success</td>
<td>How can I via instruction help students succeed and allow them to control their success?</td>
<td>Training and Education Ability to adapt Efficiency and cost effectiveness</td>
</tr>
<tr>
<td><strong>Satisfaction</strong></td>
<td>Reinforcing accomplishment with rewards (internal and external)</td>
<td>What can I do to help the students feel good about their experience and desire to continue learning?</td>
<td>Cognitive</td>
</tr>
</tbody>
</table>


### 2.2 Cognitive Task Analysis

Cognitive Task Analysis (CTA) is used to capture the knowledge, thought processes, and goal structures that underlie observable performance” (Chipman, Schraagen and Shalin, 2000, p.3). CTA has been used in diverse settings, including the development of “training and decision aides” (Hoffman, Crandall, Shadbolt, 1998), assessment of the extent to which students have improved, as well as reasons students are struggling to absorb the material taught (Crandall, Klein, & Hoffman, 2006).
As highlighted in our initial submission, the North Atlantic Treaty Organization: Research and Technology Organization (RTO-TR-24 AC/323(HFM)TP/16) Cognitive Task Analysis report authored by Ruisseau et al. (1997) and published in the year 2000, military implications associated with CTA embraced the “user-centered design process in the digitization of military forces” (p.iv).

The report further noted that the advantages of using CTA included: (1) “better match between system functions and human cognitive capabilities, (2) optimization of system performance and workload, (3) improved operational Command and Control team performance, (4) better understanding of abilities needed for the job, (5) enhanced training system design” (p.iv).

The overall artefact of the cognitive task analysis may be utilized to edify interface design elements and training structures (Militello & Hutton, 1998). Thus, for the proposed mobile app, CTA will be used in the content development phase. NATO personnel will be assessed to decipher (1) what they already know, (2) what are their views on the content, (3) how they structure the information cognitively, and (4) how they intend to learn new information. A similar approach will be adopted during the evaluation phase, which is discussed in greater detail in the evaluation strategies for microlearning and learner performance improvements section.

The results obtained from NATO experts’ responses will align with NATO’s microlearning goals. We will be able to unpack ways to create a learning environment that allows for just-in-time learning with relevant and precise objectives that also enable users to collaborate and exchange information succinctly.

2.3 Design Elements

Given that the proposed mobile app aligns with the NATO ACT commitment to providing a “holistic approach to education and training that helps identify gaps and avoid duplication” (NATO news), the elements depicted in Table 2 below will be considered in the development of the proposed app:
Table 2. Elements considered in developing the proposed mobile app

<table>
<thead>
<tr>
<th>Target Audience</th>
<th>Content</th>
<th>Instructional Activities</th>
<th>Learning Analytics</th>
</tr>
</thead>
</table>
| • 29 member countries- North America & Europe  
**Partner Nations** (i.e., Afghanistan, Kosovo, Mediterranean and Africa) | • Personalized learning differentiated & easily translated into language of choice  
• Easily accessible  
• Adheres to *Universal Design for Learning (UDL)* principles & *Americans with Disability Act (ADA)* compliant  
• Aligns with NATO culture  
• **Small multiples** (Stringham, 2012) | • Dictated by the intended purpose/lesson objective  
• Scenarios  
• Games  
• Infographics to present step-by-step processes | • Accessible data used to measure, and monitor student performance  
• Data used to consistently improve overall personnel microlearning experience |

**Partner Nations** may be included at a later phase

**Universal Design for Learning Principles (UDL)** is a method of teaching and learning that takes into consideration the learners' abilities. Thus, learning material will consist of separate transcripts, screencast, and closed captions that can be switched out per language as well as content with icons/images.

**Americans with Disability Act (ADA)** the app will ensure that all people with disabilities are catered for. Other countries disability acts will be considered in the development of the proposed mobile app.

**Small multiples** (Stringham, 2012) images arranged to “reveal salient comparisons in data presentation, visualization and pedagogy” (p.7) will be used.

3 Development Strategy
We begin this section by presenting our argument for using a mobile app. We then proceed to outlining our development strategy.

3.1 Why Use a Mobile App?
Currently, NATO ACT offers courses, seminars and workshops for its employees through various channels, such as the Partnership Training and Education Centers (PTECs), NATO e-Learning (JADL), immersive learning, portals and stand-alone computer-based training packages. Our solution will integrate available content from the existing e-learning channels into the proposed mobile app. Doing so will enhance the “global training architecture, strengthen national engagement” and promote innovative ways that provide customer driven “simulations and collective training exercises” (Lt. Gen Karl-Heinz Viereck cited in Thurkettle, 2014, slide 7). This is best illustrated by Figure 1 below.
The proposed mobile app may be used without internet or network connection after installation. We will utilize technological services to synchronize messages and learning progress between the app and the different learning platforms. Offline access is important to NATO workers, as many often find themselves in far-off locales. Prior to and following missions, users will be able to download relevant content for that mission. Following a mission, the app will sync with the needed learning management system to report progress and “check in.” A check-in will consist of 2-way reporting, both indicating which modules the learners made use of while on assignment, as well as pushing new training in response to performance or upcoming missions. This reporting will serve not only the individual learner, but also NATO, inasmuch as the eLearning Training Manager will be able to track which just-in-time modules learners access across assignments and geographies, thereby providing valuable information to formatively improve training over time.

The mobile app will have an interactive user-interface that enables NATO personnel to assimilate with phone features such as navigation, notifications, vibrations. This will allow the proposed app to connect to users’ everyday experience with their mobile device. Although relatively costly when compared to websites, the speed, ease of use and content usage counteracts this feature.

### 3.2 Benefits Associated with Using a Mobile App

The implementation of the proposed mobile app will enable NATO to:

- Adjust to changes in technology.
- It will not disrupt NATO education and training business model, instead complement it.
- It enables the exchange of ideas and how to get the best practices from one country and apply to another.
- It is readily accessible to students and caters for their respective needs.
• It is receptive to feedback from users.
• It will be routinely monitored and improved.
• It will stimulate thinking that can result in increased retention due to broad learner participation.

Additionally, the proposed mobile app is a value-add to NATO personnel.
• Personnel will be able to immediately translate and align information to relevant tasks, thereby allowing a “better match between system functions and human cognitive capabilities” (Ruisseau, et al, 2000, p.iv).
• Personnel will receive personalized learning that leads to better understanding and execution of tasks.
• Personnel will spend less time away from performing respective duties, thus increased productivity.
• The app promotes self-directed learning, enabling personnel will take charge of, direct, and oversee their own learning.
• Increased collaboration. Personnel can easily share information with peers and supervisors to better learn from each other.

Our team developed a working prototype to show some of the potential ways to implement these ideas to achieve these benefits. Below, Figure 2 shows an idea for the homepage, and Figure 3 displays a possible design for the training/learning “library”. This prototype can also be viewed at https://cmb0gh.axshare.com/#id=um1gob&p=page_1&sc=2&fn=0.
3.3 **How Will the Proposed App Be Developed?**

Special focus will be placed on ensuring that the app is user-centered. We will follow these phases when developing the proposed mobile app:

**Phase 1:** For each content area, we will conduct a needs analysis via online questionnaires across all NATO stakeholders to ascertain the specific area in which the mobile app will be a value-add to current training needs. This questionnaire will address demographics, perceived need for a mobile app, helpful features that users will want to see/use and overall functionality of the mobile app. A separate face-to-face interview will be conducted with subject matter experts.

**Phase 2:** We will assess how we can fully use existing NATO resources and applications to inform the design of the microlearning modules. We will use a common reporting standard (e.g., SCORM, xAPI) to report progress between the app and the existing learning platforms. Conducting this assessment also enables us to uncover potential limitations that exist such as bandwidth extension for mobile use.

**Phase 3:** We will decide on the application we will use to build the mobile app on and content to place in it. The chosen application will be secure, cross-platform (Android, iOS), and will consist of a “responsive user interface” (YML, 2019). In addition, based on our assessment results from both Phase 1 and Phase 2, we will focus on one or two competencies (maximum) that the mobile app can address, including “nice to have” vs. “much needed” features. This will help in the pilot development phase and will ensure that a quality app is developed that is user friendly, does not
overwhelm the user but ignites interest. Further, conducting this phase enables us to progressively manage the project functionalities.

**Phase 3.5:** Product development will occur. The programmer will develop the app, and the instructional designers will trim current resources to microlearning sized chunks that are also applicable to potential job duties and/or problem solving opportunities.

**Phase 4:** Conduct a pilot study where a mock version of the mobile app is distributed to a controlled group to assess its effectiveness. Data analytics will be an important guide for this phase as it will give an indication of the strengths, weaknesses, opportunities and threats (SWOT) that can affect the effectiveness of the mobile app.

**Phase 5:** Implement changes noted in Phase 4 and conduct one final pilot test before launching the mobile app. The final pilot phase may include adjustments of lesson time and overall user satisfaction.

**Phase 6:** Mobile app ready to launch

**Phase 7:** Post-production management

The team acknowledges that there may be times where the phases highlighted above do not go as planned, and therefore contingency plans will be in place for all phases, specifically phase 6 and 7. Also, the team assumes that the allocated budget (discussed in the estimated cost estimate section) will sufficiently cover all the development/microlearning phases.

### 3.4 Microlearning and the Mobile App

As indicated in the initial proposal, microlearning consists of:

1. highly focused, short and quick learning modules
2. byte sized content (single objective lesson, no longer than 10 minutes)
3. lessons that are conveniently accessible to various learners’ and/or learning types

The overall microlearning goal is to meaningfully engage learners, promotes knowledge retention, self-directed learning, and a pragmatic approach to problem-solving (Buchem & Hamelmann, 2010; Giurgiu, 2017).

Hence, we will ensure that we shorten existing E-Learning content including videos to fit the microlearning criteria. We will incorporate appropriate jargon, i.e., similar terms in E-learning training will be built in microlearning search codes used for different topics that are constructed to accessing database material. We will succinctly organize information based on how learners are thinking (i.e., learner centered approach helps reduce costs). So, videos will provide just in time information that is organized to ease access and understanding. This will be done by looping in videos that consist of definitions, scenarios, demonstration and animated slides show. A search tab that incorporates text, key words, hashtags or image search will be incorporated. Also, language differences across the different NATO operational centers will be taken into consideration, i.e., British English vs American English and French.

Further, app designers will collaborate with NATO personnel to create a multinational mobile app. This will take into consideration the different software that will be incorporated in the
design and creation of the app. Small multiples, UDL principles and the respective disability act compliance will also be included to aid in cross-international understandings, thereby making it easier for users to come up to speed with recent required training.

Pilot testing will be conducted by a selected group. Specific focus will be placed on the mobile app usability, issues or errors that need to be rectified and overall satisfaction. The prototype we created gives a visual image of the overall product. Hence, as highlighted by Table 3 below, our microlearning aspect of the mobile app aligns well with the instructional models.

Table 3. Synthesis of Instructional Design Models, Development Strategy and NATO Needs

<table>
<thead>
<tr>
<th>ARCS Model Categories</th>
<th>CTA</th>
<th>Development Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention</td>
<td>Match between system functions and cognition</td>
<td>5-10 min videos that consist of definitions, scenarios, demonstration and/or animated slide show</td>
</tr>
<tr>
<td>Relevance</td>
<td>Match between skills required to perform the task.</td>
<td>1. Search tab and appropriate language.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Small multiples, UDL principles and the respective disability act compliance.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Learner centered approach.</td>
</tr>
<tr>
<td>Confidence</td>
<td>Enhanced training system design</td>
<td></td>
</tr>
<tr>
<td>Satisfaction</td>
<td>User-centered design</td>
<td>Applicable software that meets desired goal.</td>
</tr>
</tbody>
</table>

4 Evaluation Strategies for Microlearning and Learner Performance

As highlighted earlier, CTA will be adopted to evaluate microlearning strategies. Feedback will be sought out from subject matter experts (SME) to assess the effectiveness of the modules as well as overall perceived efficiency (post development). Insight from personnel who have used the app will be gathered too. Surveys will be used as an instrument to collect data. Further, to ensure rigor, all evaluation conducted will comply with standard NATO criterion such as “relevance, efficiency, effectiveness, impact, confidentiality, and sustainability of effects” (See The ADL Handbook, 2014, p.47 for details).
On the other hand, learner assessments will be conducted to ascertain the extent to which information has been retained. For the proposed mobile app, formative and summative assessments will be conducted. Formative assessments will evaluate the extent to which the learner has mastered the content, “direct attention/focus on quintessence of course, interaction with the course material and students’ level of accountability” (The ADL Handbook, 2014, p.14). Summative assessments will consist of assessments conducted to measure the success of the specified competency. These are usually at the end of the module.

Thus, assessments will be based on the single outlined objectives and will consist of short quizzes, interactive games, or request for proof that tasks have been completed via photos and/or a voice recording. All these will be easily uploaded to the current learning management system (LMS) for review by the supervisor. Upon completing the assessment, learners will be given digital rewards in the form of a badge that will be seen by everyone enrolled for a similar course. This boosts confidence and inspires learners to learn (as highlighted by the ARCS model).

5 Implementation Plan

5.1 Resource Requirements for Designing and Implementing Microlearning

The proposed mobile app will use the Ionic 4.0 framework that utilizes HTML, CSS and JavaScript. This is a suitable framework for the proposed mobile app as it focuses on the user experience (i.e., “controls, interactions, gestures, animations and integrates well with other libraries or frameworks” (ionic framework, 2019). Hence the resources required are as follows:

1. Ionic 4.0 license: the license is “free and open source project, released under the permissible MIT license” (ionic framework,.2019).
2. Information Architecture
3. Wireframes
4. Ionic Command Line Interface: scaffolding tool
5. Style guide with corresponding language: Language will include English, French, Russian and Ukrainian (to name a few)

Further, the team will work along the creators of the NATO-Industry Forum Mobile App and NATO information Assurance-Armour Mobile to build an amalgamated mobile app for users. Hence, like the NATO information Assurance-Armour Mobile, the proposed app will be downloaded and activated by users. An “On premises” option will be available too.

5.2 Implementation of Elements

1. 5.2.1 Major Tasks

Phase 1- Needs Analysis

- Make questionnaires for different types of users
- Conduct Face-to-Face interview
- Survey users
- Examine data
Phase 2- Resource Assessment

- Examine existing resources
- Determine what can be used for microlearning
- Compile data to determine other resource needs

Phase 3- Application and Content Development Decisions

- Report findings from phases 1 and 2
- Determine what application to build application on
- Determine features to include initially
- Determine content needs and applicability

Phase 3.5- Product Development

- Work with developer to create mock-up based on phase 3 decisions
- Reorganize and trim existing resources

Phase 4- Pilot Study

- Pilot Study- determine usability test components, choose control group, implement test
- Compile findings from study
- Report findings and determine needed changes
- Make decided changes

Phase 5- Secondary Study

- Secondary Study- determine usability test components (if initial components needed updates based on changes), choose control group (or use initial control group), implement test
- Compile findings from study
- Report findings and determine needed changes
- Make decided changes

Phase 6- Roll out Application

- Create user instructions for signing into and how to use the app (infographics/other instructional materials)
- Train senior staff how to use the app
- Dispense instructional materials with user information

Phase 7- Post-production Management

- Collect data regarding user experience and functionality of the app
- Report findings and make changes (as needed)

2. 5.2.2 Development Outline

As per the phases highlighted above, the projected timeline depicted in Figure 3 below indicates that the team will develop the app and its relevant motivational elements first. We will then follow through with an iterative process of developing several 10 minute modules. We will be working during our needs analysis to determine which modules will be needed and the scope thereof. We will then pilot those with a select group of participants to see how they use and respond to the microlearning (and if our model is effective). Information gathered will then be
used to inform the design of 5 more 10-minute modules. This process should repeat itself until we have enough modules in place and an optimized design process for creating 10-minute modules. This process is best depicted by figure 3 below.

The next section shows the project plan implementation template, which gives estimates for the completion of each task within a specific phase and for the phase itself.
### 5.2.3 Project Plan Implementation Template

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Duration</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 3: Needs Analysis</td>
<td>15d</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Make Questionnaires</td>
<td>2d</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Conduct Face-to-Face Interviews</td>
<td>5d</td>
<td></td>
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<tr>
<td>Survey Users</td>
<td>5d</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review Data</td>
<td>8d</td>
<td></td>
<td></td>
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<tr>
<td>Phase 2: Reserve Assessment</td>
<td>15d</td>
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<tr>
<td>Examine Existing Resources</td>
<td>15d</td>
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<tr>
<td>Determine What Can Be Used for Microlearning</td>
<td>10d</td>
<td></td>
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<td></td>
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<tr>
<td>Complete data to determine other resource needs</td>
<td>5d</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Phase 3: Application and Content Development Design</td>
<td>45d</td>
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<td></td>
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<tr>
<td>Report findings from phases 1 &amp; 2</td>
<td>1d</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Determine what application to build with</td>
<td>5d</td>
<td></td>
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<td></td>
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<tr>
<td>Determine features to include initially</td>
<td>5d</td>
<td></td>
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<tr>
<td>Determine content needs and applicability</td>
<td>5d</td>
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<tr>
<td>Phase 3.5: Product Development</td>
<td>45d</td>
<td></td>
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<tr>
<td>Create mock-up with developer</td>
<td>45d</td>
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<tr>
<td>Recognize and note existing resources</td>
<td>25d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Phase 4: Pilot Study</td>
<td>15d</td>
<td></td>
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<tr>
<td>Pilot study</td>
<td>5d</td>
<td></td>
<td></td>
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<tr>
<td>Complete findings from study</td>
<td>5d</td>
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<tr>
<td>Report findings and determine needed changes</td>
<td>2d</td>
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<tr>
<td>Make decided changes</td>
<td>5d</td>
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<td>Phase 5: Secondary Study</td>
<td>15d</td>
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<td>Secondary Study</td>
<td>5d</td>
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<tr>
<td>Complete findings from study</td>
<td>5d</td>
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<tr>
<td>Report findings and determine needed changes</td>
<td>2d</td>
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<tr>
<td>Make decided changes</td>
<td>5d</td>
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<td>Phase 6: Roll Out Application</td>
<td>10d</td>
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<tr>
<td>Create user instructions for signing into and how to use</td>
<td>1d</td>
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<tr>
<td>Train senior staff on how to use app</td>
<td>5d</td>
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<tr>
<td>Dispense Instructional materials with user information</td>
<td>5d</td>
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<tr>
<td>Phase 7: Post-Prediction Management</td>
<td>25d</td>
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<tr>
<td>Collect data regarding user experience and functionality</td>
<td>25d</td>
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<tr>
<td>Report findings and make changes (as needed)</td>
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</table>

*Due to the small size of the template, here is a link where the template can also be accessed.  
https://drive.google.com/file/d/1AhHWdjItmGLzrz04LqkPe2IR1Xcph6rQ/view*

This is the project plan implementation template for the development and implementation of the app. Each phase was given time for collaboration amongst instructional designers, programmers, and NATO ACT seniority. This is a rough estimate, and times may vary depending on any issues that may arise.
5.3 Estimated Costs

As stated in our initial proposal, our goal is to efficiently use existing NATO resources to save money and manpower while simultaneously incorporating microlearning training at a multinational level. Therefore, the cost estimate takes into consideration the following existing elements:

1. license to operate globally - multinational involvement
2. 24/7 hosted servers on the intranet/internet
3. security: -hyperlinking existing NATO E-Learning material. This will be accessed from the in-house database/trusted library database (https://jadl.act.nato.int/).

Note that estimated cost hourly rate is subject changes caused by the iterative process listed above.

<table>
<thead>
<tr>
<th>Item to be billed and details on what the item entails</th>
<th>Number of Positions /Items</th>
<th>Hourly Rate</th>
<th>Estimated Hours per person</th>
<th>Total Cost</th>
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</thead>
<tbody>
<tr>
<td>A. Instructional Designer cost include:</td>
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<tr>
<td>a. audio, video, test questions (Chapman, 2006)</td>
<td>2</td>
<td>$100</td>
<td>275</td>
<td>$55,000</td>
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<tr>
<td>b. Simulations and interactive content (Chapman, 2006)</td>
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<td>c. Other costs including unforseen overhead cost.</td>
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<tr>
<td>B. App Designer cost include:</td>
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<td></td>
</tr>
<tr>
<td>a. Storyboard</td>
<td>2</td>
<td>$55</td>
<td>300</td>
<td>$33,000</td>
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<tr>
<td>b. Wireframe</td>
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<tr>
<td>c. Prototype</td>
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<tr>
<td>C. Internal Project Manager</td>
<td>Number of positions/items, rate and hourly rate at NATO discretion.</td>
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<tr>
<td>D. Pilot Testing (incentives)</td>
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<td>$3,000</td>
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</table>
### E. Equipment and Supplies (e.g. print outs for testing)

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<thead>
<tr>
<th></th>
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<th>$3,500</th>
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<tbody>
<tr>
<td><strong>Total Estimated Cost per Annum</strong></td>
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<td>$94,500</td>
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</table>

#### 6 Conclusion

Culver Instructional Solutions is positioned to cater for NATO needs through tailored, efficient and modern solutions. We propose the use of a mobile app that will act as a microlearning vehicle that facilitates superior NATO ACT training and education. With the use of the Cognitive Task Analysis and the ARCS model, the proposed mobile app will house the existing NATO e-learning suites, address NATO needs, increase productivity and simultaneously eliminate duplication.

Our implementation plan proposal included a summary of NATO needs, detailed description of instructional design models that guide the project, development and evaluation strategies for microlearning and learner performance improvement, resource requirements for designing and implementing microlearning. It also includes the project plan template, projected timeline, and budget. A prototype is included to demonstrate some of the microlearning elements that will be applicable to the proposed mobile app.

We would be honored to be part of the NATO ACT team to begin the design, development and implementation processes of the proposed mobile app.
APPENDIX A: REFERENCES


