Enhancing Learning Environments with Stories-as-a-Service:

How Content Collection, Automated Tagging, and Service Architectures Enable Knowledge Sharing

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Motivation

Make stories available to training & education on-demand, when learner is doing or thinking something that makes a story instructionally meaningful

WHAT: Enhance digital learning systems with informal instruction

- Tacit knowledge transferred from experts/peers during routine interaction
- Making “war stories” available within or beyond workplace

HOW Augment any API-compliant learning environment w/”Story Appliance”

- Create SOA capability to offer client learning applications *Stories-as-a-Service*
- Develop simple, flexible indexing organizes stories for instructional relevance
- Build story collection platform and story browsing interface

Sponsor: Advanced Distributed Learning Initiative

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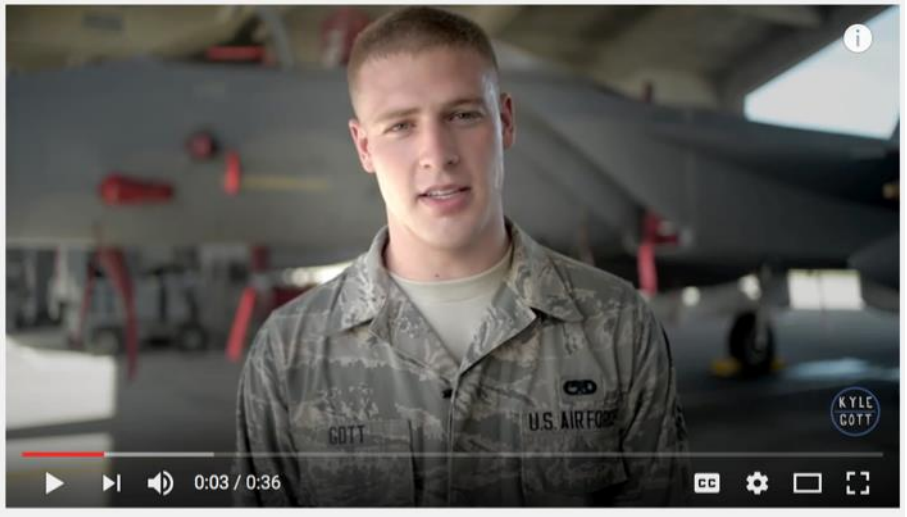
Armed Forces Interest in Video Stories

- Stories for recruiting, public affairs, education, training
- Online video collections professionally produced, edited
- Organized by high level topics areas or general questions



Airman Video Contest, AFBlueTube

armystrongstories.com

Limitations of Today's Practices

- Online video collections
  - Purpose-built and labor-intensive
  - No (or limited) meta-tagging
  - Content is siloed

Veterans Affairs (recovery, addiction, depression)

- Result: Good content but not scalable/repurposeable

Ask a Marine, Marines.mil Youtube Channel

#AskASailor, America's Navy Youtube Channel

Project Objectives

- Encapsulate tangible, relevant content in stories
  - lessons learned, advice, warnings, tradecraft
- Enhance Training Simulations with Video Stories
  - Tacit knowledge transfer via 1st-person “war stories”
  - Long-standing practice across diversity of communities

Augmenting Next-Generation Learning Environments with Stories

ANGLES

- Content meta-tagging/indexing
- Story Collection
- Client Learning App
- Sample Videos
- API
- Storyboard

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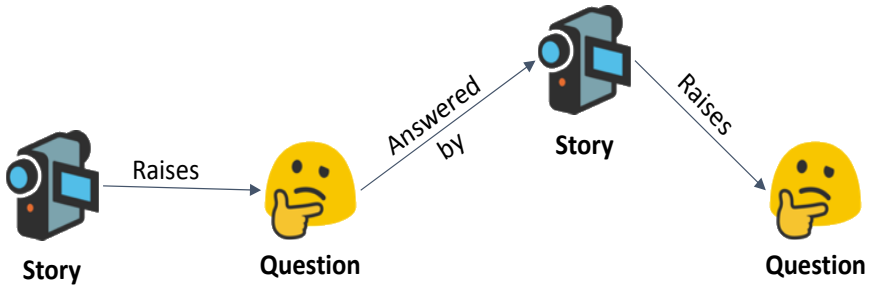
Linking Stories w/Question Indexing



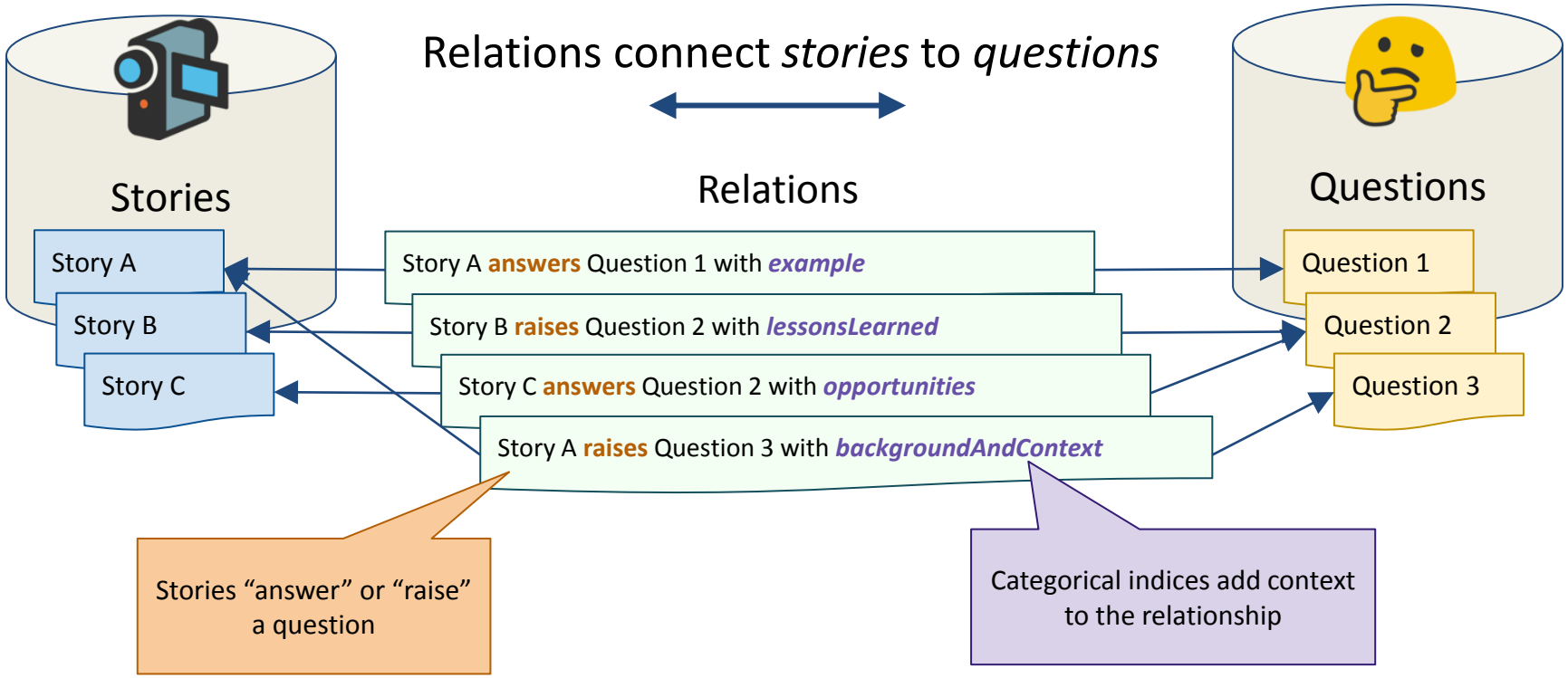
- A story is related to other stories…
  - It raises questions another answers
  - It answers questions raised by others
- Questions can be coded thematically

- ACOA: **Alternative Courses of Action** to the advice discussed in the story
- TT: **Tips & Techniques** that can be extracted from the story
- EX: **Examples** of the issue discussed in story
- C: **Consequences** or later events following the situation discussed in the story
- LL: **Lessons Learned** from the story

- BC: **Background & Context** that led to the situation discussed in the story
- IW: **Indicators & Warnings** about the situation discussed in the story
- RM: **Response Measures** that were taken in the story
- O: **Opportunities** related to the situation discussed in the story

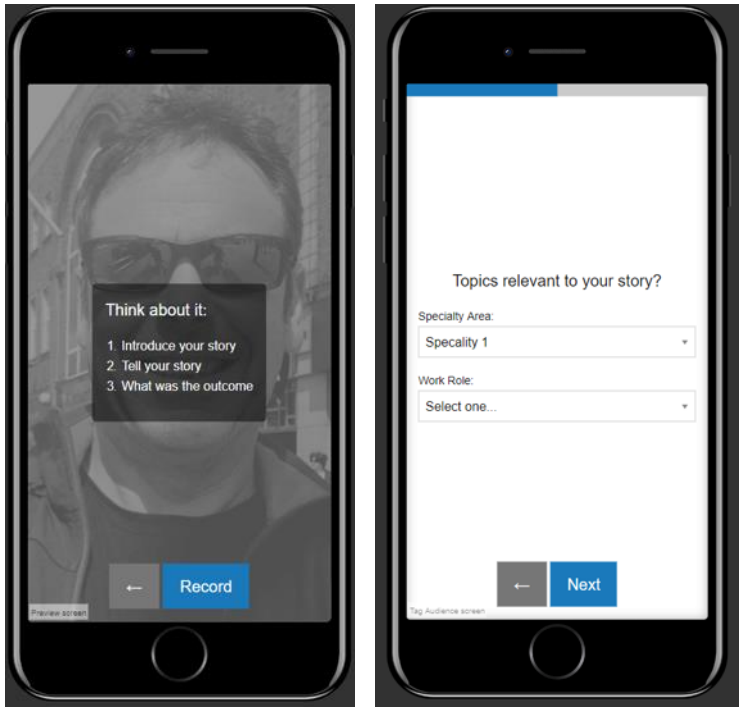
Story and Question Data Models

Index	Example Question
BC: Background & Context	What vulnerabilities will attackers try to exploit?
IW: Indicators & Warnings	What indicators of an attack do you look for in the network traffic?
RM: Response Measures	What steps do you take once an attack has been detected?
ACOA: Alternative Courses of Action	How can *least privilege* & *need-to-know* enhance a security policy?
TT: Tips & Techniques	How does pattern recognition help detect cyber anomalies?
EX: Examples	Has poor team collaboration ever resulted in a negative outcome?
C: Consequences	What are the vulnerabilities created by damage from an attack?
LL: Lessons Learned	What cyber risks are emerging along with the Internet of Things?
O: Opportunities	Are there ways of detecting insider threats before they attack?

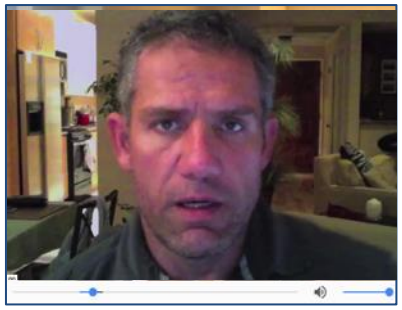


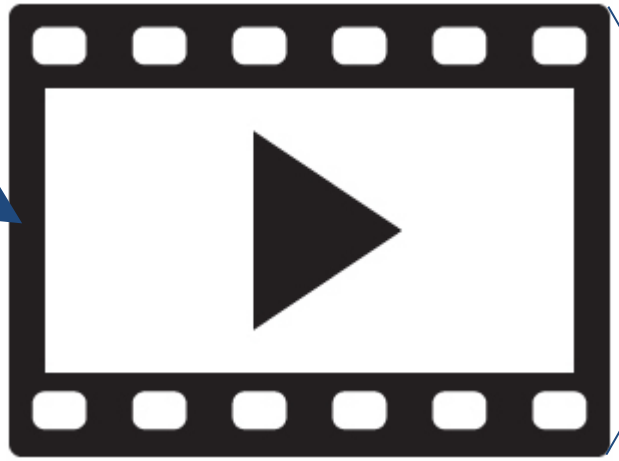
Story Collection

- Video Capture, Compression
- Speech-to-Text
- User Selected Indexing
- Metadata Generation
- Automated Alignment

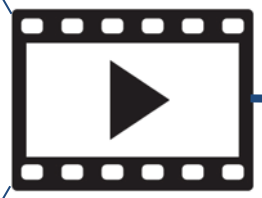


Video Capture / Compression

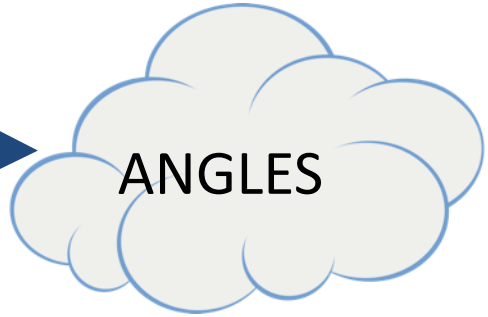




Most phones record video at
~150MB per Minute

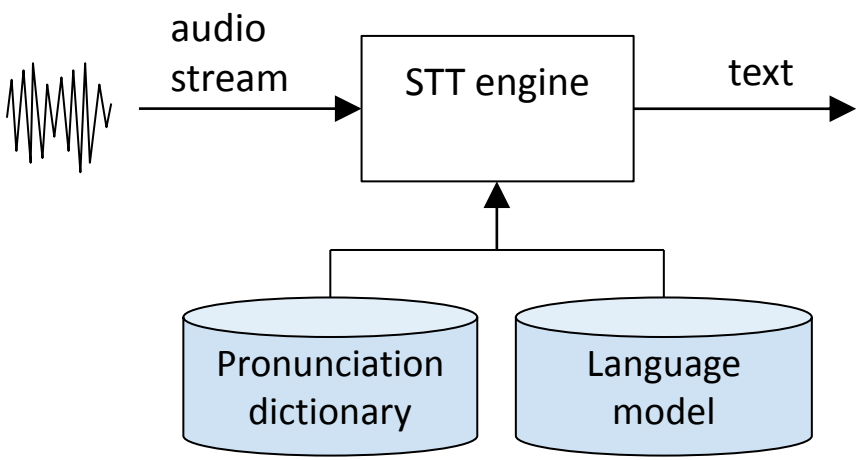


~10MB per Minute



On Device Compression

Speech-to-Text



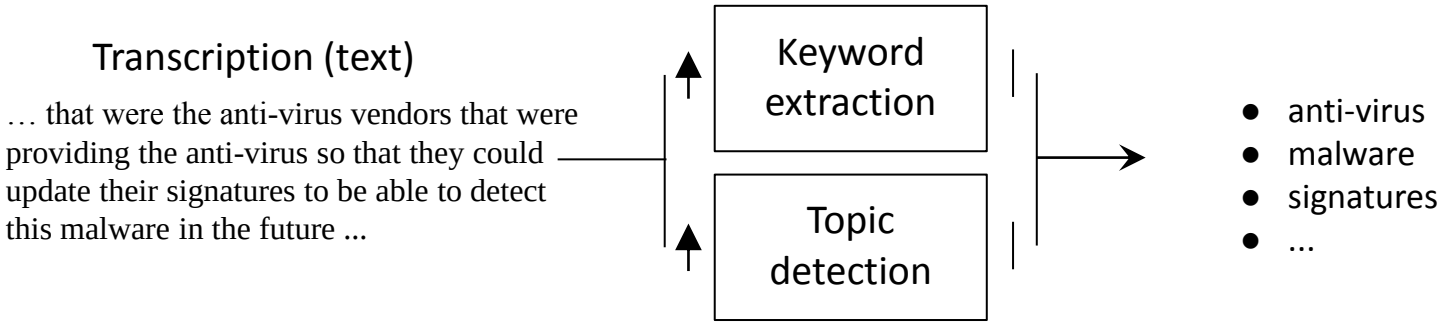
… that were the anti-virus vendors that were providing the anti-virus so that they could update their signatures to be able to detect this malware in the future ...

Word	**Pronunciation**
Darknet	d aa r k n eh t
honeypot	hh ah n iy p aa t
malware	m ao l w eh r
truecrypt	t r uw k r ih p t

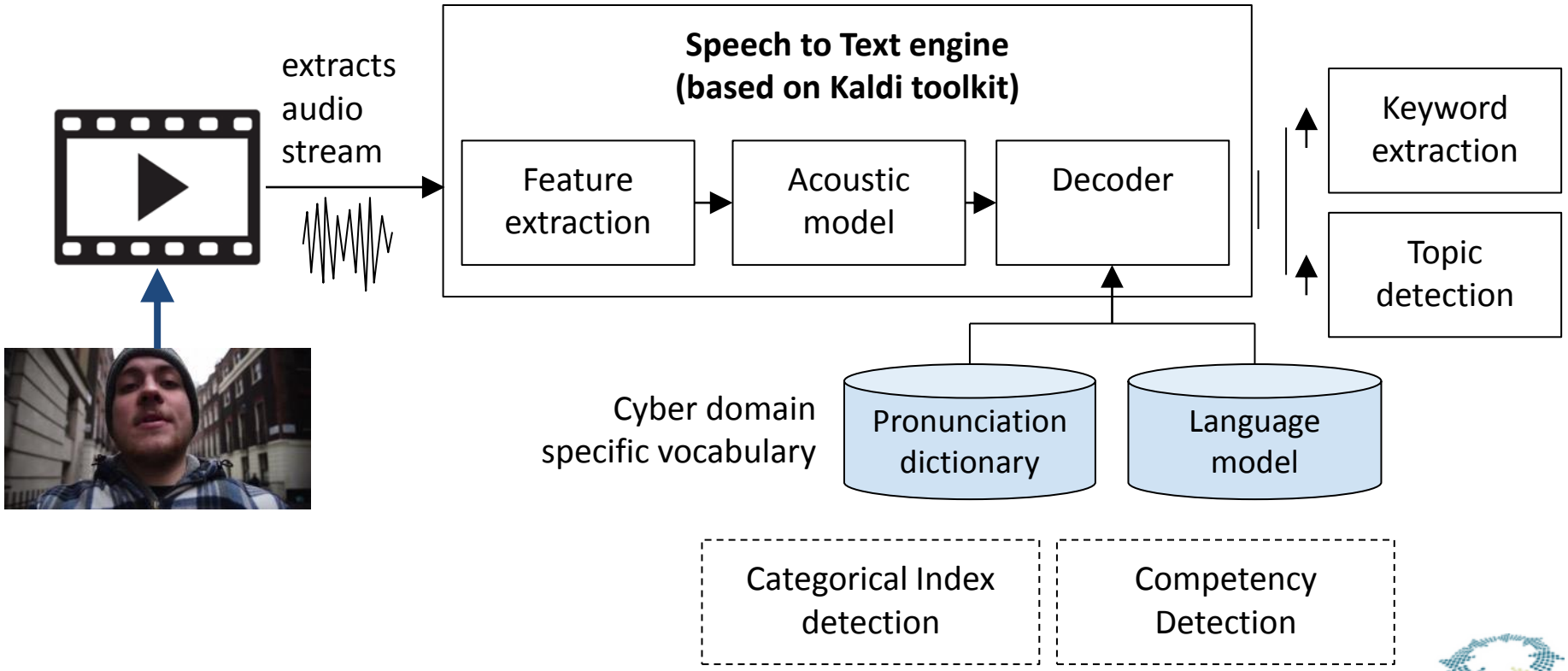
Bi-/Trigram	**log-likelihood**
antimalware scanner	-0.989783
get antimalware	-4.149837
launch antimalware	-2.580665

Metadata Generation

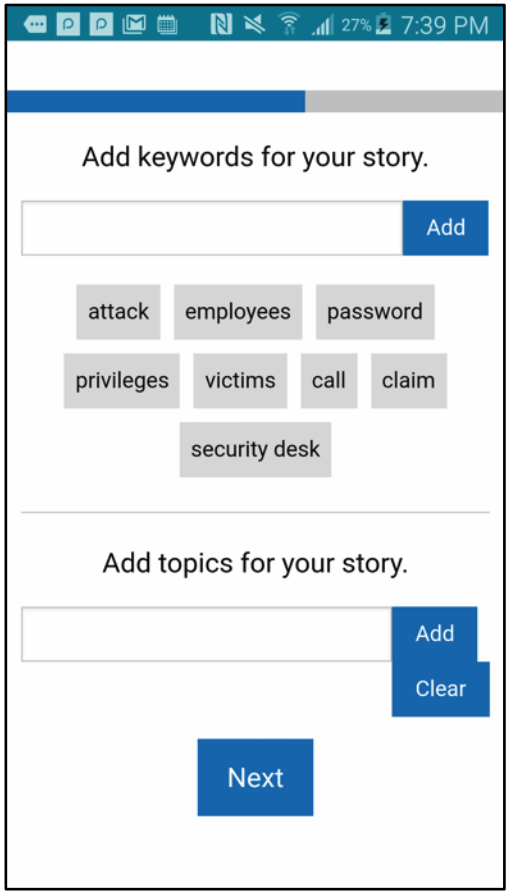
- Proof-of-concept for keyword extraction incorporated into collection app



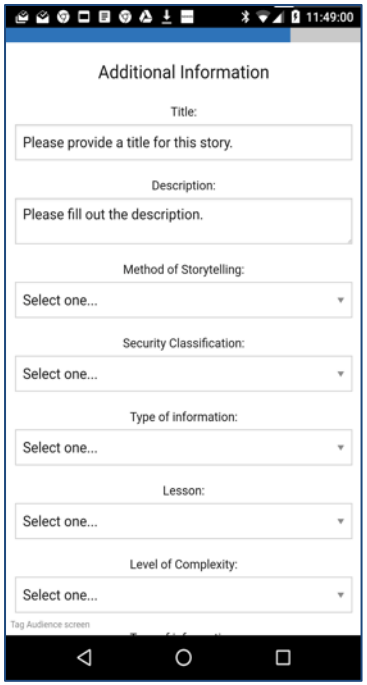
Server-based Speech-to-Text & Automated Metadata Generation

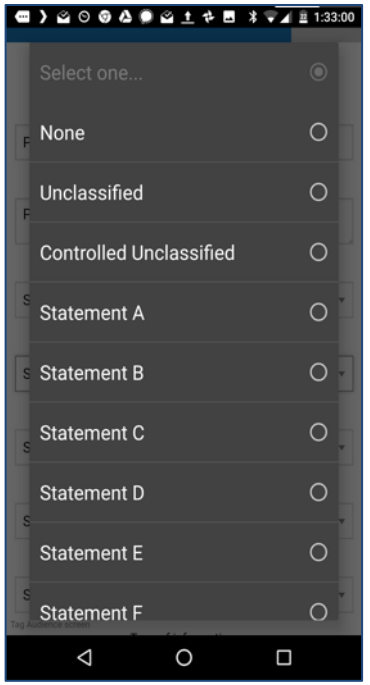


User Selected Metadata Tagging



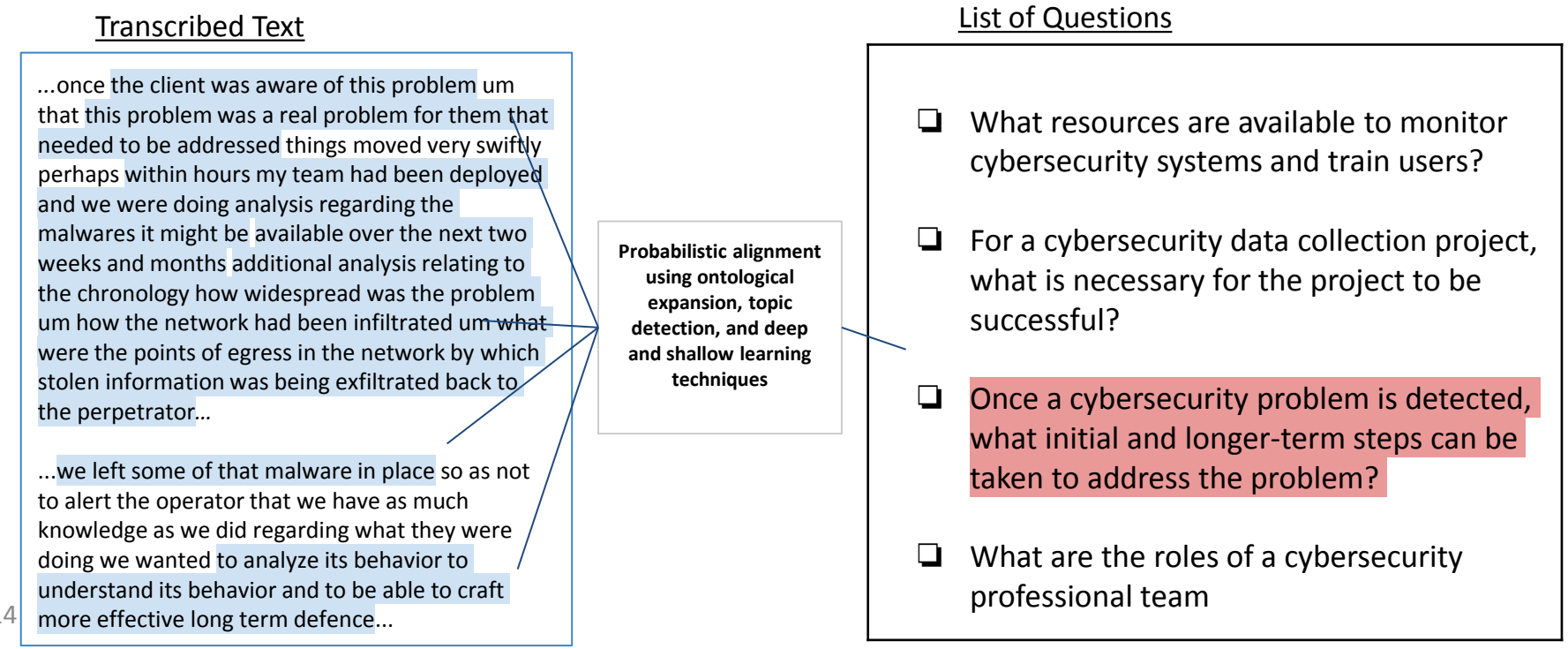
- Keyword suggestions from domain-tailored speech-to-text
- User-provided tagging:



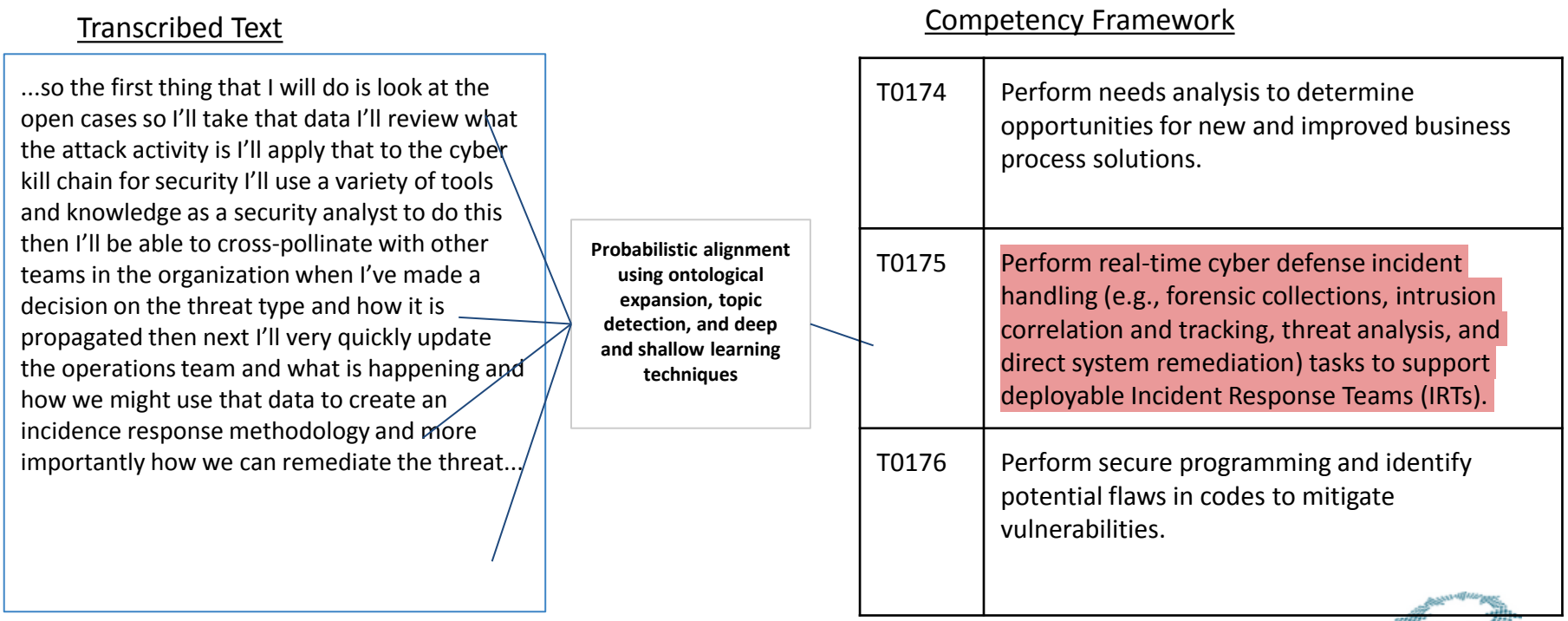


Automated Alignment to Questions

- Ontological expansion
- Topic detection
- Deep and shallow learning techniques

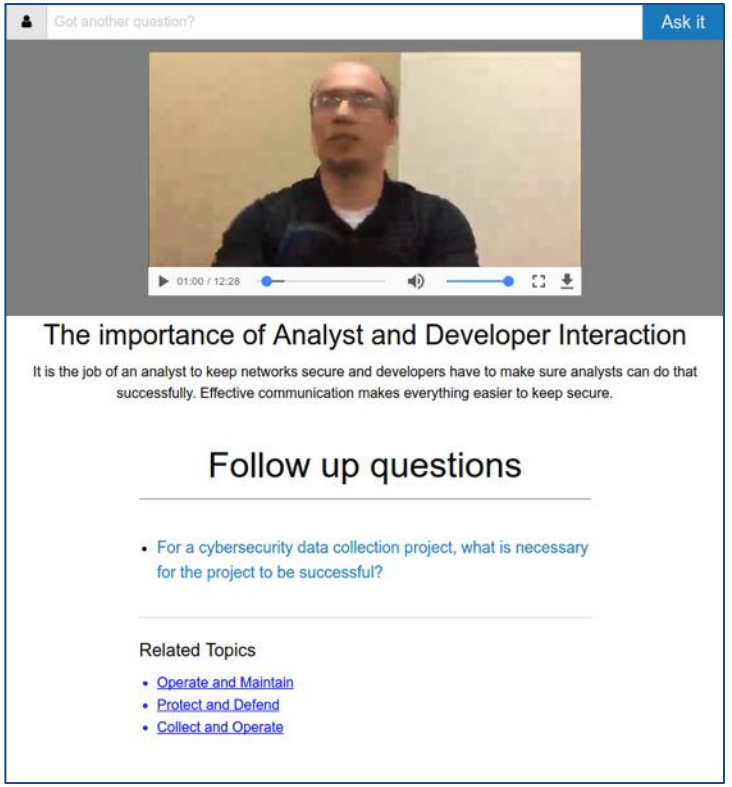


Automated Alignment to Competencies

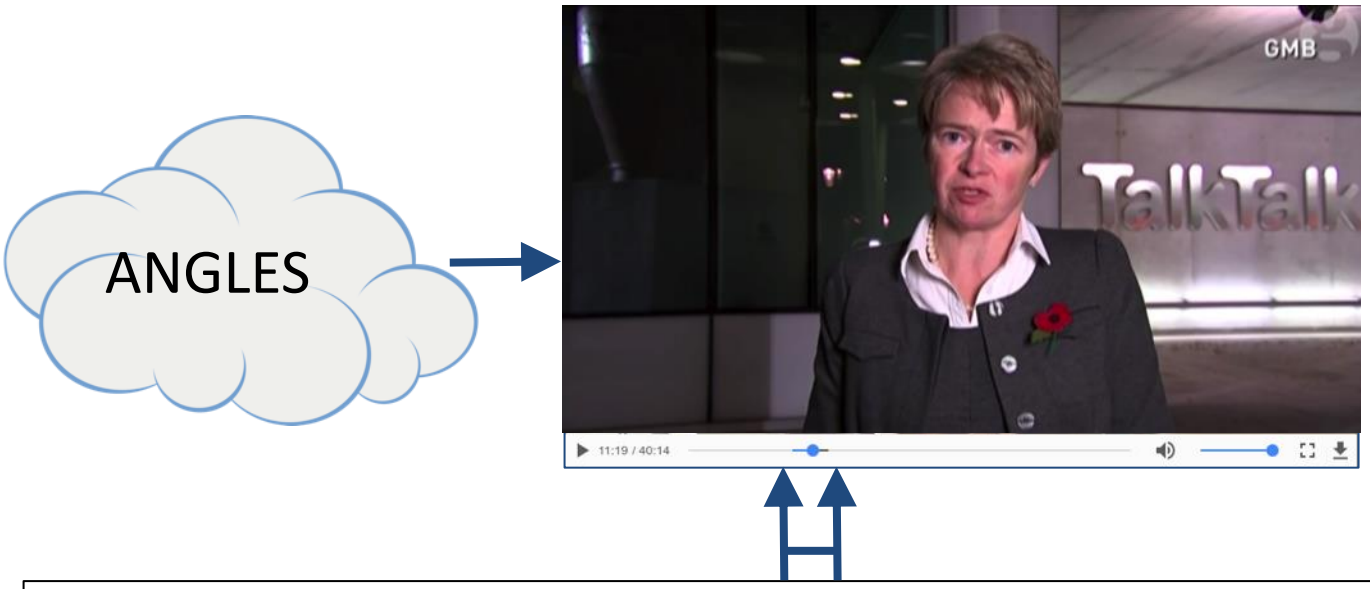


Example Client Learning App

- Surrogate Simulation Environment
  - Story Browser
  - Uses API to ANGLES server
- User can
  - Ask Questions
  - Browse Topics
  - Traverse links for virtual conversation

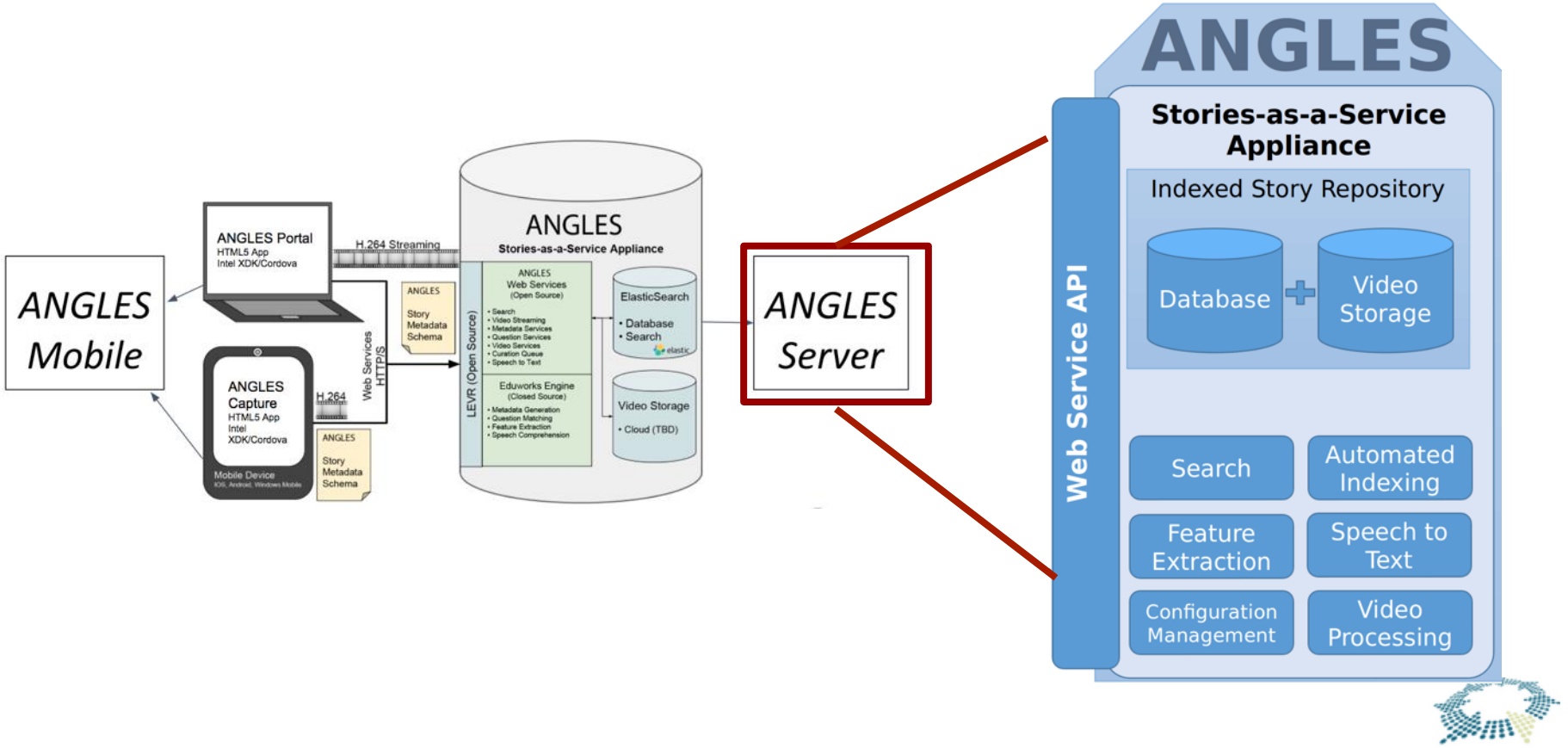


Streaming Playback



Streaming Playback enables reuse of videos for multiple stories (or other purposes)

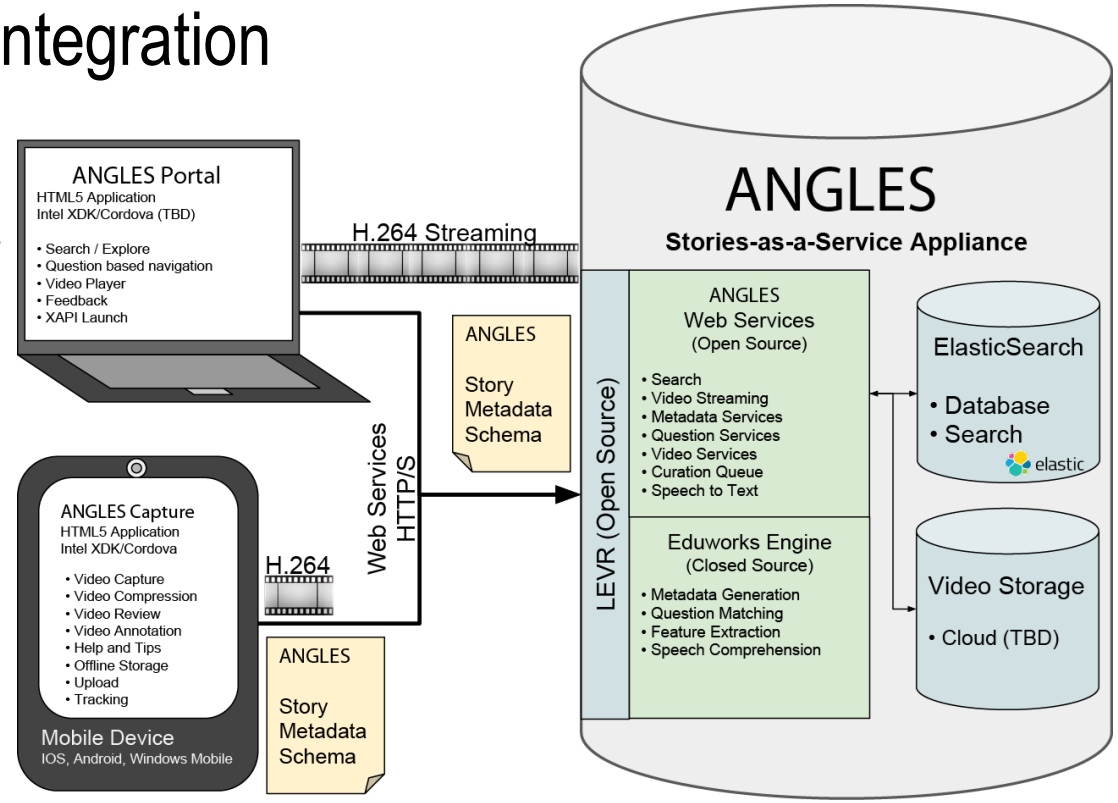
Architecture: Server, Mobile Client



API

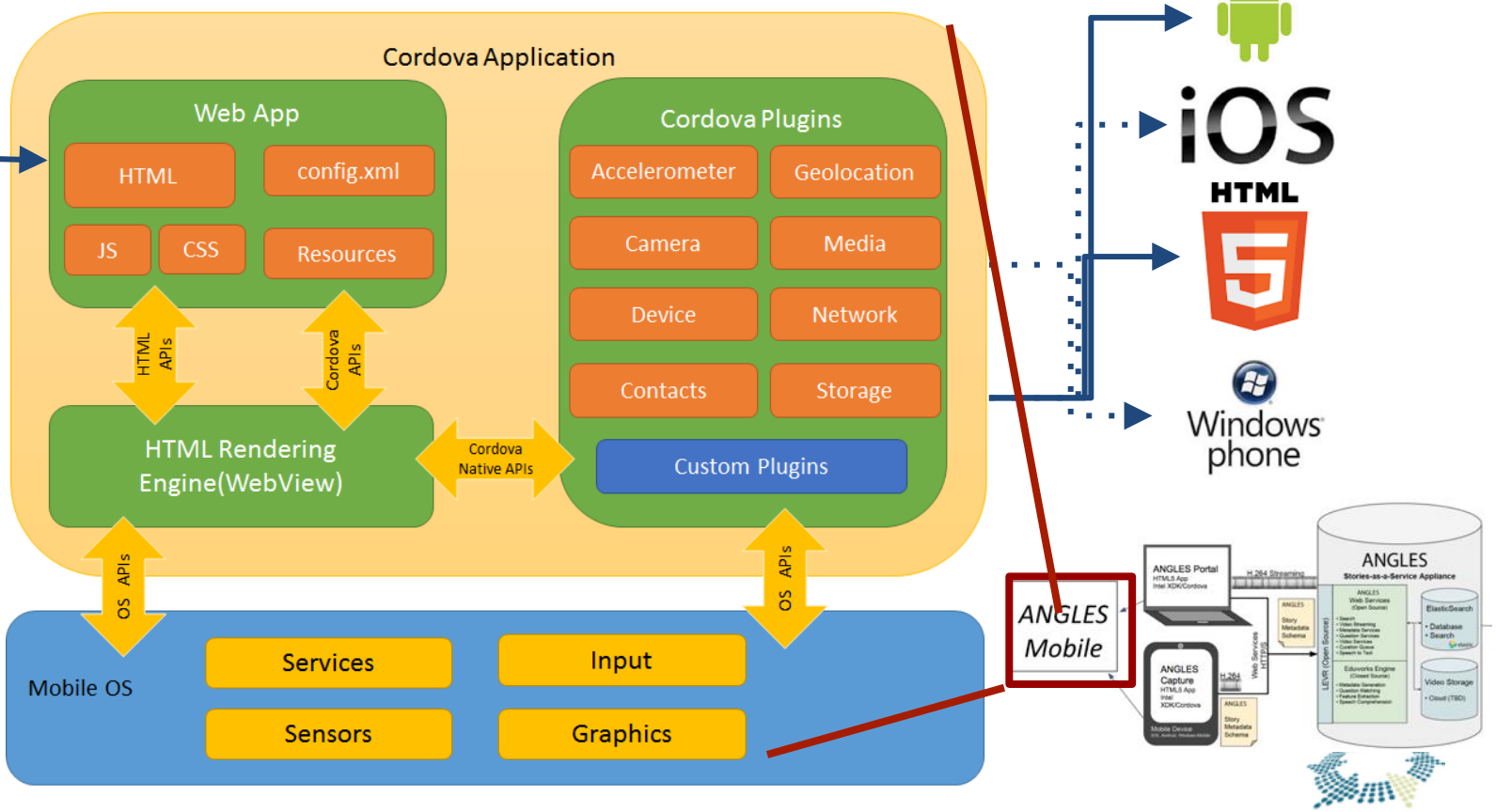
- Based on Open Linked Data
- Reuses/extends common schemas
- RESTful, JSON-LD
- Learning Environment Integration
- Notification Service

Your simulation here



Mobile Client

ANGLES Mobile Code



Example App: Cyber Security

- Sample stories told by cyber security SMEs
  - machine-transcribed for semantic analysis
- Tagged w/ANGLES indexing
  - 66 Stories
  - 148 Questions
  - 246 Relations (between stories and questions)

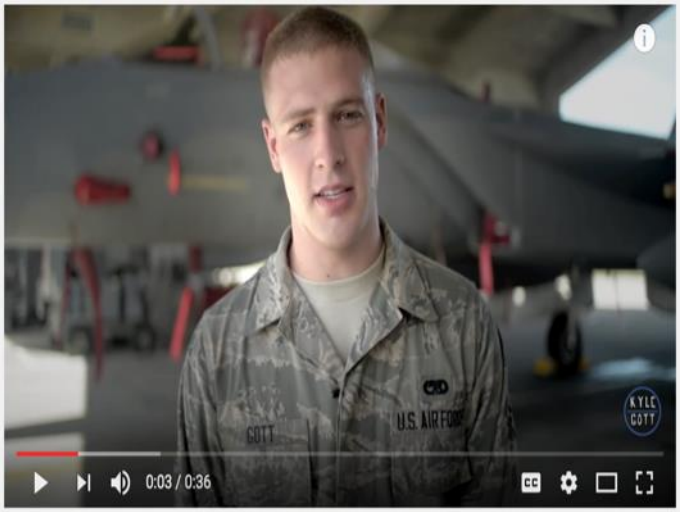
Contributions

- Tools for Content Collection
  - Keyword recommendations to support user-tagging
- Advances in Automated Tagging of Content
  - Metadata generation / Question generation
- SOA capabilities for delivering content to 3rd-party learning environments
- Broadening Community of Content Providers

Benefits to Armed Forces

- Enhanced services/tools
  - can add scale and utility

- Used for training, recruiting, public affairs



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#AskASailor, America's Navy Youtube Channel

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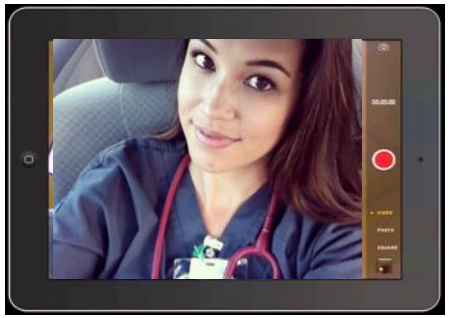
Benefits: Enhance Current Video Services

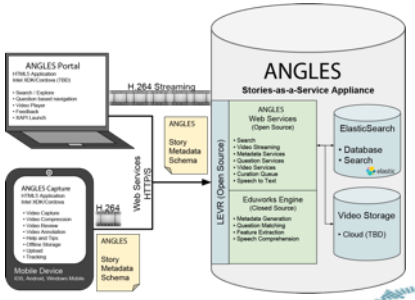


- How can ANGLES help?
  - Story collection via mobile app
  - Enhanced story navigation/browsing
  - Automated content analysis/tagging
- "War stories" -- on-demand relevant expertise
  - Interagency disaster response: Supplemental training
  - Public Health education – overdose reversal, vaccines, infant and pre-natal care, substance abuse, STDs
  - Public Safety education - driving, fire prevention, gun safety, emergency preparedness

Applications: Private Sector

- Stories-as-a-Service
  - Integrated w/web-based eLearning, mobile learning
- Corporate Workforce Development
  - On-demand access to relevant, first-person narratives
  - Supplement formal online training and education
  - Compliance, retention

How do I know what to wear to a job site?



Summary

- Enhances online learning w/Stories on-demand
  - SOA for delivering content to learning environments
- Broadens community of content providers
  - Videos scalable; no professional cameras, production
- Tools for content collection
  - Keyword recommendations to support user-tagging
  - Automated metadata generation / question generation
  - Content can serve multiple learning goals & apps
- API exposes Story Services to diverse simulations