Def(initely) Jux(topia)

Augmented Reality (AR) + xAPI bounty

The Team

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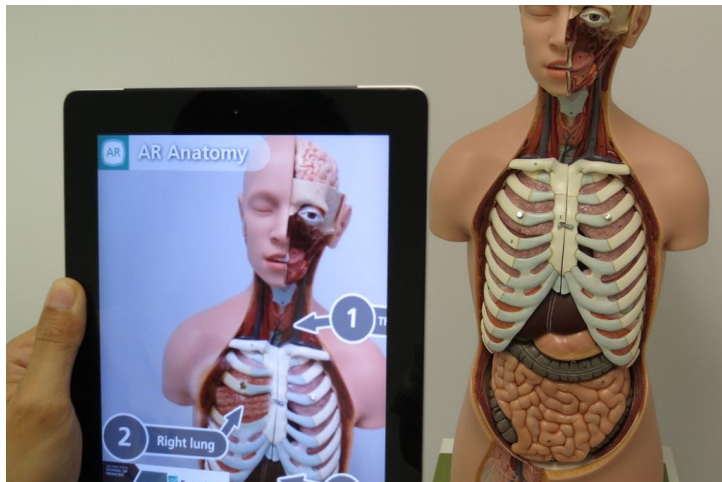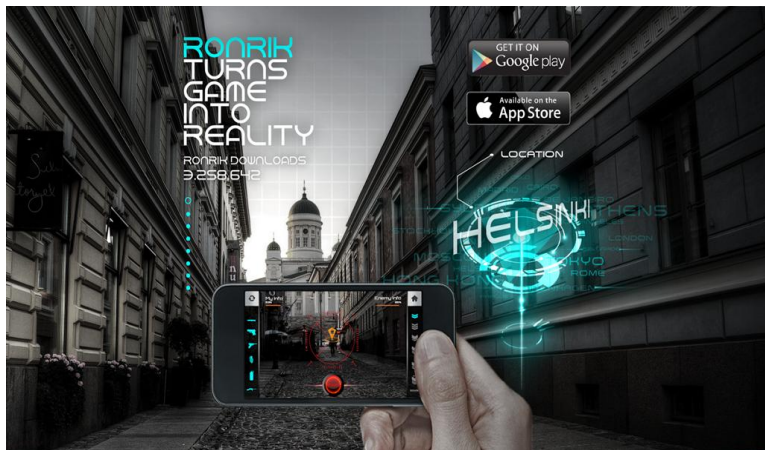- Fridolin Wild
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Project goals

1) Identify and prototype a simple Augmented Reality/xAPI interaction for POC and testing

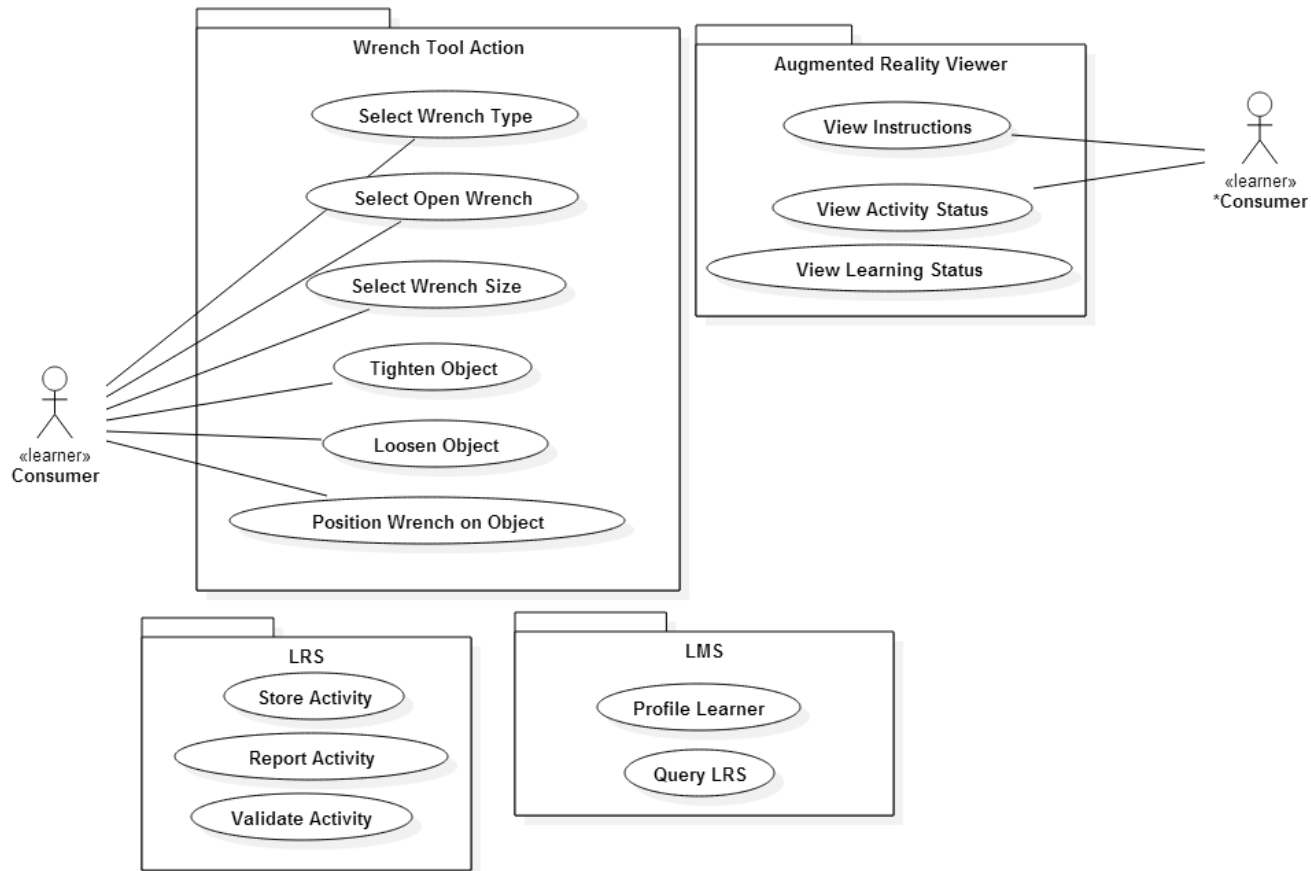2) Look at AR as part of a broader and more comprehensive training environment

Augmented Reality?

The humble wrench

- Simple
- Easy for computer to recognize
- Easy-to-find
- Easy-to-demo

AR Wrench initial use case

AR Wrench Training (vocabulary)

Search for reusable vocabulary in LRS in Context with Activity Type

- Selected
- Rotated
- Identifed
- Moved
- Adjusted
- Tightened
- Attached

- Detached
- Ordered
- Viewed Instructions
- Selected type
- Selected size
- Loosened

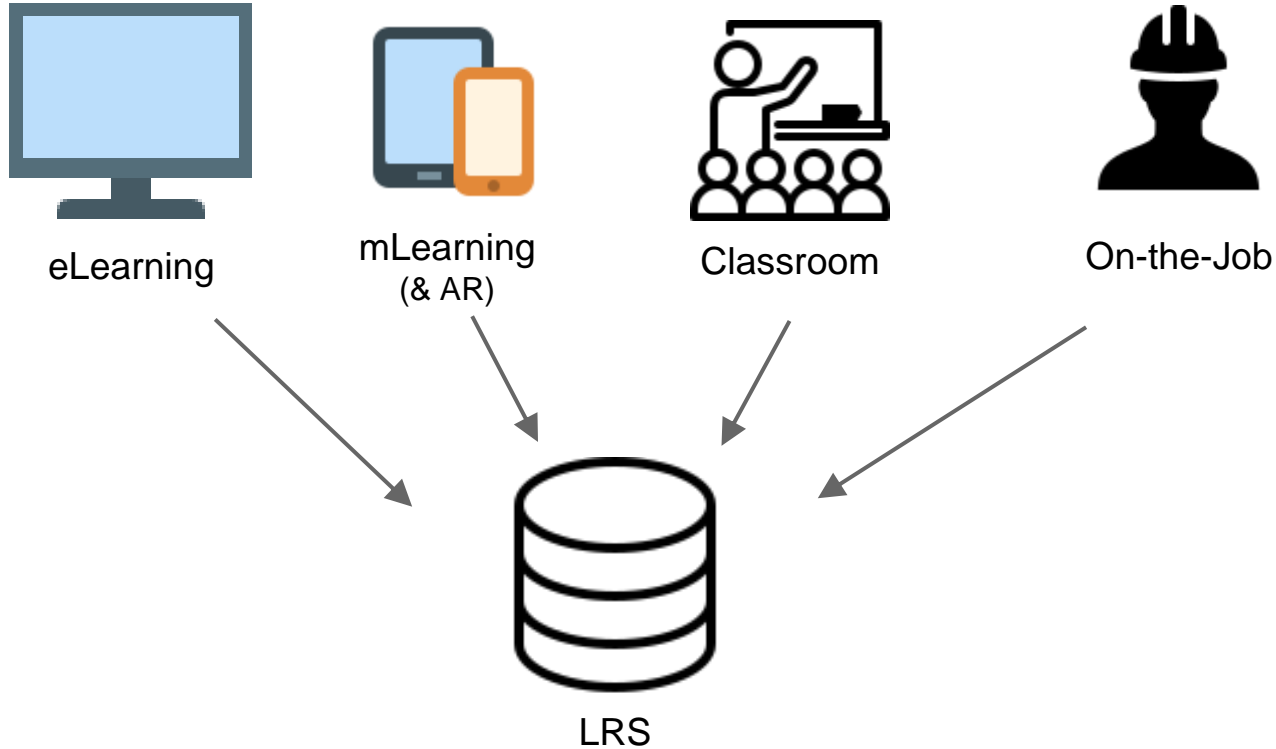# Count every grain of sand in the beach?
Or judge the quality of a sandcastle?

Make it skookum!

AR-supported LX design

eLearning   mLearning (& AR)   Classroom   On-the-Job

LRS

eLearning:
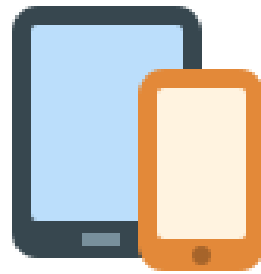
What's it good for?
- Lots of information
- Compliance
- Traditional assessments

Possible solutions:
- Courses
- Modules
- Support documents

mLearning & AR:

What's it good for?
- Just-in-time training
- Performance support
- Contextual learning
- Social
- Psychomotor training & eval (AR)

Possible solutions:
- Push & on-demand
- Tool guide
- AR Wrench app

ILT:

What's it good for?
- Support
  (instructor and peer)
- Soft skills practice & application
- Social
  (team-building & etc)

Possible solutions:
- Introduction/kick-off
- Refresher classes

On-the-job:

What's it good for?
- Learning in context
- Assessment
- In-the-moment remediation
- Coaching and mentoring
- Peer support

Possible solutions:
- Location-based performance support
- Observation rubrics & reporting tools
- Coaching resources
- Self-reporting

Example Work Scenario

- A new shutdown procedure is being rolled out in an industrial setting, to conform with new regulations.
- This multi-stage procedure must be completed quickly and with a minimum of error in a variable and potentially volatile environment.
- Regulations require that all personnel undergo monthly refresher training in the emergency shutdown procedures, and the results are liable for auditing by industry inspectors at any time.

Example Work Scenario, (*Cont.*)

The training plan for industry compliance—demonstrate conceptual and psychomotor proficiency:

1. Personnel take short eLearning course on new regulations and procedures in company training portal.
2. Learner processes and scores are tracked and stored in an LMS and LRS.
3. After completing a given number of modules, personnel access a AR training.

Example Work Scenario, (*Cont.*)

- At each phase, progress is recorded& tracked through xAPI statements.
- Results, stored within the LRS, can determine how the learner proceeds, and can act as a gate between the phases.
- *E.g.,* learners must complete the eLearning course and pass an assessment activity with a score of at least 85% before they are permitted to use the AR training software.
- Learner progress is recorded through xAPI statements & written to LRS each time learners complete a knowledge check.
- Final assessment = A passing score of at least 85% sets a flag in the learners database record that will be checked by the AR software when it is opened.

AR Wrench Training: Scenario 1

Objective: By the end of the exercise, the learner will be able to identify three wrench units and place them in a specified order on the work mat for retrieval.

Conditions: As this exercise is simulating tool selection during an emergency, the activity will be timed and must be completed within 25 seconds.
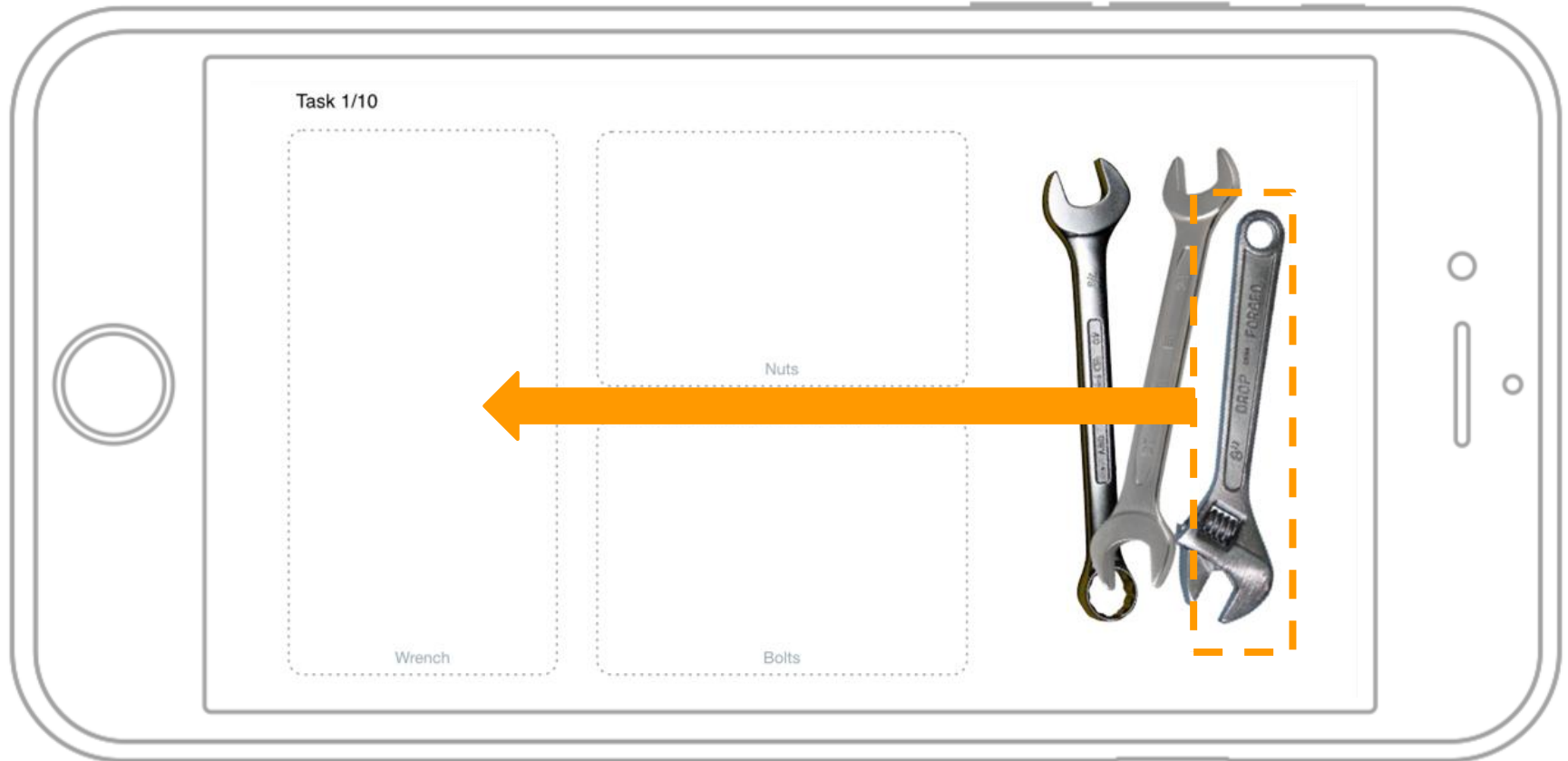
Scenario 1: Activity Flow

- Learner begins activity (by selecting the scenario 1 from the "Introduction to the Wrench" menu in the mobile learning environment)
  - Learner started ARWrench_01_01

- Learner aligns AR device to target activity work area
  - Learner aligned AR_unit

- Learner locates the work area (by aligning AR viewer over physical workspace)
  - Learner identified Gasket_Plate_01

- Learner selects first wrench and places in correct location of the work area
  - Learner selected Wrench_01
  - Learner placed Wrench_01

Scenario 1: Trackable elements

Scenario 1: Trackable elements

Scenario 1: Trackable elements

Scenario 1: Trackable elements

Scenario 1: Trackable elements

- activity start
- activity completed
- # of attempts
- elapsed time (for each attempt)
- wrench selected
- wrench placed
- And so on...

Formative Assessments

Example Knowledge Check 1-01:

According to the operational procedures pamphlet "Lefty Loosey, Righty Tighty" what are the three wrenches required for connector plate assembly?

A. #10 open-end, #12 open-end, #14 box-end
B. #10 box-end, #12 open-end, #14 box-end
C. #9 open-end, #12 box-end, #14 open-end
D. #10 open-end, #12 open-end, #20 box-end

AR Wrench Training: Scenario 2

Objective: By the end of the exercise, the learner will be familiar with the placement and tightening order of nuts on the connector plate assembly, appropriate tool (wrench) usage techniques, and work area prep.

Conditions: As this exercise is simulating the installation of connector plate that must be absolutely flush with the flange assembly, the nuts must be tightened to (torque setting?) in a specified order. Also, as the threaded shaft are of 2 different diameters, the proper nut and wrench combination must be used.

Scenario 2: Activity Flow

- Learner begins activity (by selecting scenario 2 from the "Introduction to the Wrench" menu in the wearable AR learning environment)
  - {Learner} started ARWrench_01_01

Learner selects three #14 flange nuts and places them in the work area

- Learner selects the open-end wrench and places it in the work area
  - {Learner} identified Open-Wrench

- Learner selects the box-end wrench and places it in the work area
  - {Learner} identified Box-End Wrench

- Learner selects four acorn nuts and places them in the work area
  - {Learner} selected acorn nuts 1…4
  - {Learner} placed acorn nuts in work area

- Learner selects three flange nuts and places them in the work area
  - {Learner} selected flange nuts, 1..3
  - {Learner} placed flange nuts in the work area

Scenario 2: Trackable elements:

Example: Using the procedure outlined in chapter 6 of the "Torque is your friend" workbook, identify the next nut placement by holding the appropriate sized nut in the green box of your AR overlay.

- learner selected nut_01 *(incorrect)*
- learner selected nut_02 *(correct)*

Learning intervention mechanics

Actions trigger:

- Formative assessments, knowledge checks &etc.
- Supplemental learning interactions (consider the affordances and constraints of device)
- Provide multi-modal (e.g., visual, auditory, olfactory, and tactile) feedback.
- Overlay real-world objects with contextual info.
- Real-time evaluation (e.g., Failed to complete exercise in the target time (x) times, then deliver remediation. Successfully completed exercise after failing more than once.)

Next Steps

1. Integrate Assessment into AR Project.
2. Construct Wearable AR Software w/ xAPI.
3. Assess learning outcome.
4. Report results.