Information literacy in distributed digital work

Jose Teixeira and Helena Karsten

The traditional way of making software

- A company intending to acquire software outsources making it to a software house
  - Both sides have project managers responsible for this particular application
  - Information architect at the company ensures the application fits in with the other applications
  - When the application is functional, the software house sends it to the company for acceptance testing and integration with other software in the company
  - The byer does not see the source code, only the translated version with the user interface
- Problems
  - Expensive, takes long time, error prone
- Alternatives for sourcing
  - Software as a Service, off-the-shelf software packages, opensourcing, crowdsourcing

Free and Open Source Software

- Seeks to extend the intellectual commons into the realm of computer software (for example the Linux operating system)

- Open source software is released under permissive legal licenses (such as GNU) that keep the software and its source code open to the common heritage of all: everybody is free to use, study, modify, and redistribute copies of the software.

- Most collaborative work is carried out in a decentralized fashion across the globe over the Internet while giving up intellectual property rights, but gaining a reputation of a pro.

- Characterized by loose managerial control and self-organization

Crowdsourcing

- Used for much else besides software development
  - Amazon Mechanical Turk
- a collaboration model enabled by people-centric web technologies to solve problems and create solutions using a dynamically formed crowd of people who respond to an open call for participation
- the commissioner/employer and the worker/employee typically interact only via the digital platform. The platform owner regulates this.
- problems solved and products designed by the crowd become the property of the company

OpenMolar

- A dissatisfied dentist in Scotland wanted to create better software for dental clinics
  - Dental records of the patients
  - Treatments given
  - Invoicing and other business functions
- Started with learning the *Python* programming language, the *qt* user interface kit, *MySQL* and *Postgres* relational databases.
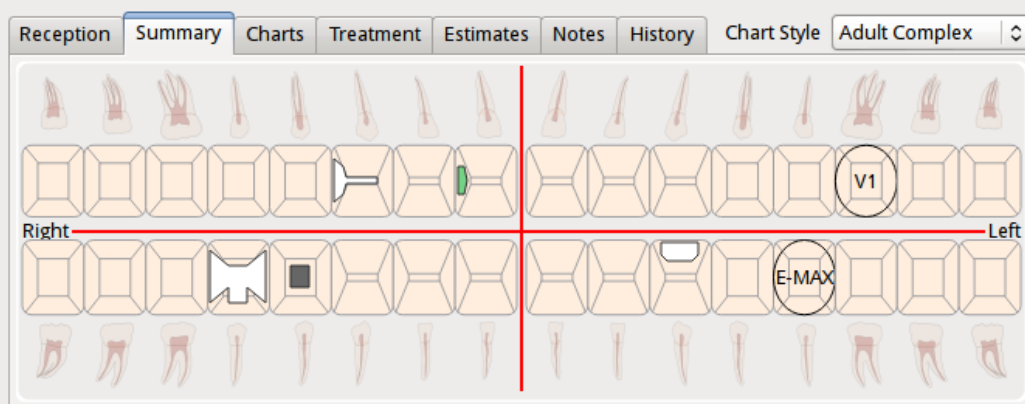- Invited in a community to join in the effort.

'openmolar_demo' 192.168.0.3:5432

Menu

Reception | Summary | Charts | Treatment | Estimates | Notes | History   Chart Style   Adult Complex

find   Related

Right   **Left**

V1

E-MAX

Patient 1
Miss Hannah Abbott
17/08/2005
7 years 0 months

Regular Dentist	Hygienist
	Add

- home (2)
The Cottage
Snoddith
DUNDEE
DD42 7RP

01015 479765 (home)

MEMO

BPE 17/08/2012

| 1 | 2 | 3 |
| 4 | * | - |

Treatment Plan
for Miss
Hannah Abbott

Date	Author	notes
04/09/2002	None (?)	a line of clinical notes. random 009713
14/05/2003	None (?)	a line of clinical notes. random 009505
16/07/2003		a line of clinical notes. random 002457
07/09/2005	None (?)	a line of clinical notes. random 002620
14/07/2007		a line of clinical notes. random 000358
07/10/2007	None (?)	a line of clinical notes.

Perform Exam   Hygienist Shortcuts   X-ray Shortcuts   »

Fees

Codes

▷ Examinations
▷ Diagnosis
▷ Prevention & Perio
▷ Restorations
▷ Endodontics
▽ Crowns
   Other Crown (F00)
   PJC (F01)
   Porcelain/Precious Metal (F02)
   Porcelain/Non-Precious Metal (F03)
   Gold Shell (F10)
   Gold 3/4 Crown (F11)
   Gold reverse 3/4 Crown (F12)
   Precious Metal Crown (F15)
   Non-Precious Metal Crown (F16)
   Resin Crown (F20)
   Opalite Crown (F30)
   3M Lava Crown (F32)
   Ivoclar e-max Crown (F33)
   Fortress Crown (F34)
   Stainless Steel Crown (F40)
   Temporary Crown (F50)
   Crown Recement (F51)
   Cast Precious Post (F60)
   Cast Non-Precious Post (F61)
   Chairside Post (metal) (F62)
   Chairside Post (other) (F63)
   Core build up (F70)
   Crown Repair (F71)
   Crown unfinished (F72)
▷ Inlays/Onlays/Veneers
▷ Removable Prosthetics
▷ Fixed Prosthetics (BridgeWork)
▷ Implants
▷ Surgery

editing **Miss Hannah Abbott**   USER1   -   Surgery Mode

How to locate information

- Other software
- Internet
- Books
- peers

How to share and communicate information

- Communication via
  - https://openmolar.com
  - groups.google.com/group/openmolar
  - #openmolar on irc.freenode.net (Internet Relay Chat)
  - Github.com/rowinggolfer
- *Peer-to-peer model*

CrowdFlower
San Francisco

- The company offers data mining and crowdsourcing services

- A crowdsourcing platform which allows commissioners to access online workforce (aka crowd) to clean, label and enrich data = human-in-the-loop

- Typical commissioners of CrowdFlower are data scientists who use the software to create training data to build models and train machine learning algorithms = blending humans and machines
  - Harvard Tuberculosis Lab used it to identify drug-resistant TB cells
  - emergency agencies used it to support their rescue efforts after the earthquake that struck Haiti on January 12, 2010

- Uses Microsoft Azure Machine Learning cloud service

Map Analysis: Help us Figure out the Latitude and Longitude of State and National Parks ⓘ

Seth Teicher

1. DESIGN JOB

Data
Build Job
Preview

2. MANAGE QUALITY

Test Questions
Contributors
Job Settings

3. GET RESULTS

Launch
Monitor
Results

Dashboard   Advanced Analytics

100%
Complete

$275
Cost ⓘ

40
Active Test Questions

3,810
Units ⓘ

0
Judgments Per Hour ⓘ

15,364
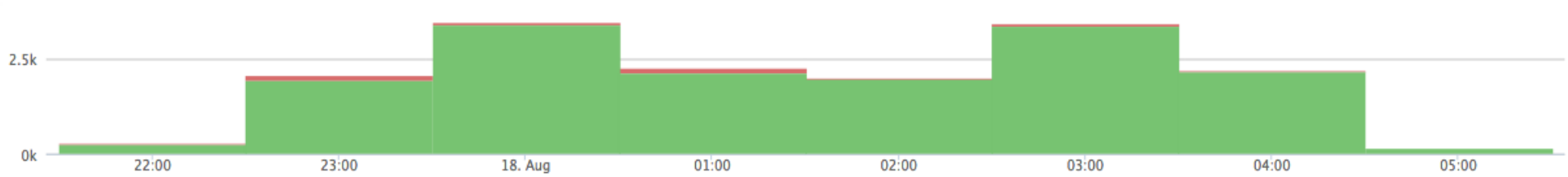Trusted Judgments ⓘ

485
Untrusted Judgments ⓘ

0
Pending Judgments

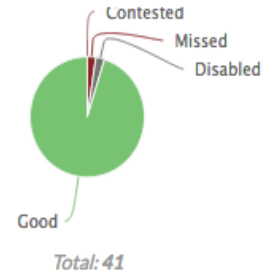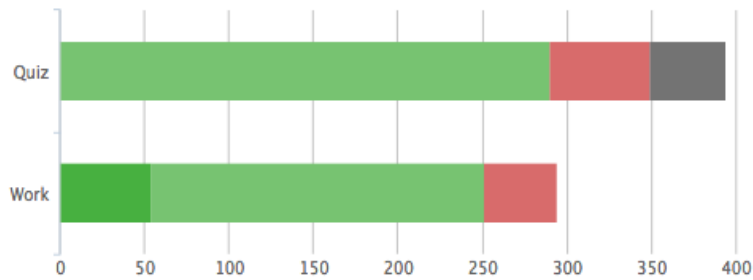Judgments Per Hour   Estimated Completion: Aug 18, 5:37 am

Contributor Funnel

Test Questions ⓘ

Total: 41

Contributor Satisfaction

3.9 / 5
Overall

4.1 / 5
Instructions Clear

3.5 / 5
Test Questions Fair

3.7 / 5
Ease Of Job

3.6 / 5
Pay

Help
Contact us!

Project on housing and wheelchair accessibility

- Contributors viewed 10,000 images in Google Maps and marked whether they were residential areas. If they were, they noted which type of homes were most prevalent in the area (apartments or houses) and whether the area had proper sidewalks that are wheelchair friendly.

- After collecting the human work, the commissioner tested and refined a machine learning process that does the job automatically (i.e. a software robot).

Locate information

- Tasks require physical actions by the crowd
- Commissioner must define the task very well

Software crowdsourcing

- "The accomplishment of specified software development tasks on behalf of an organization by a large and typically undefined group of external people with the requisite specialist knowledge through an open call. "

- Case TechPlatform Inc. (TPI): Migration of field engineer desktop tool to web (Ågerfalk, Fitzgerald & Stol 2015)

Share and communicate information

- Generally, workers do not know their co-workers or their commissioners
- Only the country of the worker is known as commissioners may want to exclude certain countries
- Commissioner can remain anonymous, avoiding the stigma related to crowdsourcing or to protect IP
- Ticketing system in the platform; a task = a ticket
- *Bridged communication*
  - Constrains information flows
  - Fee for the intermediary

Knowledge of the crowd

Lack of continuity — the "fleeting relationship" in that developers in the crowd would not tend to wait for further competitions from a particular company but would work on whatever competitions were open (Stol and Fitzgerald 2014).

An architect involved in the crowdsourced project at TPI illustrated this as follows:

"There is a limited amount of carry-over knowledge. We will get a few contestants that will participate in multiple contests, but they won't build up domain knowledge in the way that an internal person would."

- If the available talent-pool is truly global, then there is good reason to expect broad and deep knowledge on the topics under development.

- Agerfalk, Pär, Fitzgerald, Brian, and Stol, Klaas-Jan (2015) Not so Shore Anymore: The New Imperatives when Sourcing in the Age of Open, *Proceedings of the 23rd European Conference on Information Systems (ECIS)* Münster, Germany, May 2015.