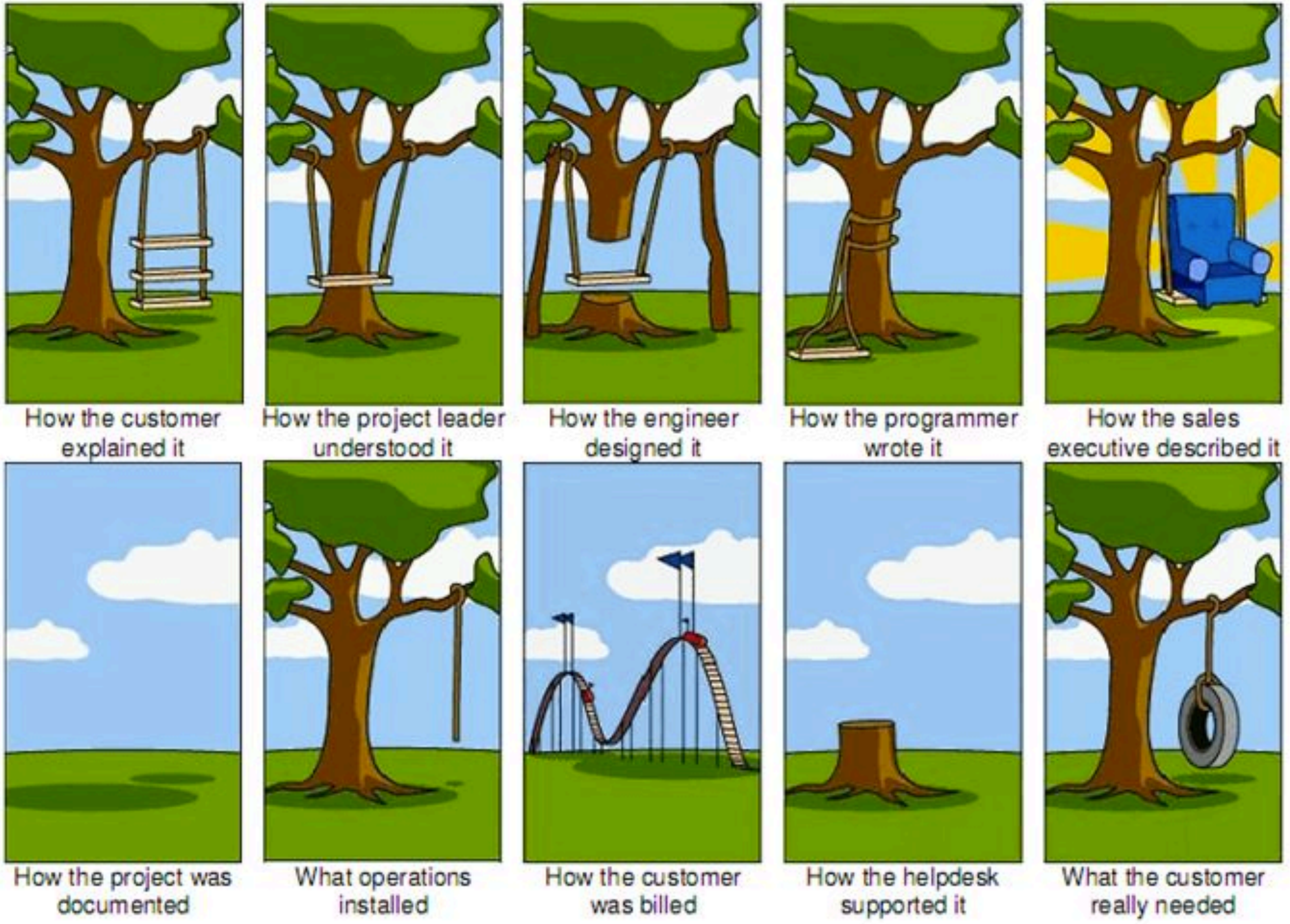
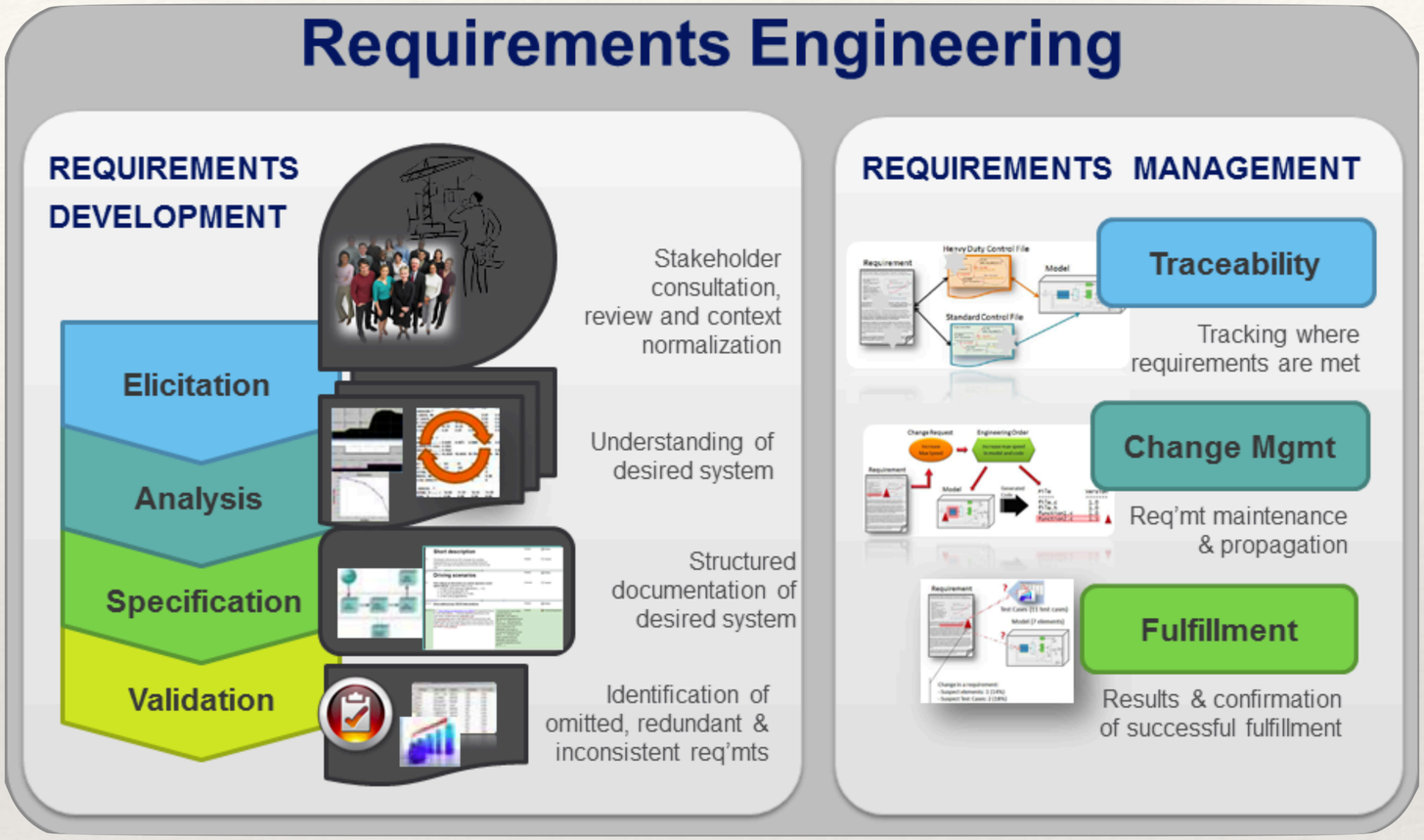
Requirement Analysis from a Practical Perspective - Are You Solving the Right Problem?

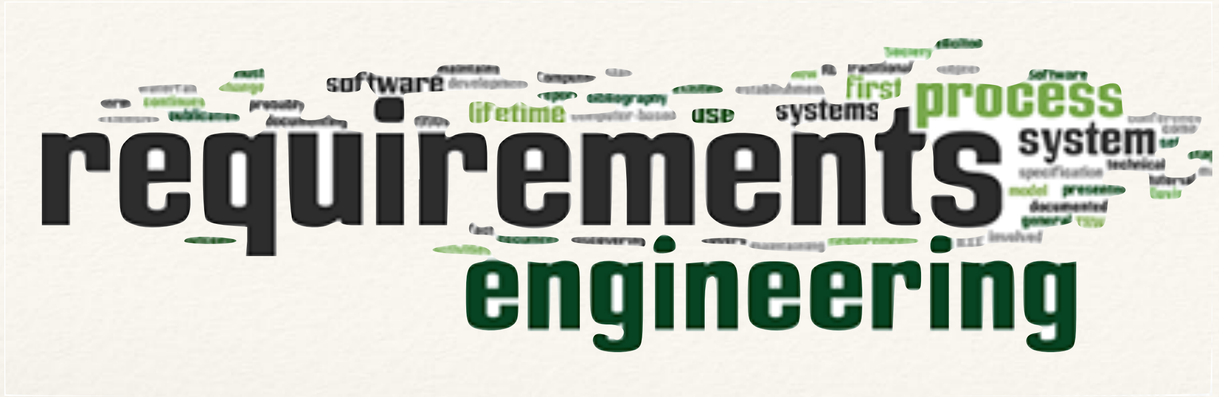
Yu Sun, Ph.D.
CS480 Software Engineering
http://yusun.io
yusun@cpp.edu

CAL POLY POMONA
SoftCom Lab


How the customer explained it
How the project leader understood it
How the engineer designed it
How the programmer wrote it
How the sales executive described it
How the project was documented
What operations installed
How the customer was billed
How the helpdesk supported it
What the customer really needed

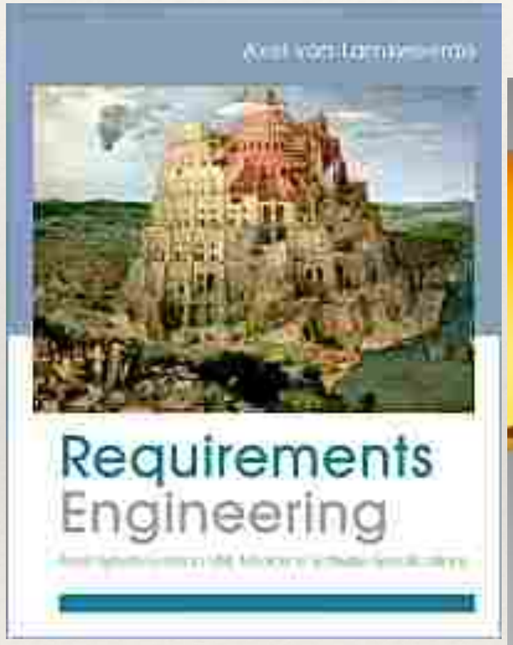


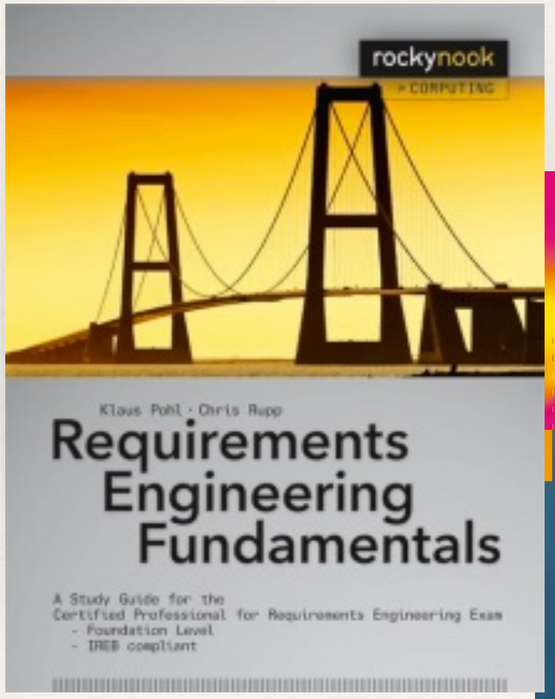
Requirements Engineering (RE) refers to the process of formulating, documenting and maintaining software requirements.

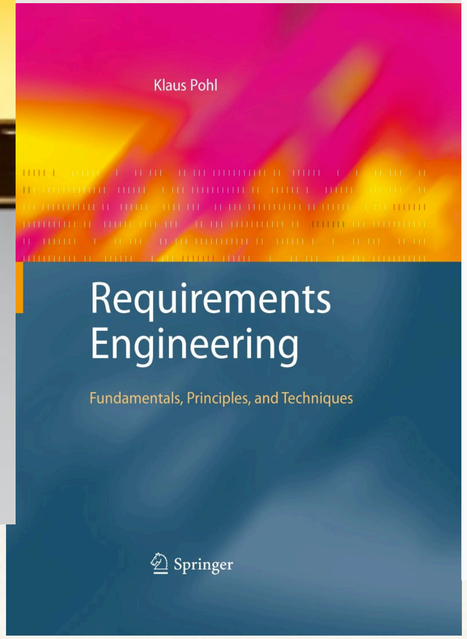


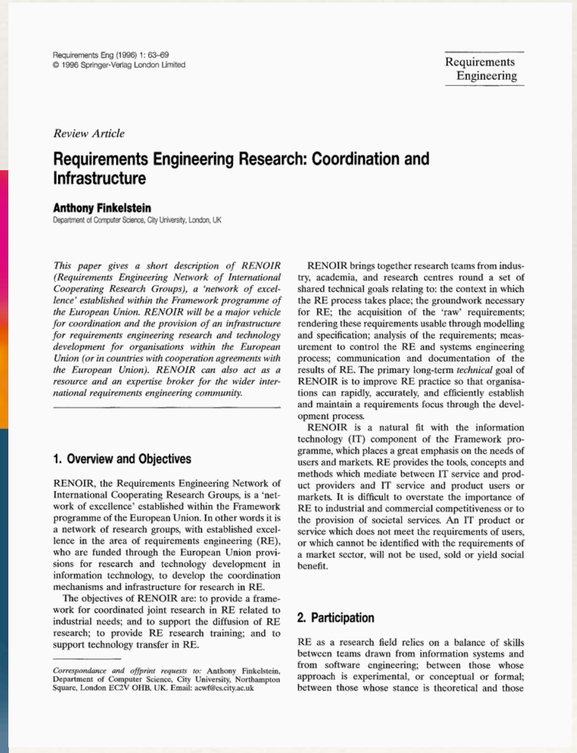
22nd IEEE International Requirements Engineering Conference

August 25-29, 2014.
Karlskrona, Sweden.









Requirements Eng (1996) 1: 63-69
© 1996 Springer-Verlag London Limited

Review Article

Requirements Engineering Research: Coordination and Infrastructure

Anthony Finkelstein
Department of Computer Science, City University, London, UK

This paper gives a short description of RENOIR (Requirements Engineering Network of International Cooperating Research Groups), a 'network of excellence' established within the Framework programme of the European Union. RENOIR will be a major vehicle for coordination and the provision of an infrastructure for requirements engineering research and technology development for organisations within the European Union (or in countries with cooperation agreements with the European Union). RENOIR can also act as a resource and an expertise broker for the wider international requirements engineering community.

1. Overview and Objectives

RENOIR, the Requirements Engineering Network of International Cooperating Research Groups, is a 'network of excellence' established within the Framework programme of the European Union. In other words it is a network of research groups, with established excellence in the area of requirements engineering (RE), who are funded through the European Union provisions for research and technology development in information technology, to develop the coordination mechanisms and infrastructure for research in RE.

The objectives of RENOIR are: to provide a framework for coordinated joint research in RE related to industrial needs; and to support the diffusion of RE research; to provide RE research training; and to support technology transfer in RE.

Correspondance and offprint requests to: Anthony Finkelstein, Department of Computer Science, City University, Northampton Square, London EC1V 0HB, UK. Email: acwf@cs.city.ac.uk

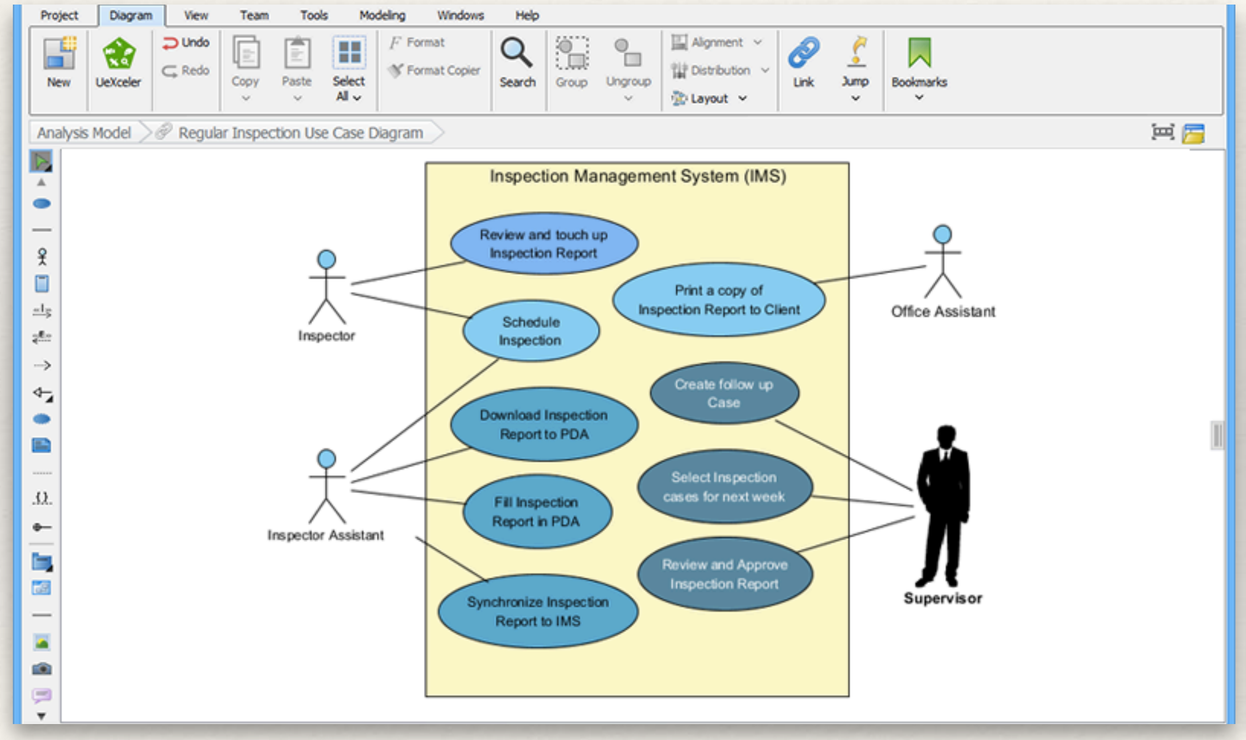
RENOIR brings together research teams from industry, academia, and research centres round a set of shared technical goals relating to: the context in which the RE process takes place; the groundwork necessary for RE; the acquisition of the 'raw' requirements; rendering these requirements usable through modelling and specification; analysis of the requirements; measurement to control the RE and systems engineering process; communication and documentation of the results of RE. The primary long-term *technical* goal of RENOIR is to improve RE practice so that organisations can rapidly, accurately, and efficiently establish and maintain a requirements focus through the development process.

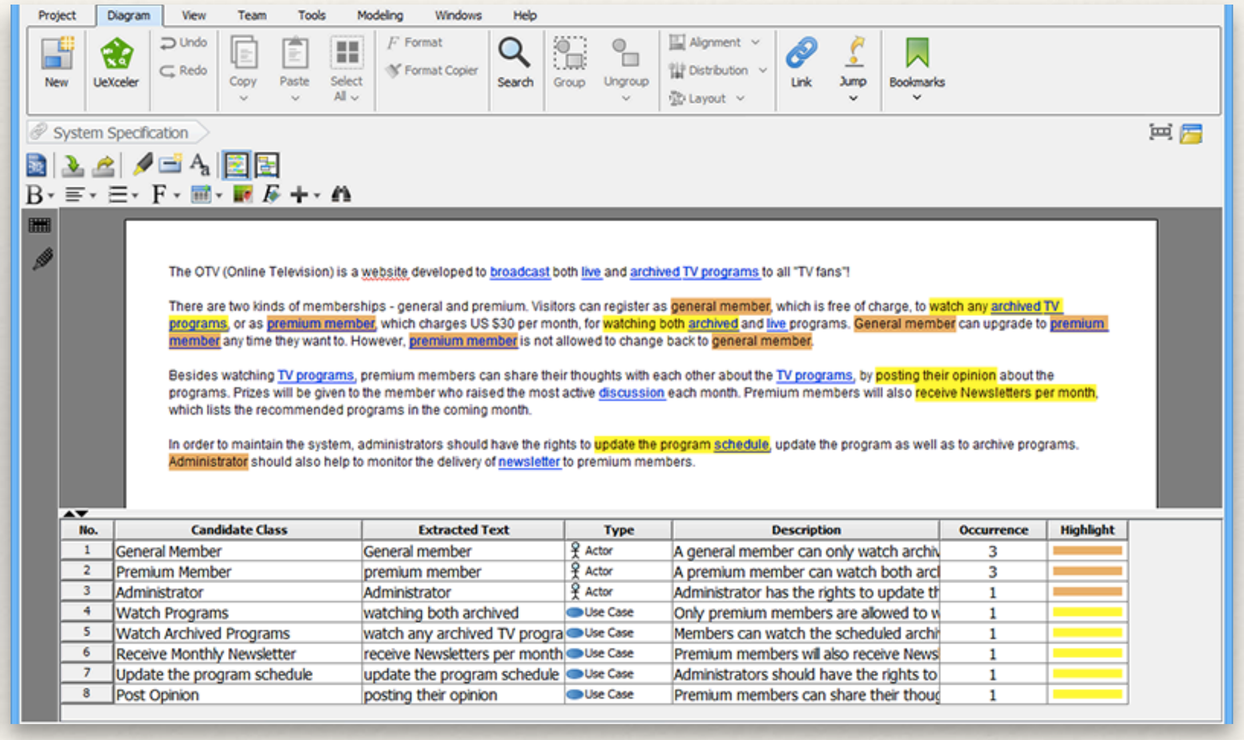
RENOIR is a natural fit with the information technology (IT) component of the Framework programme, which places a great emphasis on the needs of users and markets. RE provides the tools, concepts and methods which mediate between IT service and product providers and IT service and product users or markets. It is difficult to overstate the importance of RE to industrial and commercial competitiveness or to the provision of societal services. An IT product or service which does not meet the requirements of users, or which cannot be identified with the requirements of a market sector, will not be used, sold or yield social benefit.

2. Participation

RE as a research field relies on a balance of skills between teams drawn from information systems and from software engineering; between those whose approach is experimental, or conceptual or formal; between those whose stance is theoretical and those

Requirements Engineering Tools



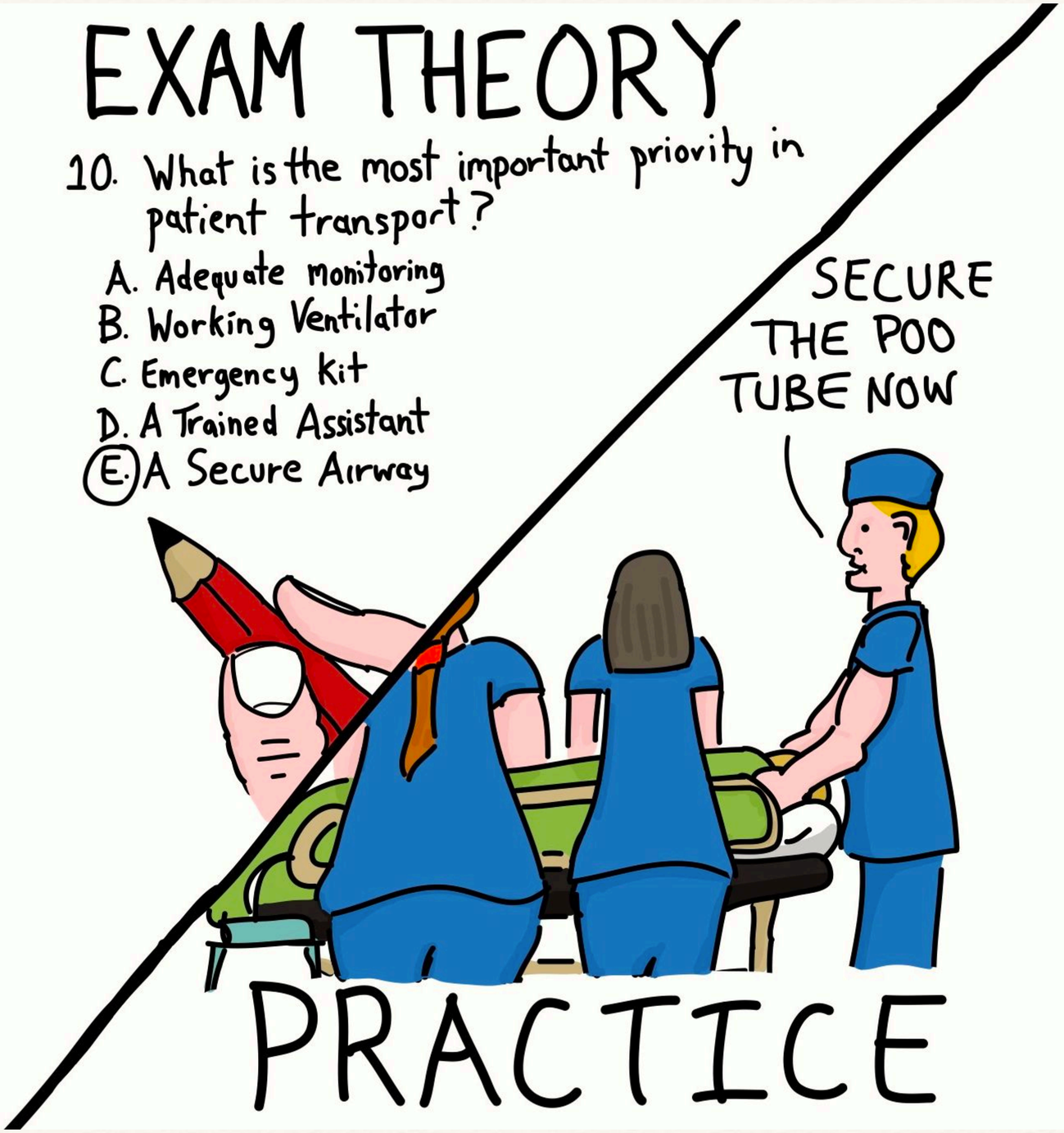


No.	Candidate Class	Extracted Text	Type	Description	Occurrence	Highlight
1	General Member	General member	Actor	A general member can only watch archiv	3	
2	Premium Member	premium member	Actor	A premium member can watch both arcl	3	
3	Administrator	Administrator	Actor	Administrator has the rights to update th	1	
4	Watch Programs	watching both archived	Use Case	Only premium members are allowed to w	1	
5	Watch Archived Programs	watch any archived TV progra	Use Case	Members can watch the scheduled archi	1	
6	Receive Monthly Newsletter	receive Newsletters per month	Use Case	Premium members will also receive News	1	
7	Update the program schedule	update the program schedule	Use Case	Administrators should have the rights to	1	
8	Post Opinion	posting their opinion	Use Case	Premium members can share their thoug	1	

EXAM THEORY

10. What is the most important priority in patient transport?

A. Adequate monitoring
B. Working Ventilator
C. Emergency kit
D. A Trained Assistant
(E.) A Secure Airway

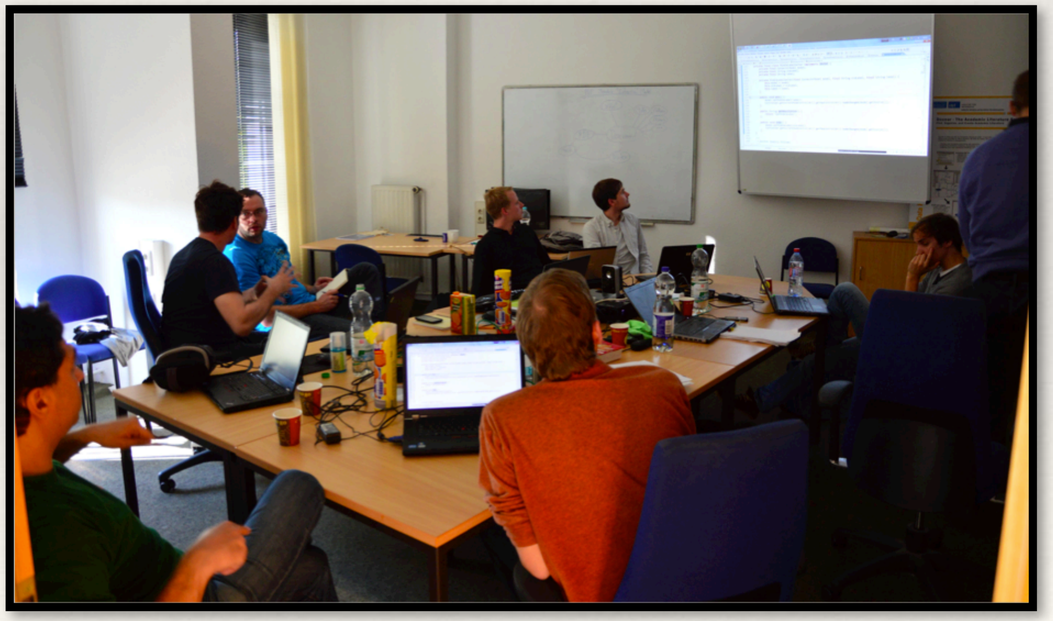


PRACTICE

What's the RE in practice today?

1. Talk to Customers

2. Decide Requirements



We solve
problems

Demo: How to Jumpstart a Car

For more demos: https://www.youtube.com/user/PARworks/videos

Mobile Augmented Reality

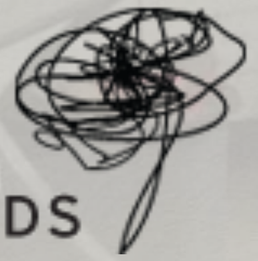
PAR works
An Allied Minds Company

Great Start!

PAR works
An Allied Minds Company

1.1M

ALLIED MINDS



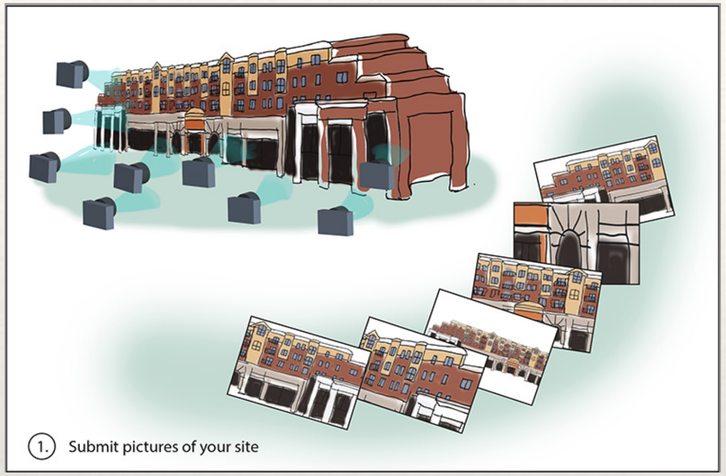
DESIGN & ENGINEERING SHOWCASE HONORS
INNOVATIONS INTERNATIONAL CES
2013

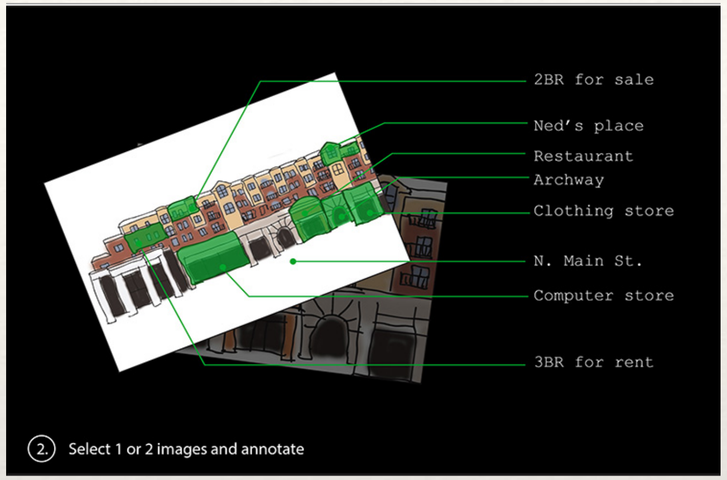
SXSW 2013
ACCELERATOR
FINALIST

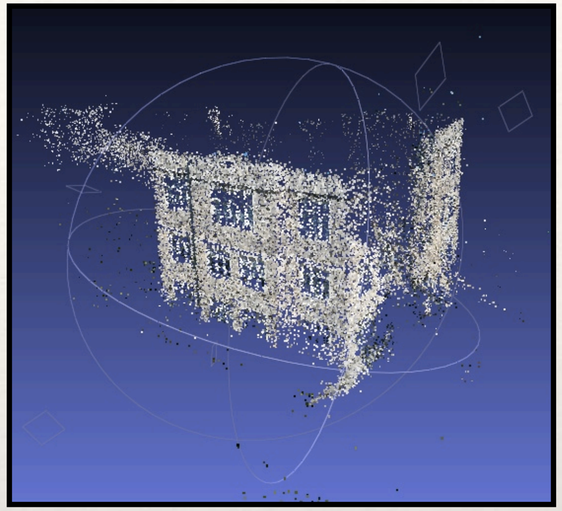
FINALIST
2013 SXSW

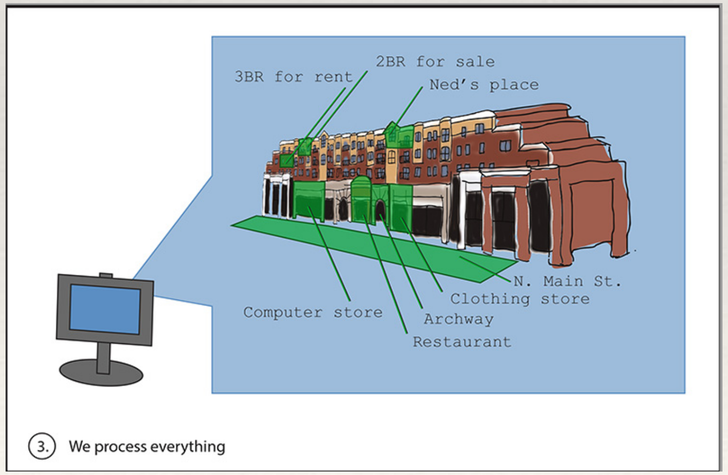
One Year Later …

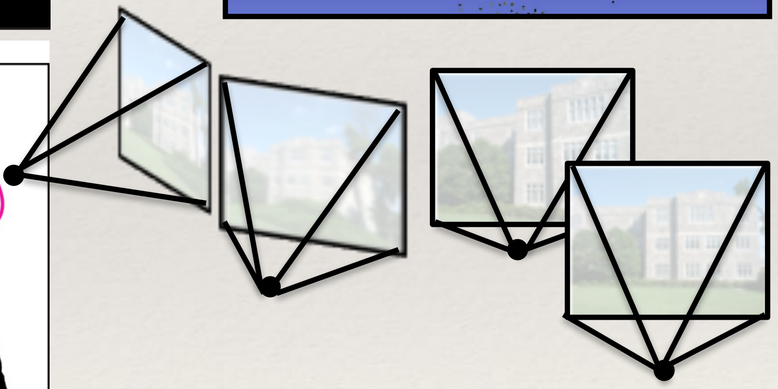
First 2 Months - Tech Development











Hyojoon Bae, Jules White, Mani Golparvar-Fard, Yao Pan, Yu Sun, "Fast and Scalable 3D Cyber-physical Modeling for High-precision Mobile Augmented Reality Systems", Springer Journal of Personal and Ubiquitous Computing, 2016

Next 5 Months - Business Development

Set Up a Call

Demo the Tech

Make a Deal

facebook

Google

Michaels
Where Creativity Happens

TARGET

DUNKIN' DONUTS

ZACHRY

Turner

Sapient

THE HOME DEPOT

CVS pharmacy

Next 5 Months - Business Development

Set Up a Call

Demo the Tech

Discussion

"Wow, it's cool, but where can we apply it?"

facebook

Google

Where Creativity Happens

TARGET

DONUTS

ZACHRY

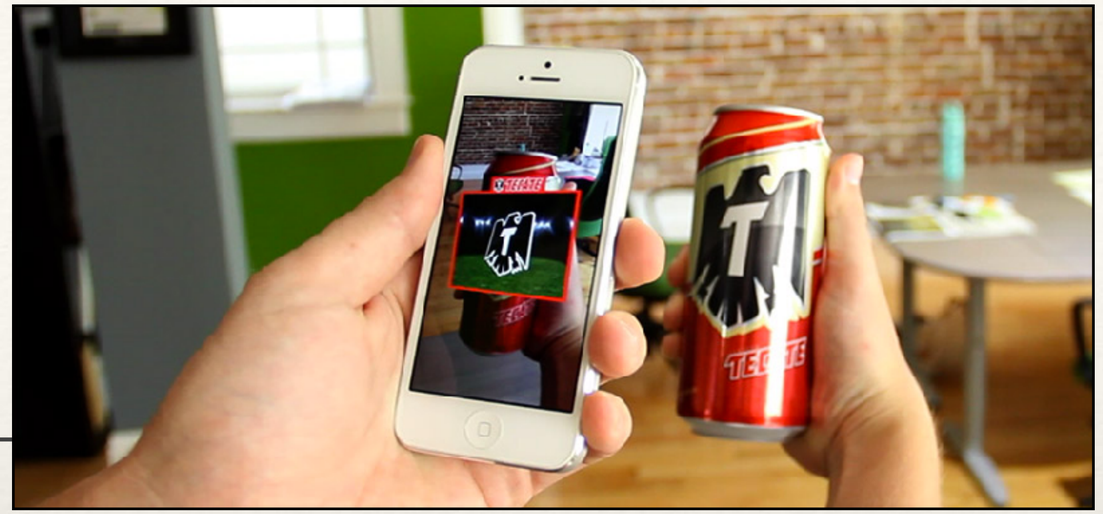
Turner

Sapient

THE HOME DEPOT

CVS pharmacy

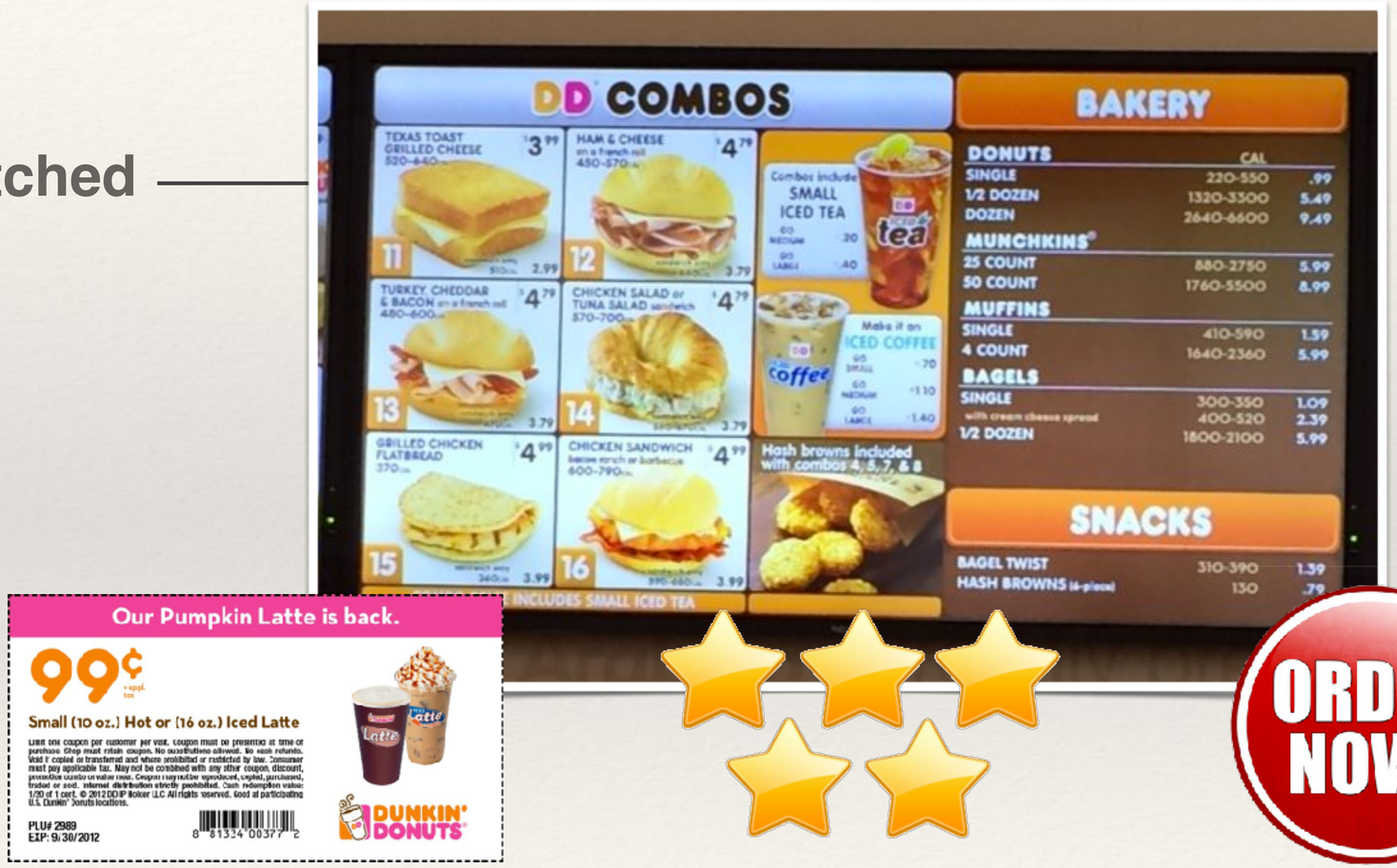
What we pitched



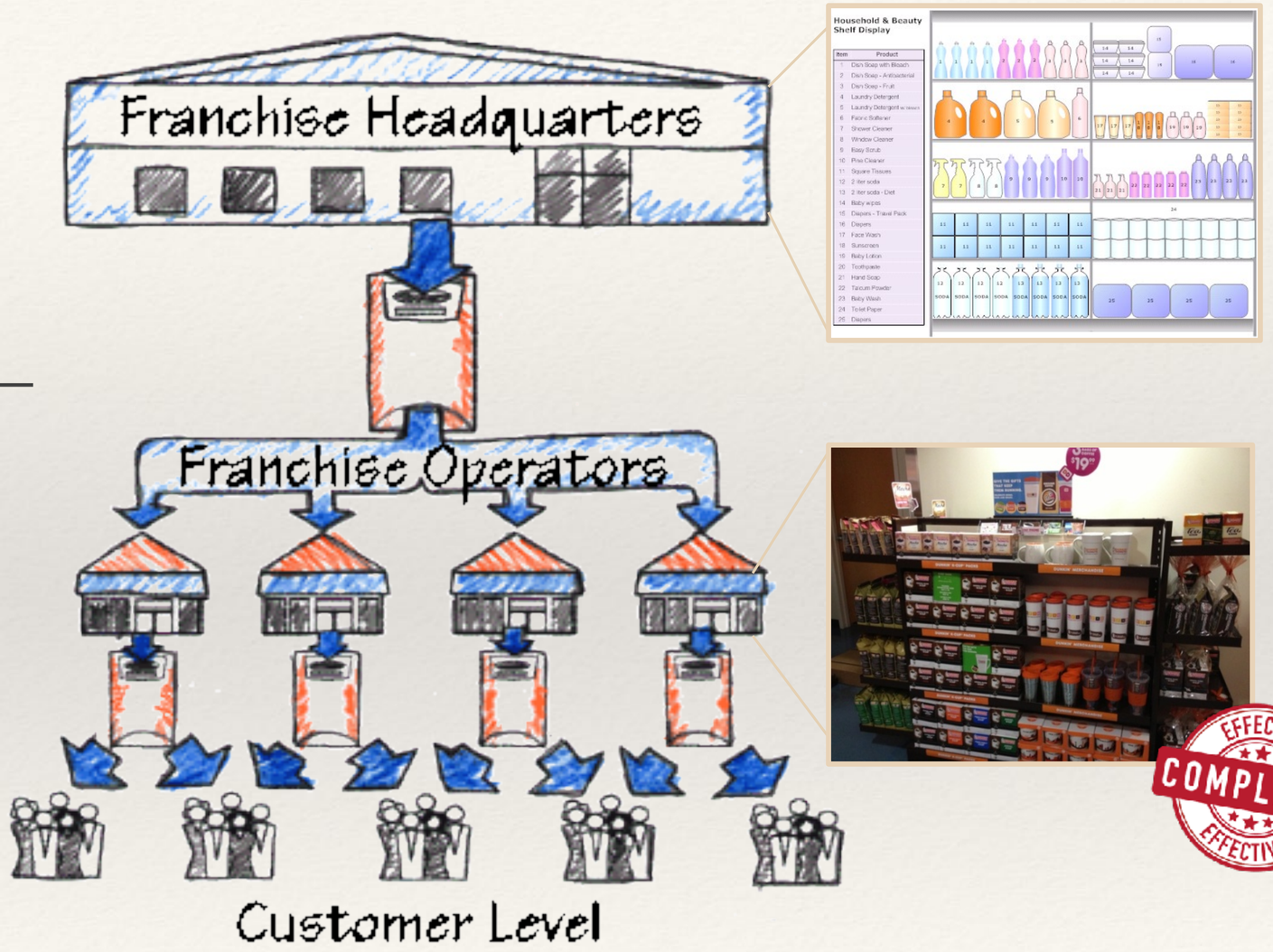
What the customers need

DUNKIN' DONUTS

What we pitched



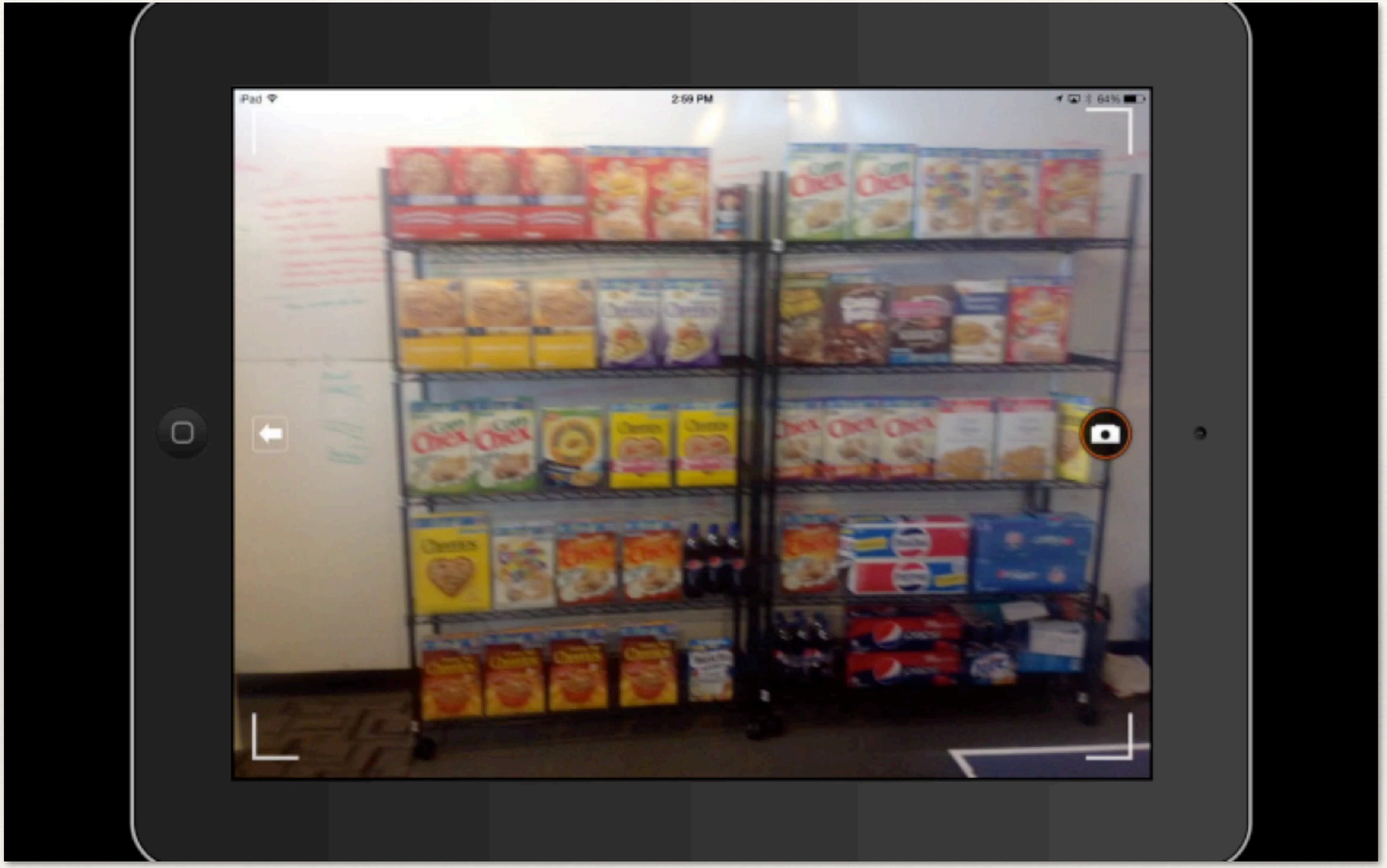
What the customers need



DUNKIN' DONUTS

What the customers need

Inconsistencies immediately recognized and clearly marked

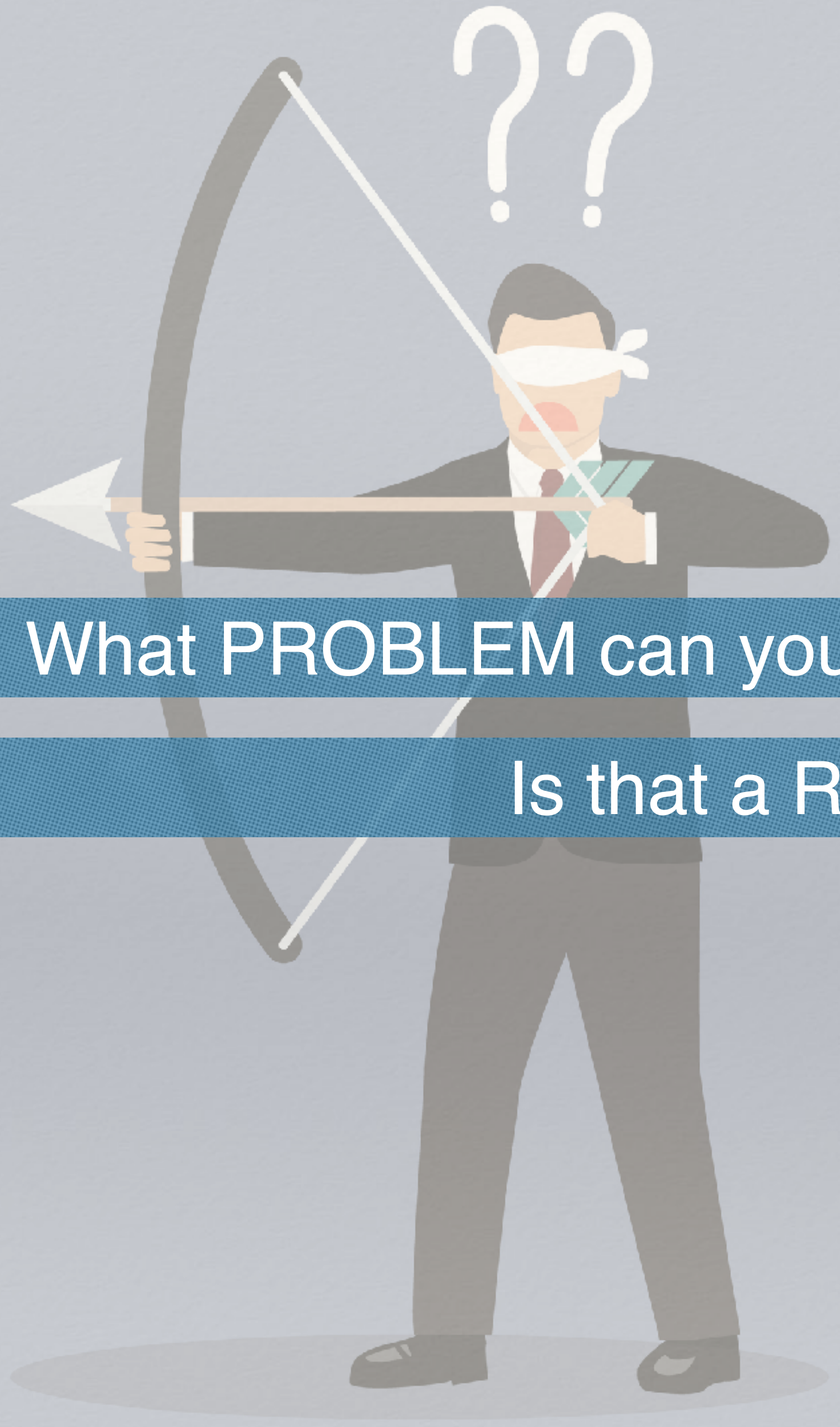


PAR works
An Allied Minds Company

DUNKIN' DONUTS

Planogram Compliance Checking Demo

For more demos: https://www.youtube.com/user/PARworks/videos



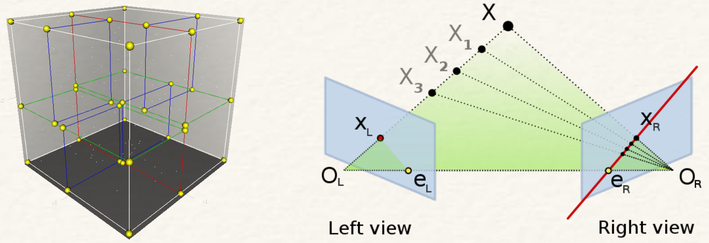
What PROBLEM can you solve by using the technology?

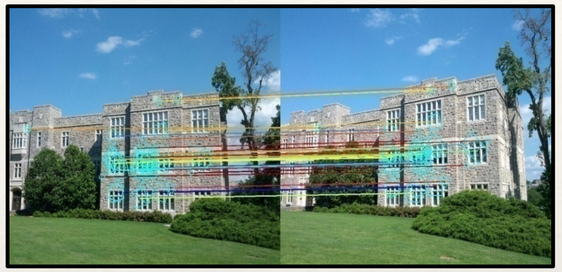
Is that a REAL PROBLEM?

The Technology

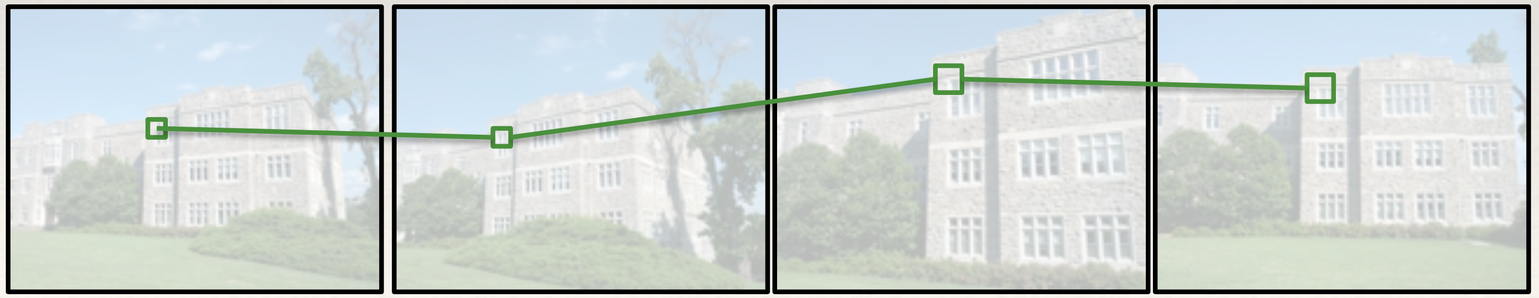
Image Capture

Feature Extraction



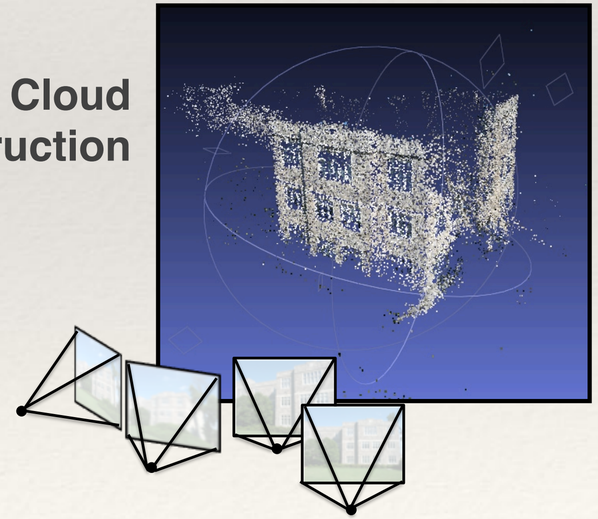


Feature Mapping



Feature Tracking

3D Point Cloud
Model Construction

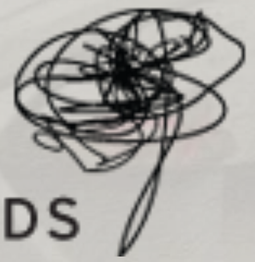


Is this something COOL or something USEFUL?

OPTIOLABS
AN ALLIED MINDS COMPANY

OPTIOLABS
AN ALLIED MINDS COMPANY

$ 1.5M



ALLIED MINDS

1.5 years later

$

10M in Series A

OPTIOLABS

An Allied Minds Company

Optio Core

“ OptioCore can monitor, block, or modify individual method calls to prevent undesirable functionality while maintaining secure and reliable services for the Android device

http://www.optiolabs.com/

The idea of OptioCore came from a research meeting where a federal agency talked about the current needs in mobile security

problem

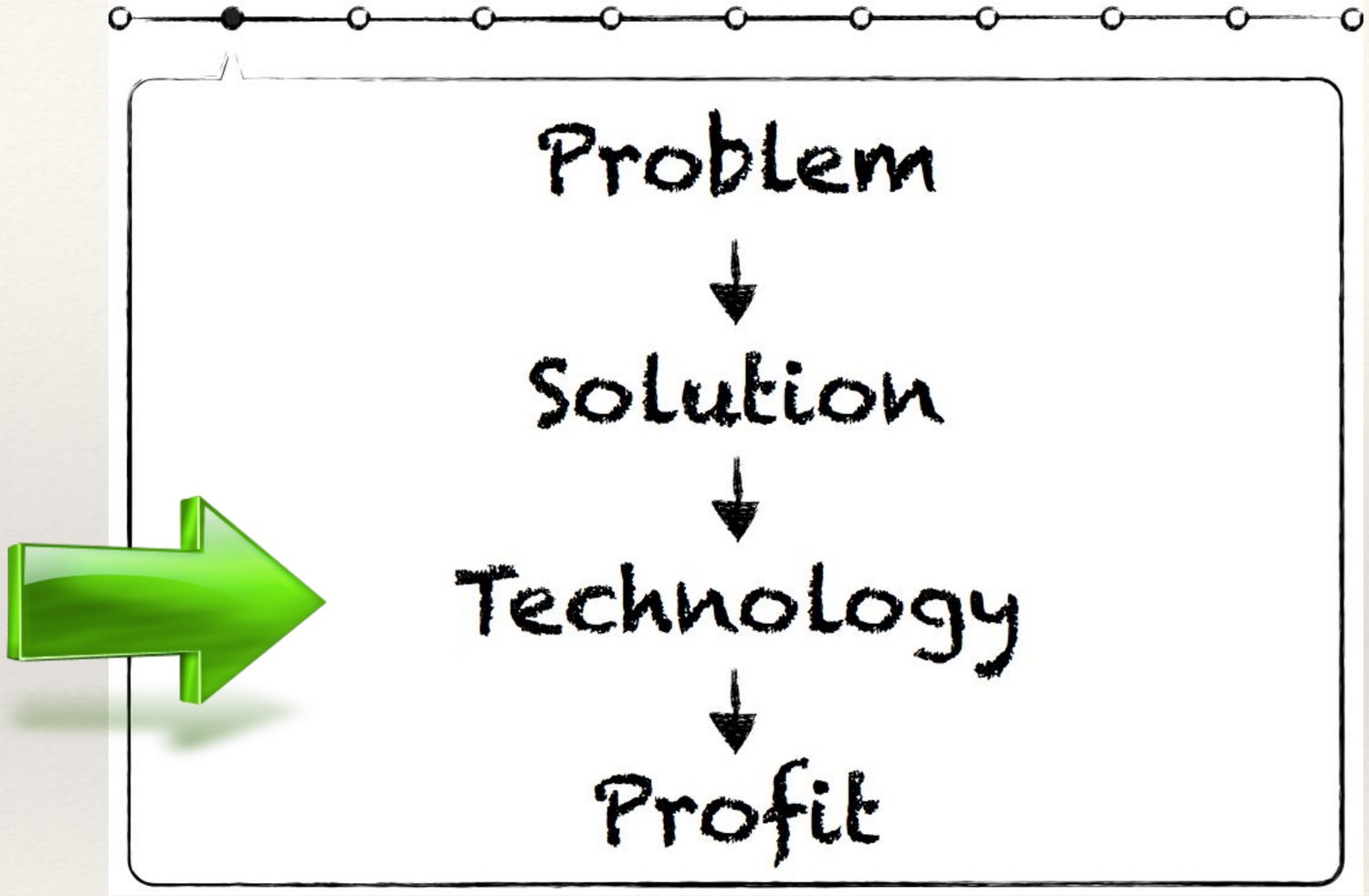
solution

solution

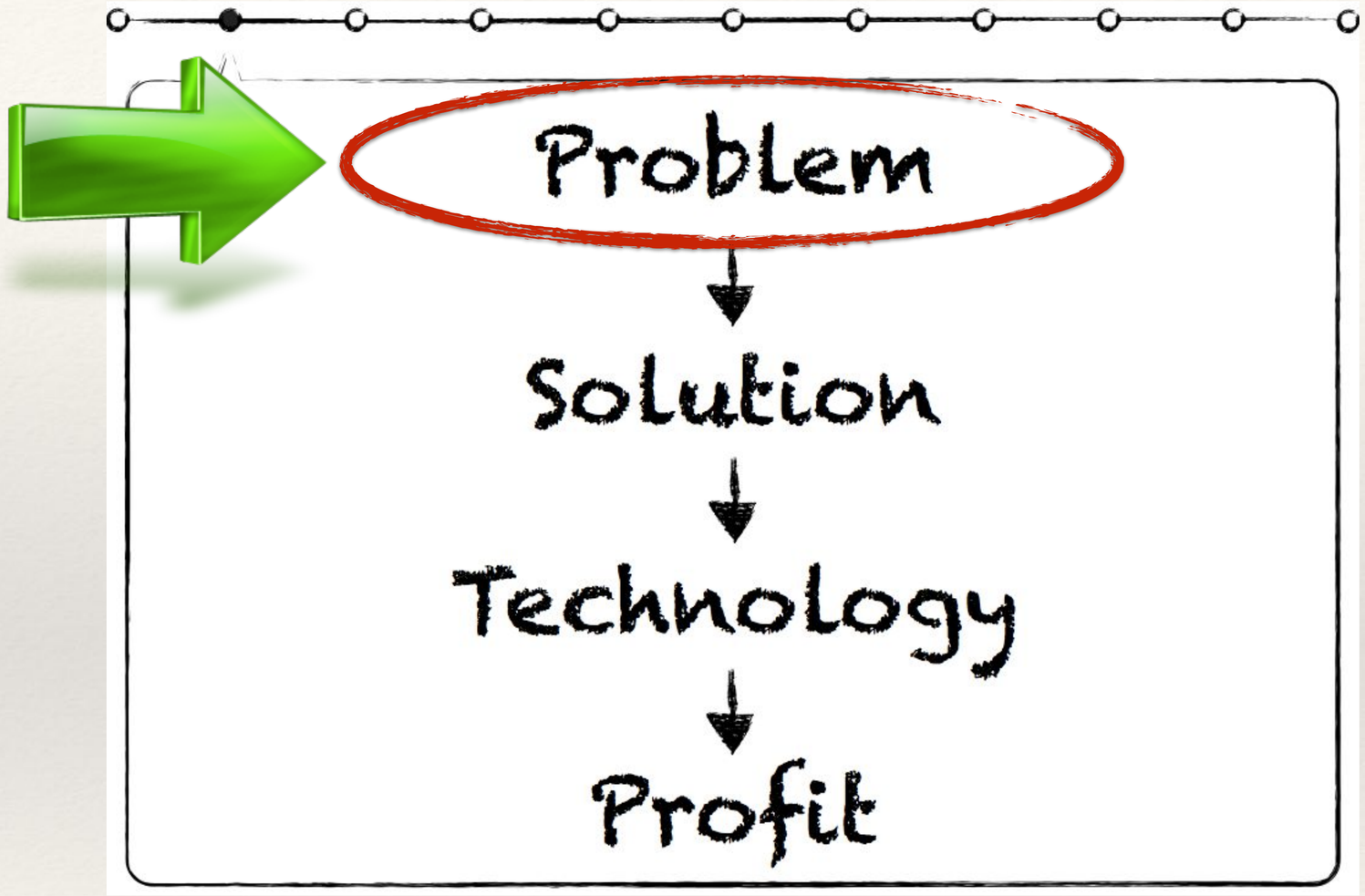
problem

facebook Google Michaels Where Creativity Happens TARGET DUNKIN' DONUTS

ZACHRY Turner Sapient THE HOME DEPOT CVS pharmacy



Building Technology vs Solving Problems
http://dalezak.ca/2011/11/building-technology-vs-solving-problems.html



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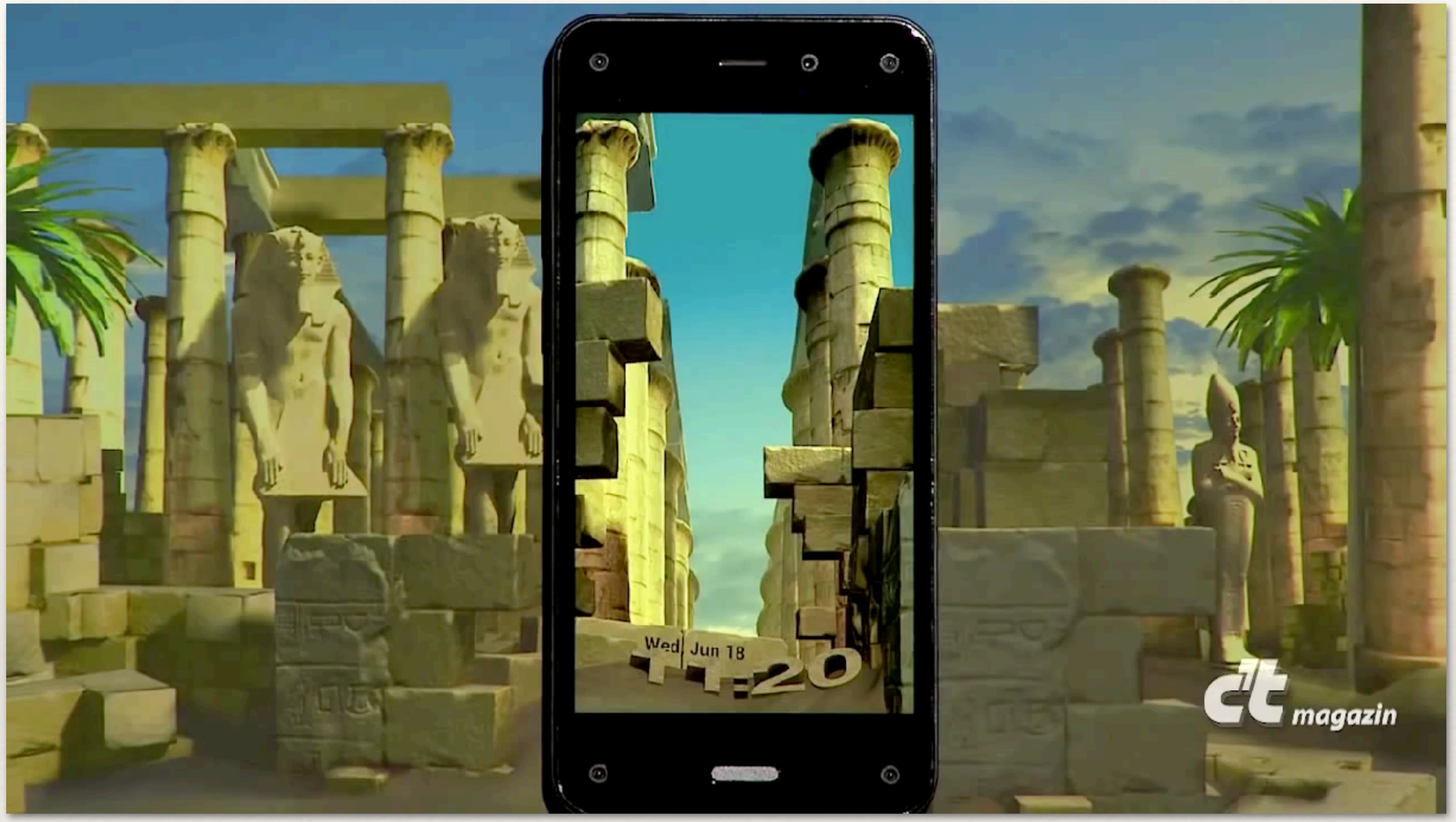


amazon

Jeff Bezos introduces Amazon Fire phone Dynamic Perspective Feature

Amazon Press Conference, June 2014

GLASS

Google

Sergey Brin talks about Google Glass
TED Conference, June 2013

Introducing Apple Watch
Apple Press Conference, June 2015

1. Make it faster
2. Private browsing mode
3. Reading mode
4. Trending web pages
5. Easy to share/save pages
6. Cooler UI
7. … …

Harris Poll Reputation Quotient Study

	2010	2011	2012	2013	2014
#1	Berkshire Hathaway	Google	Apple	amazon	amazon
#2	Johnson & Johnson	Johnson & Johnson	Google	Apple	Coca-Cola
#3	Google	3M	Coca-Cola	Disney	Apple
#4	3M	Berkshire Hathaway	amazon	Google	Disney
#5	SC Johnson	Apple	Kraft	Johnson & Johnson	Honda
#6	Intel	Intel	Disney	Coca-Cola	Costco
#7	Microsoft	Kraft	Johnson & Johnson	Whole Foods	Samsung
#8	Coca-Cola	amazon	Whole Foods	Sony	Whole Foods
#9	amazon	General Mills	Microsoft	Procter & Gamble	Microsoft
#10	General Mills	Disney	UPS	Costco	Sony

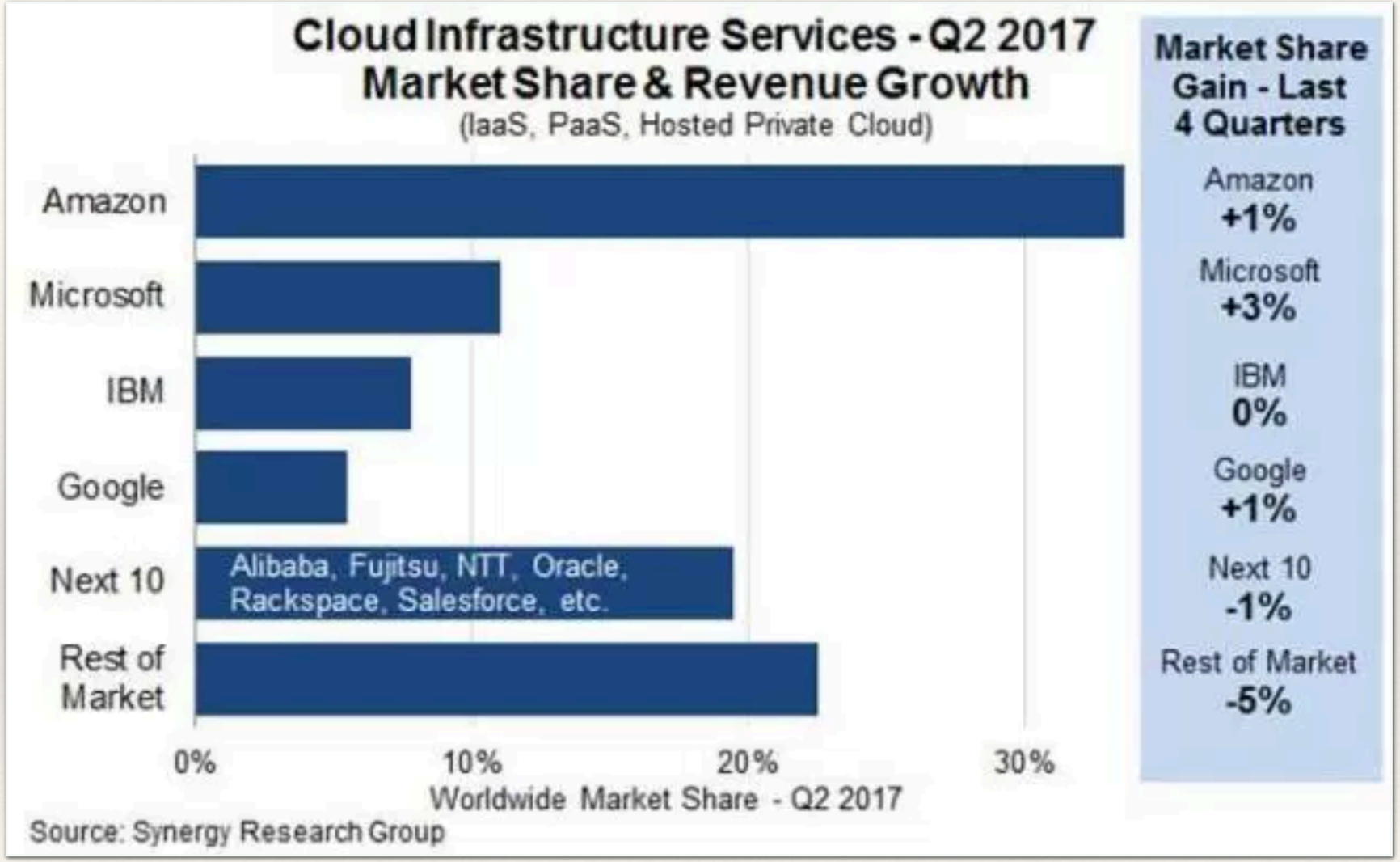
Amazon MayDay

- *"We set a goal for ourselves to have a response time of **15 seconds or less** when a customer tapped the Mayday button – we're proud to say that on Christmas Day we met this goal, with an average response time of just **9 seconds**," (source: Digital Trends)*

Amazon
Customer-Centric

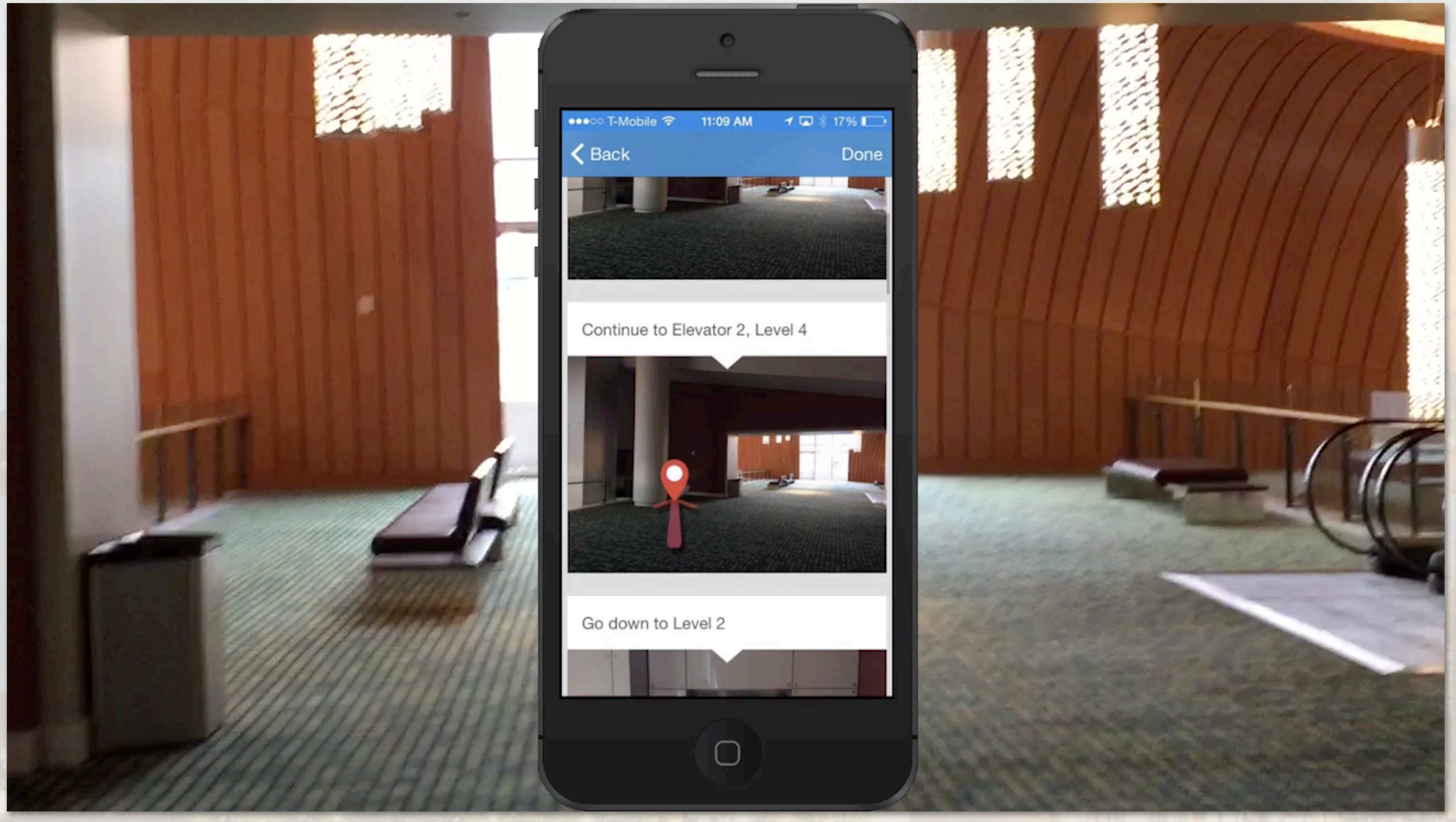
amazon web services

Google Cloud Platform


Cloud Infrastructure Services - Q2 2017
Market Share & Revenue Growth
(IaaS, PaaS, Hosted Private Cloud)
Amazon
Microsoft
IBM
Google
Next 10
Alibaba, Fujitsu, NTT, Oracle, Rackspace, Salesforce, etc.
Rest of Market
0%
10%
20%
30%
Worldwide Market Share - Q2 2017
Source: Synergy Research Group
Market Share Gain - Last 4 Quarters
Amazon +1%
Microsoft +3%
IBM 0%
Google +1%
Next 10 -1%
Rest of Market -5%

Mobile Indoor Navigation

Music City Center, Nashville, TN



Ziiio Indoor Navigation Demo

http://zii.io/

Mobile Indoor Navigation

Convention Center

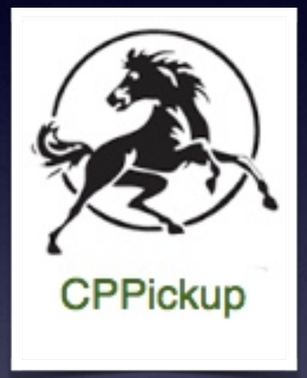
Hospital

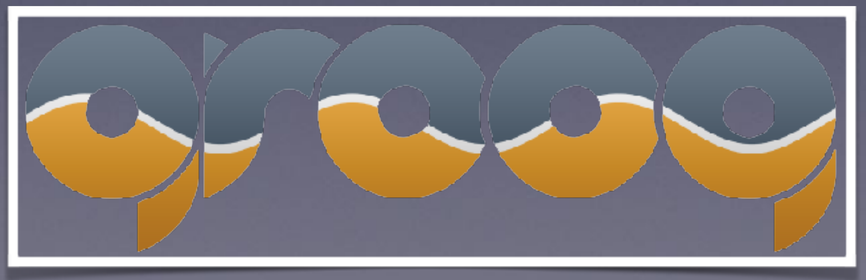
Hotel

My Favorite Courses

- **CS480 Software Engineering**
  - http://cs480-projects.github.io
- **CS499 Mobile Application Development**
  - https://play.google.com/store/apps/developer?id=Cal%20Poly%20Pomona

CS480 - The Class of Winter 2015





CS480 - The Class of Fall 2015

NEXONE

01001110010000010100110101000101
BRONCOBOARD

COLLABIN

WUMBOLOGY

Perk

Bonis!

Well Met!

TL;DW
Too Long; Didn't Watch

-TipsySwift-

CS580 - The Class of Winter 2016

SpaceX QuickInfo

MaddyTechie

Durosham

circular reasoning Works because

Scattershot

Bake It Yourself

NearbyShopsWebsite
"find what you need in easy way"

SHAREMYWEEK

HOPE

CS480 - The Class of Fall 2016

WEBINEERS

THE PINKIES

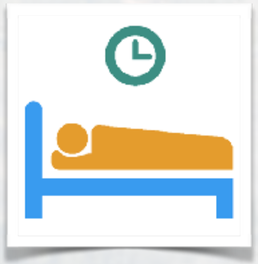
MEDASSIST

JET

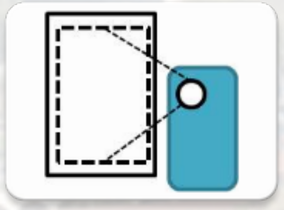
AM I SAFE HERE?

UFINDER

CS499 - The Class of Spring 2015

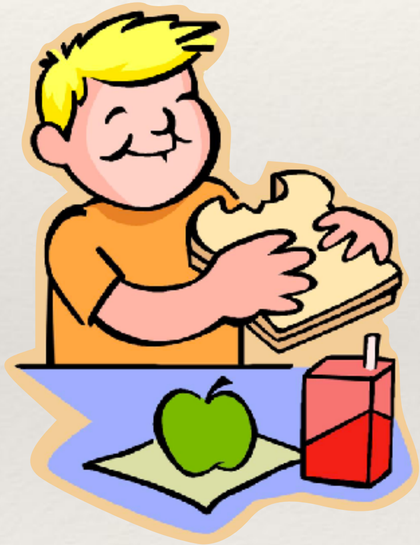


CS499 - The Class of Winter 2016



CPP's Top 3 Biggest Problems to Solve

1. Where to Park?



2. What to Eat?

3. What to Play?

MINECRAFT
POCKET EDITION
Crafting
Glass w/ Water
Crafting
Bread Stick
Crafting
Soap
Crafting
Soapy Water
Crafting
Block o Cheese
Crafting
Rice Seeds
Crafting
Flour
Crafting
Bread Dough
Crafting
Checker Floor
Crafting
L Cupboard
Crafting
M Cupboard
Crafting
S Cupboard
Crafting
Cheese Slab
Crafting
Washing Machine
Crafting
Freezer
Crafting
Green Bin

Google Play

Minecraft Checker

(3,289 downloads in Google Play)

Marion Levy

(Class of 2015)

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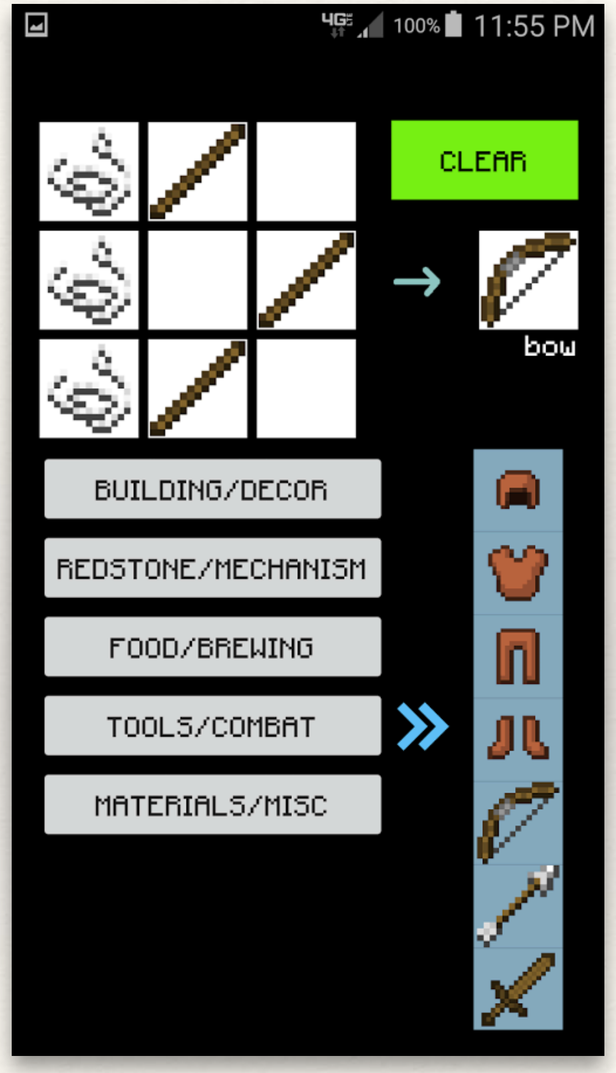


https://play.google.com/store/apps/details?id=la_hacks.minecraftchecker

Google Play

VideoFly

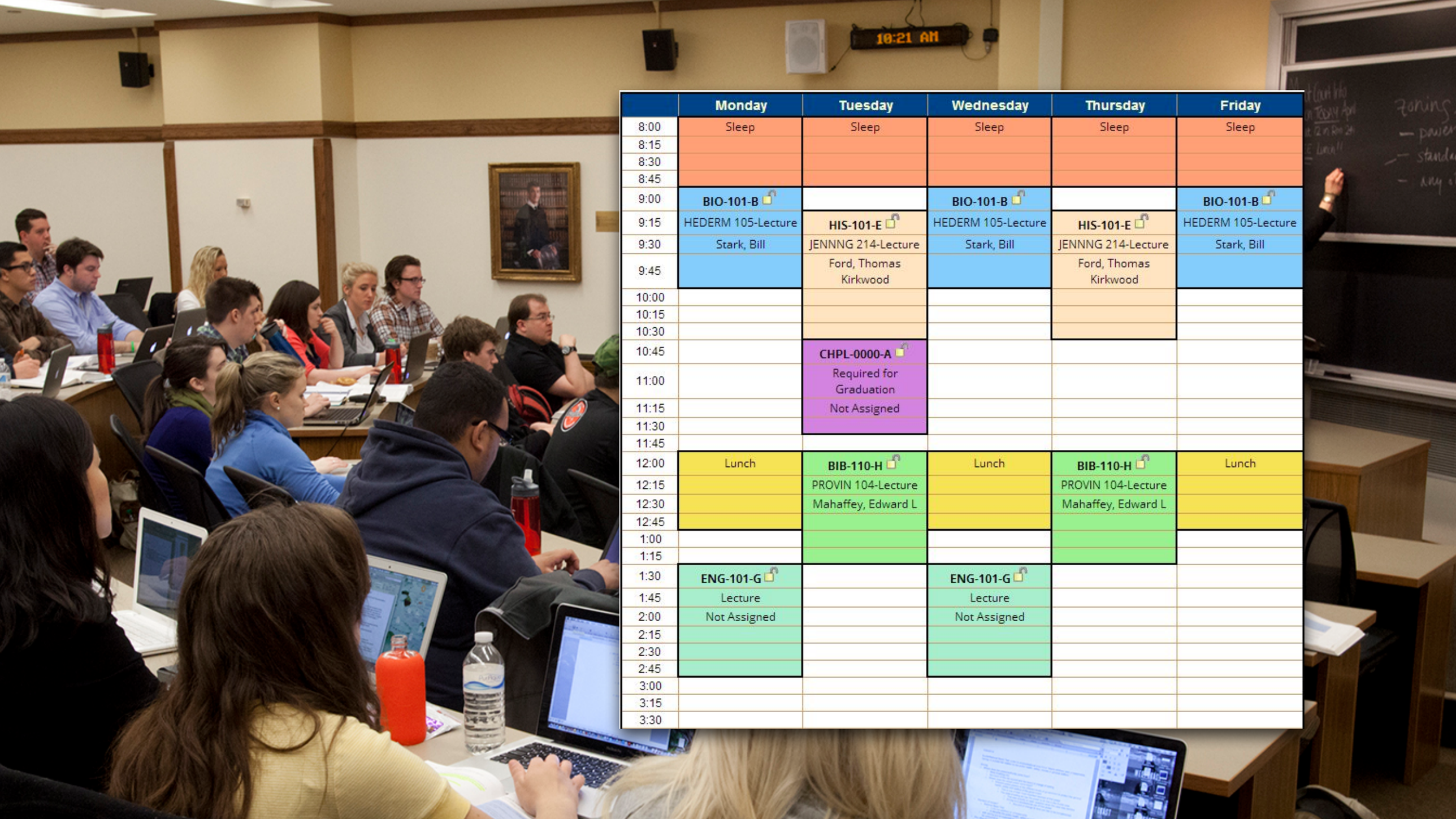
(2,454 downloads in Google Play)

Madhav Chhura

(Class of 2015)

chhura.madhav@gmail.com

https://play.google.com/store/apps/details?id=example.com.videofly



	Monday	Tuesday	Wednesday	Thursday	Friday
8:00	Sleep	Sleep	Sleep	Sleep	Sleep
8:15					
8:30					
8:45					
9:00	**BIO-101-B**		**BIO-101-B**		**BIO-101-B**
9:15	HEDERM 105-Lecture	**HIS-101-E**	HEDERM 105-Lecture	**HIS-101-E**	HEDERM 105-Lecture
9:30	Stark, Bill	JENNNG 214-Lecture	Stark, Bill	JENNNG 214-Lecture	Stark, Bill
9:45		Ford, Thomas Kirkwood		Ford, Thomas Kirkwood	
10:00					
10:15					
10:30					
10:45		**CHPL-0000-A**			
11:00		Required for Graduation			
11:15		Not Assigned			
11:30					
11:45					
12:00	Lunch	**BIB-110-H**	Lunch	**BIB-110-H**	Lunch
12:15		PROVIN 104-Lecture		PROVIN 104-Lecture	
12:30		Mahaffey, Edward L		Mahaffey, Edward L	
12:45					
1:00					
1:15					
1:30	**ENG-101-G**		**ENG-101-G**		
1:45	Lecture		Lecture		
2:00	Not Assigned		Not Assigned		
2:15					
2:30					
2:45					
3:00					
3:15					
3:30					

http://broncoscheduler.com

BroncoScheduler

(Over 2,000 visits per day)

Isaac Siegel
(Senior)

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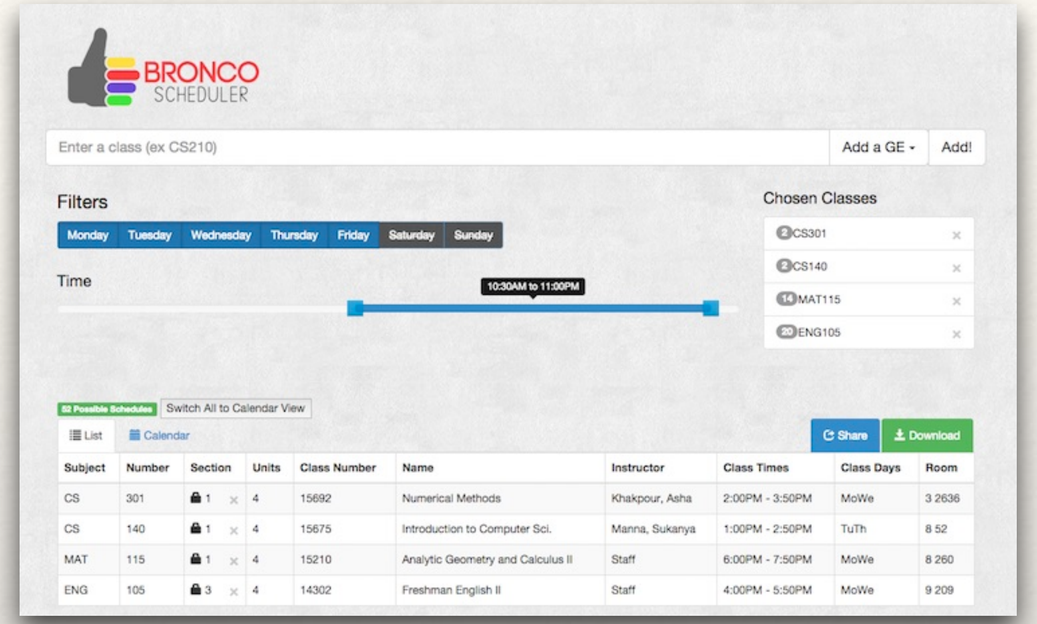


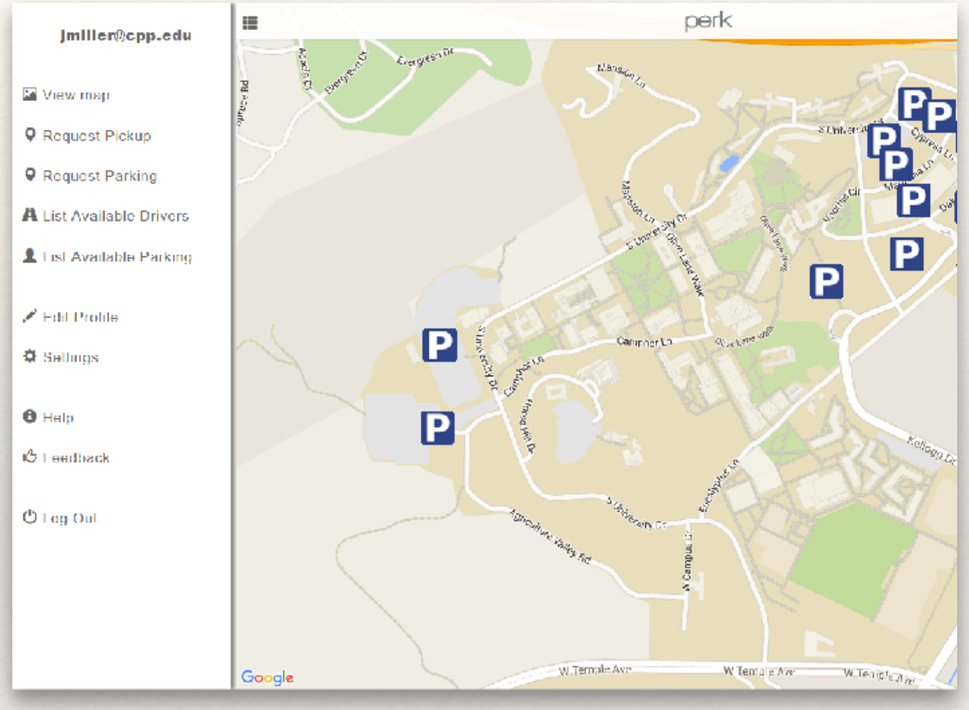
BRONCO
SCHEDULER

http://perk.net

PERK:
Trade Your Parking Spot for a Ride to Your Car

Zachary Kysar
(Senior)

zach.kysar@gmail.com



perk

WINFIELD
ARMS CORP.

Google Play / App Store

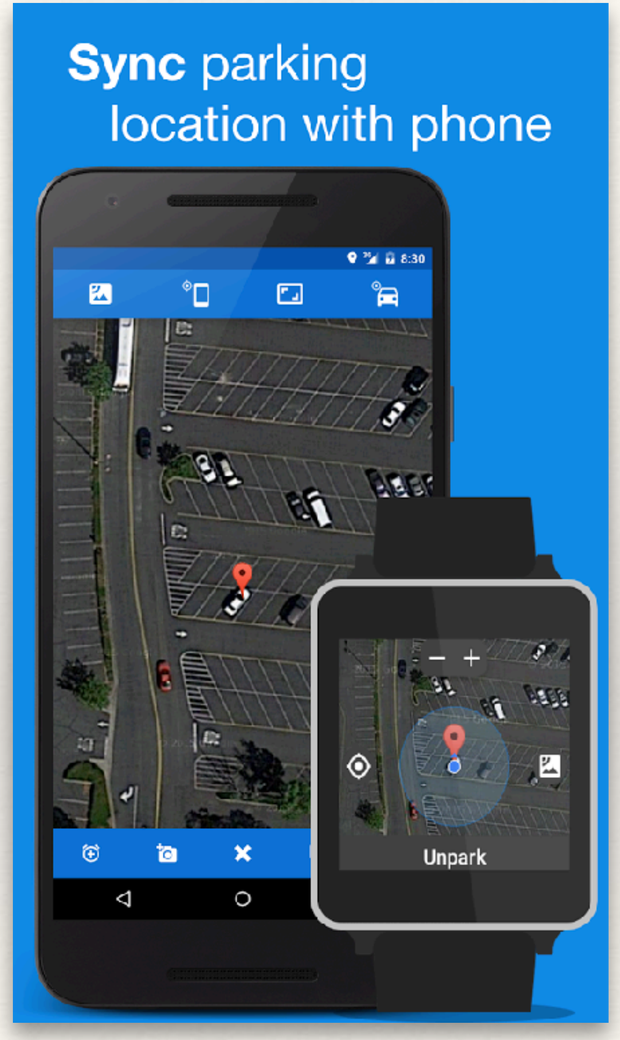
Find My Parked Car

(Over 50,000 downloads)

Aviv Miron, Ofir Miron

(Senior)

avivmironinc@gmail.com



STAR WARS
OF GOO

Google Play

Games Launcher & Booster

(Over 15,000 downloads)

Ofir Miron

(Senior)

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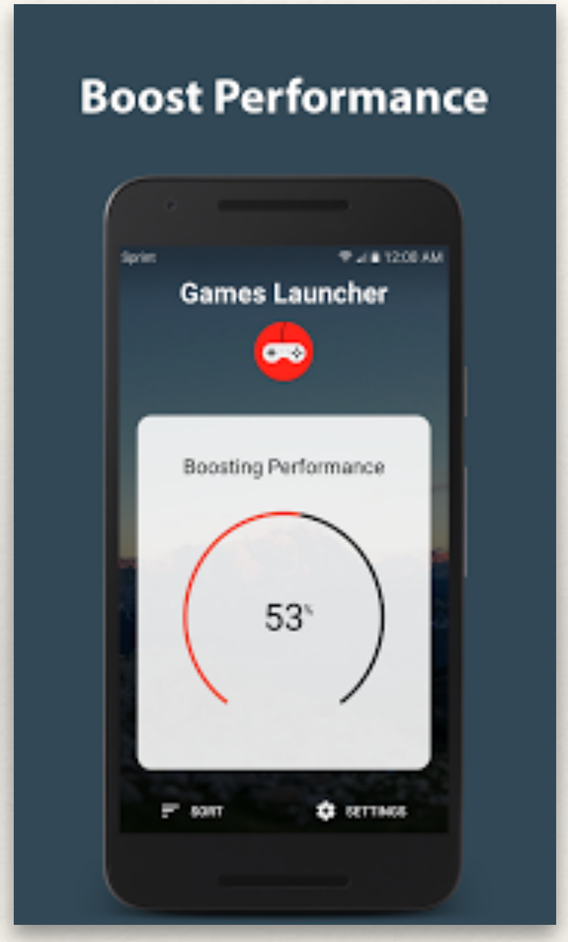

http://goodvar.com

Bonis!
A Web Application to Find Good Times Near You

David Mongiello
Keaton Simpson
Shayan Mestchian

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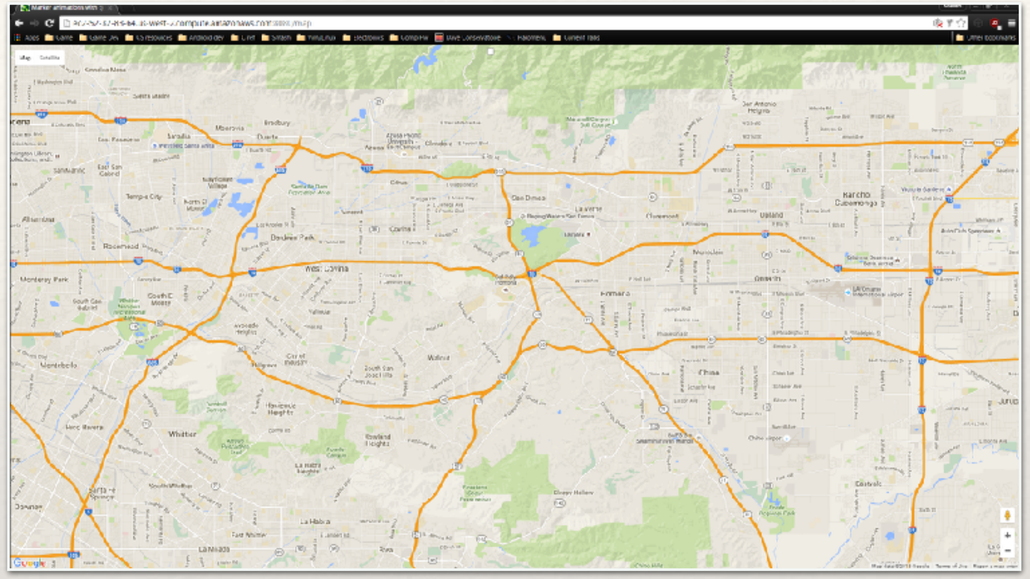

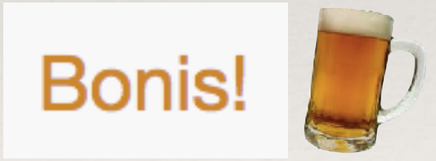

Coming soon …

Distraction-Free Writing Environment

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(Master)

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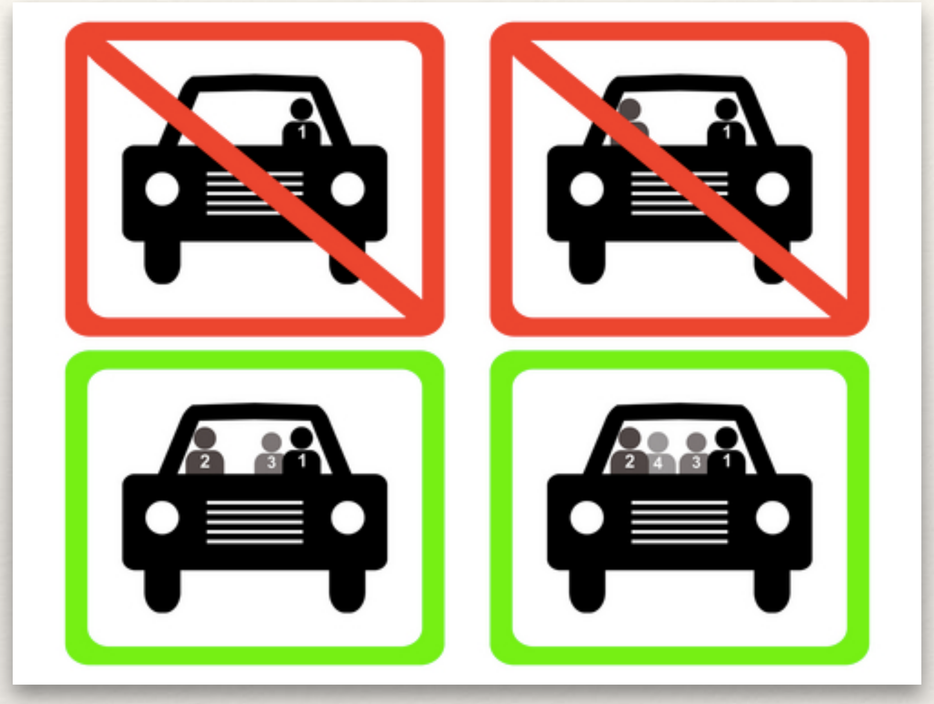
Visalia
Exeter
Pahrump
Sunrise Manor
Winchester
Las Vegas
Lake Mead National Recreation Area
Sandy Valley
Dolan Springs
Barstow
Rosamond
Lancaster
Palmdale
Adelanto
Victorville
Hesperia
Ojai
Santa Paula
Santa Clarita
Simi Valley
Oxnard
Thousand Oaks
Rancho Cucamonga
San Bernardino
Big Bear City
Santa Monica
Los Angeles
Downey
La Habra
Riverside
Banning
Hills
City
Poston

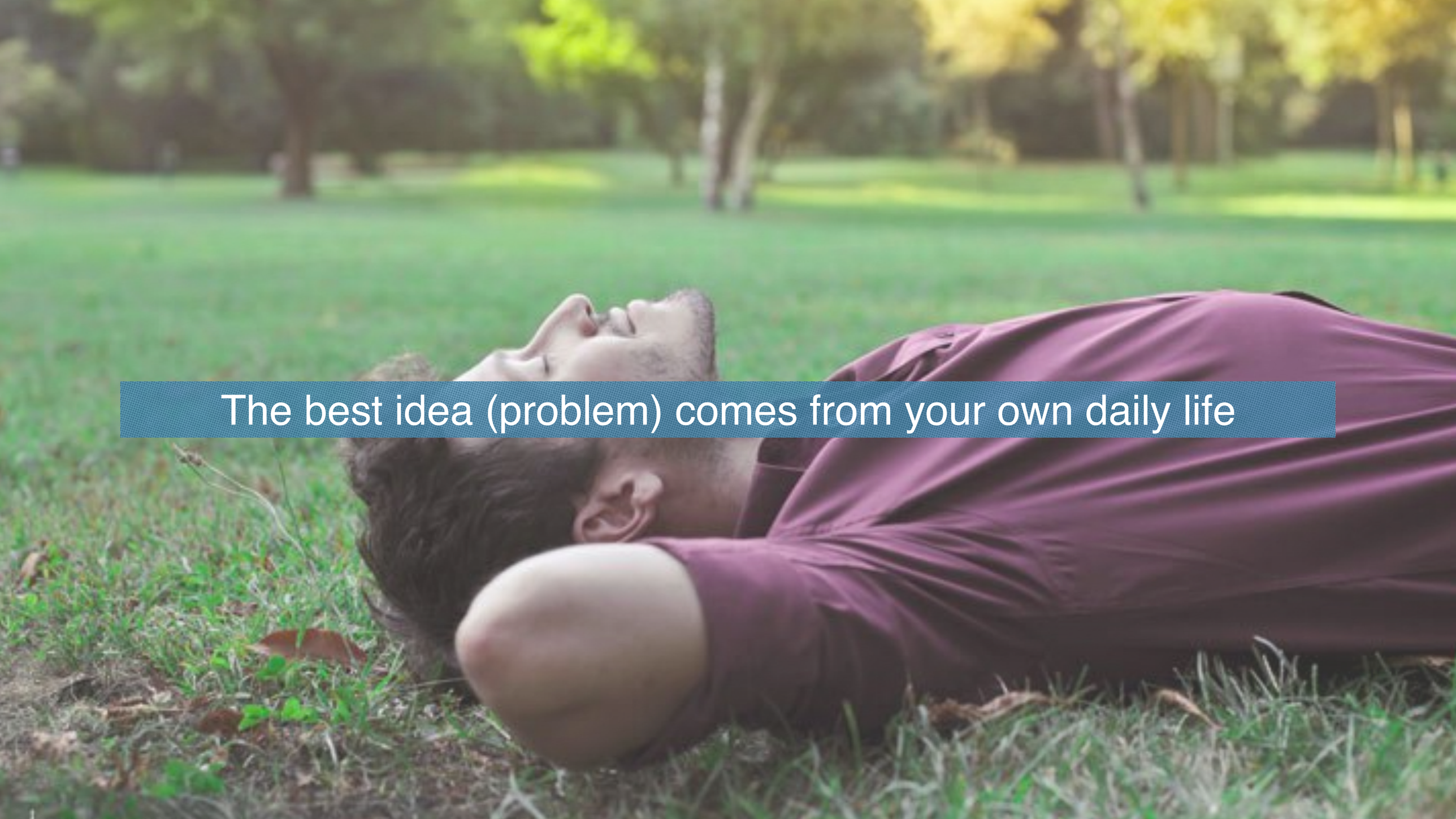
Coming soon …

Uber for Tour
Vehicle Ride Sharing

Steven Parkin
(Master)

sparkin1991@yahoo.com




The best idea (problem) comes from your own daily life