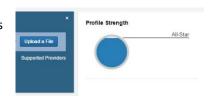## OVERVIEW

A recent Finextra survey showed that 84% of financial institutions (FIs) have increased their investment in disruptive technologies. Target areas are ranked as follows:

- Big data, where 57% expect the impact to be high or very high;
- Open APIs (53%);
- Internet of Things (47%).

Gamification, the art of building game-like elements into real-world business processes, was not on the list! A huge oversight if Professor Kevin Werbach, of the Wharton School of Business is to be believed. In describing the benefits of gamification of business processes, he cites how Linkedin increased member profile completions by 20%, simply by adding a gamified profile completion bar (see screen capture at right). The purpose being to encourage users to complete their user profile (it took only one hour for the wizards at Linkedin to write the code for the profile widget).

Linkedin profile bar

The Linkedin example demonstrates that gamifying business processes can have a big payoff. Gamification can make many other business processes more effective, and this report analyses various real-world examples that demonstrate how gamification has been used to recruit, cut costs, reduce risk and improve engagement. A snapshot of some apps and results include:

- U.S. Army video game attracted 13 million users
- McGill Neurological Institute uses simulated brain surgery to train surgeons, reduce errors and cut costs
- Mint.com's gamified personal financial app attracts 10 million users within 4 years
- ClickBlog, 25 examples of gamification in business.

U.S. ARMY

Taken to the extreme, the U.S. Army simulated a fantasy military experience by building a war game. A game that the MIT Sloan School of Management, claim influenced "30% of all Americans age 16 to 24 to have a more positive impression of the Army…even more amazingly, the game had more impact on recruits than all other forms of Army advertising combined." (David Edery, 2008, p. 141)

The results, according to a 2009 Reuters report with respect to the U.S. Army Experience Center at the Franklin Mills shopping mall in northeast Philadelphia was to match the performance of five traditional recruiting centres.

The center has 60 personal computers loaded with military videogames, 19 Xbox 360 video game controllers and a series of interactive screens describing military bases and career

Image 1 & 2, example of recruiting centre, screen capture of U.S. Army game.

options in great detail. This facility lets potential recruits hang out on couches and listen to rock music that fills the space.

According to Federal News Radio, the military is competing with the civilian sector for quality candidates.[1] "It's very expensive to recruit," said Mike Byrd, a retired Army lieutenant colonel. According to Penny Venetis, the "2009 budget totaled $20.5 Billion. This money was used for ads and video games." (Venetis, 2008) Compared to the overall budget, developing a game was more of a rounding error. "American Army" video game has 13 million registered users[2] and cost $5.5 Million to develop according to Venetis.

From the U.S. Army perspective, the game is considered to be a "cost-effective recruitment tool." It aims to become part of youth culture's "consideration set" as confirmed by Army Deputy Chief of Personnel Timothy Maude in testimony before the Senate Armed Services Committee.[19] Director Colonel Wardynski, used the metric 'cost per person hour' to measure returns, and in 2005 calculated 'a cost per person hour of 10 cents." (II, 2007, p. 173)

According to David Edery, Microsof Xbox executive and research affiliate of the MIT comparative Media Studies Program, and Ethan Mollick, co-researcher, "Recruiting is not the only use of gamification used by the military. Other important uses of gamification for the military (air force) is to train pilots and teach soldiers to control drones." The military regularly consult the gaming industry on how best to design the UI for drones.

It is commonly known that flight simulators are used to reduce risks and cut costs as they prepare individuals for real-world tasks. According to the Royal Aeronautical Society (RAS), much of the training previously undertaken in aircraft is now conducted in flight simulators. This also includes maintenance engineering and cabin crew training.

According to the RAS flight simulation offers the following benefits:

- Replace airborne training with simulator, with the balance in favour of synthetic training;
- Use simple desktop training devices and laptop computers for flight crews and maintenance technicians;
- Provides feedback;
- Simulate dangerous situation without risk;
- Ongoing simulation training for pilots using simulators cuts costs by $60m annually;
- Students can proceed at their own pace.

NEUROSURGERY SIMULATION

According to Dr. Roy Dudley, Neurosurgeon at the Montreal Children's Hospital and Montreal Neurological Institute, "Gamification or simulations have advanced significantly over the past few years." Dudley, pictured using the simulator (Image 3 & 5) is a neurosurgeon having completed 4 years of medical school, 6 years of general neurosurgery residency, and 1 year of pediatric neurosurgery fellowship. Dudley is an example of how simulations can play a role in skill development. This is because, despite years of training, like all neurosurgeons with less than 10 years of experience, he still has some learning ahead of him. Simulations could shorten the process to reaching his full potential.
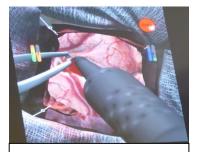

Image 3, Image of brain surgery simulation from McGill Neurological Institute

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[1] Note that the comments were made in 2008. The military is currently reducing its forces.

[2] (Wikipedia)

Of course there are other benefits as well. Simulation Director Dr. Rolando F. Del Maestro, sees the potential to "Enhance patient safety by utilizing simulation technology by improving understanding, assessment and teaching of surgical performance."
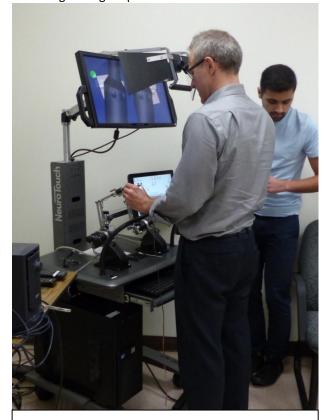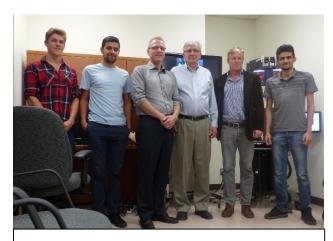

Image 3, Pictured: Duncan Sibthorpe, Dr. Khalid Bajunaid, Dr. Roy Dudley, Dr. Rolando Del Maestro, Mark Sibthorpe, Dr. Abdulgadir Bugdadi

Image 5, Dr. Roy Dudley practicing on brain surgery simulator

Simulation benefits include:

- Error reduction;

- Reduction of operating time;

- Rehearsal before live surgery;

- Competency tests;

- Rehabilitation of surgeons;

- Reduction of training costs;

- Accelerated learning.

"The incorporation of haptic (the science of touch) feedback into virtual reality simulators can be used to explore and validate a series of questions directly relating to the issue of surgical expertise. Haptic feedback recreates the sense of touch by applying forces, motions and/or vibrations to the surgical user. This mechanical stimulation can be used to create a virtual brain scenario containing tumor tissue with visual and tactile realism and appropriate pulsation in a computer simulation. Tactile sensors can be incorporated into these simulators with haptic systems which measure forces exerted by the user on the interface. These advances in computer-based technology have created a significant opportunity for implementing new neurosurgical training paradigms focusing on improving neurosurgical skill acquisition, enhancing procedural outcomes, and better documenting surgical skills assessment. In the past decade many virtual reality simulators have been developed for a variety of distinct neurosurgical purposes, ranging from training residents in simple procedures to full preoperative planning simulation."

The Neurosurgical Simulation Research and Training Centre at the Montreal Neurological Institute and Hospital has been working with the National Research Council (NRC) in order to reproduce the successful flight simulator approach in aviation." The NRC has a successful history of developing simulation technologies for applications

varying from vehicle part manufacturing to food packaging to medical device design. The goal being "realism, convenience and affordability".

The potential importance of the brain surgery simulator project is illustrated by the fact that it was ranked as the top project funded by the NRC in a number of grant reviews. It ranked highly because of the catastrophic consequence of surgical error, significant financial cost ($50-$150K) related to brain surgery and training efficiencies, that, when taken together, indicate that significant returns are possible once the technology is in place.

Simulator payback

Building a brain simulator obviously requires more effort than building a progress bar. Therefore, to measure payback, or quantify the cost benefits of simulation, consider that the majority of surgical training (90%) is performed in the operating room; and training increases the time required to complete surgical procedures by 35%. Based on the time savings due to residents being better prepared for surgery, the payback time for purchasing simulators could be as low as 6 months. (Aggarwal R. Ward, 2007)

Another example of potential payback, is simulation training results in sinus surgery. Results showed that novices experienced a steep learning curve with just three to five trials on the simulator. Four to five trials later, student's skill levels scored close to the same results as experienced sinus surgeons. (Uribe JI1, 2004)

Medical simulators also offer the possibility to collaborate and teach remotely. Dr. Joshua Benderson of the Mount Sinai Hospital in New York City believes collaboration is the key to success. "We can involve thousands of participants from students and residents to expert surgeons. The benefit is accelerating improvements, especially for remote training. (Bryce, 2014)

Measuring results and assessing competency is another advantage of simulations. In Dr. Del Maestro's words quoting Vince Lombardi a famous NFL coach, "Practice does not make perfect. Only perfect practice makes perfect." Creating the perfect practice environment requires resources. The McGill Neurosurgical Simulation Research and Training Centre, for example, lists 19 people with a role in the brain surgery simulation project. Up to 50 people, including other NRC collaborators also had valuable roles to play in order to push the project forward. To get a sense of where simulation is headed, according to Dr. Del Maestro, "Canada is not the only country advancing a simulation program, Australia has allocated substantial financial resources to simulation technology and the Saudi's have actually built an entire simulated hospital. Dr. Del Maestro expects every major world neurosurgery center to have simulators within the next 5-10 years.

As a side note, perhaps this timeline could be even shorter due to advances in consumer products like google cardboard 3d VR, and advances in gaming development technologies, such as Unity3d. Add open APIs which would let other qualified developers contribute, and suddenly 5-10 years seems very long.

GAMIFY FINANCIAL SERVICES

Informed bankers, insurance leaders and, especially actuaries, will likely agree that 36 years ago VisiCalc, the first digital spreadsheet, changed the way people use computers: from linear to interactive.

VisiCalc's breakthrough was that it allowed people to interact with data and develop business scenarios. According to Ben Rosen , people would buy $2000 computers to use the $100 software. In July 1979 Rosen said that "VisiCalc

could someday become the software tail that wags (and sells) the personal computer dog". Apple was proof of this; for the first 12 months it was only available for the Apple II, and became that platform's killer app.

The following description of what actuaries do seems to serve the dual purpose demonstrating the power of spreadsheets means:

Actuaries assemble and analyze data to estimate the probability and likely cost of the occurrence of an event such as death, sickness, injury, disability, or loss of property. Actuaries also address financial questions, including those involving the level of pension contributions required to produce a certain retirement income and the way in which a company should invest resources to maximize its return on investments in light of potential risk. Using their broad knowledge, actuaries help design and price insurance policies, pension plans, and other financial strategies in a manner that will help ensure that the plans are maintained on a sound financial basis (Bureau of Labor Statistics 2015, Government Actuary's Department 2015).

The invention of spreadsheets meant that more individuals could have real-time access to complicated business scenarios, the ability to modify and build alternative scenarios and analyse the outcome of each iteration.

Today the value of spreadsheets has been enhanced even further. Whereas, spreadsheets made simulation possible, new digital technologies have enabled developers to turn these simulations into interactive learning tools and even allow for competitive simulation scenarios in training. According to Dr. Neil Seitz, an advisor for BankersLab, "It isn't that I try to use a simulation for everything I want to teach—it's that there are many things more effectively taught through simulation than from other techniques."

Gamification of risk modelling, for example, demonstrates the approach that BankersLab follow. As the screen shots demonstrate (image 6, 7, 8), players adjust variables in order to achieve maximum profit. Profit is calculated based on their decisions, which are tied to real-world financial models. According to Seitz, "Demand theory tells me that raising the interest rate 1 percent would cause demand to fall, but theory does not tell me how much it will fall." To answer this, Seitz turns to senior industry executives for their valuable insight, so that the theory can be calibrated with reality and builds this into the algorithms.
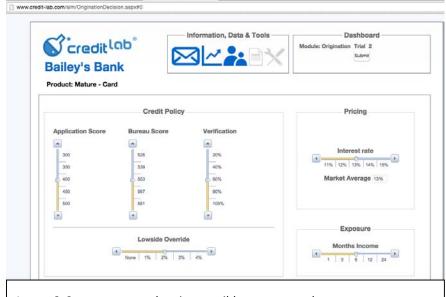

Image 6, Screen capture showing possible parameter changes

Sample screen shots from the BankersLab training dashboard. Image 6 shows credit policy variables that can be modified by adjusting the sliders. Moving the slider adjusts risks such as, credit score, bureau score and client information verification levels. These variables are correlated to pricing, demand and exposure. Using rule based algorithms the game calculates the results and provides real-time feedback to participants. BankersLab next step in the pipeline is to add more risk models, including catastrophic events; because risk is such a concern for banks these days, BankersLab may experience high demand if they can convince banks that their approach is more effective than the punitive approach being adopted by banks as reported in a recent EY survey. (Shecter, 2015) For example, by placing participants into risk

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simulations, such as, "simulated meltdowns" participants will be able to test their mettle and have practical insights with respect to the consequences of their actions. (BankersLab, 2015)

The BankersLab approach is different from training available from banking solutions vendors. Of course there is overlap, especially for software vendors offering data fuelled simulations. The difference in approach is the opportunity to test and play. For example, banking software developers typically use real-life experience and knowledge to create a replica of an organisation's application. Often the goal is to re-create the look and feel like the real application. Both types of training offer:
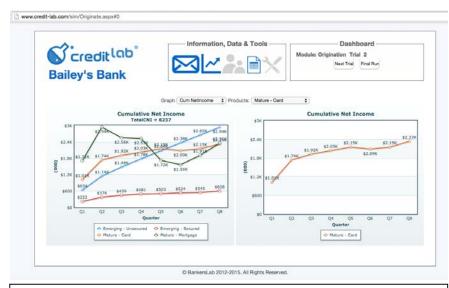

Image 7, performance results charts showing cumulative net income

- • Uniform training in a cost-effective manner;

- • Testing and scenario building;

- • Measure skills;

- • Catch errors or skill gaps off-line;

- • 24/7 availability if required.

Of course these two examples of gamification in the financial service industry are a far cry for the U.S. Army's virtual combat games which are geared to consumers. For financial services gamification examples geared to this market, I identified two initiatives which offer valuable insight into the potential benefits of gamifications and also what to avoid.

Image 8, charts showing cumulative with snapshot of revenue, credit and delinquency

On the opportunity side, Mint.com is the example I felt demonstrated what gamification could mean. Although mint were not necessarily looking to gamify their apps, the result of their achievement demonstrate the impact that a gamified user experience can offer. Essentially, Mint.com offers consumers an easy way to manage their personal finances in a way that creates a game-like feel. The app is integrated with banks, credit card issuers and other sources of financial data and uses this information to create an interactive user dashboard that contains

each member's financial data. Because the data is aggregated, users can view details of their financial life in one place, in an easy to understand dashboard (image 9).
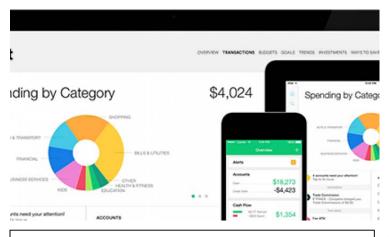

Image 9, Mint.com screen capture

Essentially, Mint.com is a real-time simulation that presents a visual snapshot of their finances, a view that they can act on. The take-away from this is realization that a well-conceived, gamified app works. For example, Mint.com grew to 1.5 million users and sold for $170 million in just 2 years, by 2013 it had 10 million users. (Kissmetrics, 2013)

Mint founder, Aaron Patzer, had this to say with respect to how he conceived the user experience:

"Within this idea (for Mint) was a little gem, a little nugget. (It was) the money component of the life planning software, of the goal planning software. It resonated; people were having trouble figuring out 'How much do I need for retirement? How much is something going to cost? How do I save up more?' And I realized that virtually everybody I talked to had this problem and virtually everybody I talked to hated Quicken and Microsoft Money, the dominant products at the time."

Another pioneer in this space was, Mysis, a banking technology company. In contrast to Mint.com, Mysis recognized the possibilities to harness games and set out on a deliberate path to build a financial planning game, as opposed to a gamified financial app. The project was called Gameo.

According to Ann Bourani, a spokesperson for Mysis "fun" was the number one priority of the app. Other goals were to create a competitive environment that combines winning, competition and social to help consumers build financial planning skills. Bourani, also envisioned the possibility to encourage viral marketing through social referrals.

Unfortunately for Mysis, despite what seemed like good philosophies and strategies at the time, Gameo did not resonated with consumers. You can view an overview of Gameon on Youtube, and walk through the actual game video and you may formulate your own conclusions as to why it did not work as well as was hoped. The implication

Images 10, 11, 12, Screen captures from Gameo youtube demo

I derived from comparing the Gameo and Mint.com examples, is that gamified business processes need to offer tangible benefit for users: for example, Bourani set out to create "fun", whereas Mint.com founder, Aaron Patzer, set out first and foremost to understand his audience and validate his concepts. As he puts it:

> *"When I started Mint I took a very different approach…and this is sort of the methodology that I formed (Validate your idea > Create a prototype > Build the right team > Raise funding).*

> *"Number one is to validate your idea. I actually didn't write a line of code until I did about three or four months' worth of thinking on Mint, which I think is counter to what a lot of people will suggest. A lot of people will say 'Just get the product out there, just iterate very, very quickly, (and) just make a prototype.' That works for certain types of things; I think anything that is social…that works. But for finance I wanted to be a little more rigorous and there were a lot of technical problems, connectivity to all of the banks, and the business model.*

> *"The next thing was to create a prototype, then to build the right team, and then to raise funding."*

With 10 million users onboard after only 4 years, Patzer's approach achieved the best results.

RECAP

To conclude, gamification has helped the U.S. Army recruit, and ensure that pilots are competent before flying. Gamification of brain surgery, as demonstrated by the Neurosurgical Simulation Research and Training Centre, shows how simulations, specifically through haptic systems, accelerate skill development and reduce the cost of surgery. Simulations, due to the invention of spreadsheets, marked the transition from linear processing to interactive experiences. Most significantly, with respect to business processes, a well-executed gamification process, as shown through the Mint.com, seems likely to improve the possibility of producing a product that resonates with, and engages consumers. So, given the success shown in these examples: what explains the fact that gamification was not a consideration in FI ranking of disruptive technologies?

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