

# “BEING DIGITAL” LIFESTYLE SYSTEMS

STUDENT PROJECT in Sensory Informatics Network Systems (SINS)

- How many digital value network groups (by verticals) are necessary?
- Create a hypothetical supply network plan engaging all the nodes in the lifestyle network.
- Draw an information systems diagram to illustrate where bi- and/or multi-directional data is essential.
- How would you propose a continuous micro-revenue stream for the suggested business services?
- Illustrate user interface designs and software development platforms or suitable software systems.
- How would you present this proposal to a major retail client or partner as a node in the lifestyle project?
- Systems Software: Do we need new products, services, apps to host and operate this lifestyle scenario?

## DISCLAIMER

Part of this was an idea for student<sup>1</sup> projects. It is not a product map or a paper to describe the technologies necessary to transform this scenario into reality. The scenario consists of multiple converging layers across different verticals which include retail, utilities, banking, mobile marketing, health, energy and household effects. The sum of all or part may represent consumer lifestyle systems in a few industrialized nations. The names and products used may have a counterpart in reality but are used by the author only to make the scenario appear plausible as a lifestyle systems network or digital value chain. The people, corporations or institutions indicated in the scenario are not connected to the scenario, they did not endorse or support the scenario or have any idea that their names, logo or brands were used to script the scenario. The scenario is solely attributed to the author. It reflects aggregation of relational applications with social media and business services which may offer service providers a continuous stream of micro-revenue. The seamless lifestyle scenario highlights the convergence of applications inevitable in the evolution of systems interoperability anchored by global conglomerates which may have the power to build open platforms and host the ecosystem of systems (and cloud analytics) in order to serve this emerging line of business where relationship and connections are key lifestyle demands from customers.

<sup>1</sup> Short course for MBA students at the Institut Supérieur de Logistique Industrielle, Bordeaux Ecole de Management in Bordeaux, France (17-18 Nov 2010) and MS students at the Chalmers University of Technology (CHALMERS TEKNISKA HÖGSKOLA) Gothenberg, Sweden (15-16 November 2010).

## Confluence of Sensor Networks, Energy and Retail Supply Chain with Healthcare Monitoring may shape Future Lifestyle Systems

*Electric Vehicles, Charging Stations and Grid Operations in Convergence with Social Networking and Lifestyle Sensory Informatics Network Systems offer Continuous Micro-Revenue Earnings Potential*

Energy distribution influences physical mobility of humans and dependent objects. The medium of mobility on land is the automobile, generally. Decreasing availability of liquid fuel will increase the number of electric vehicles (EV). The shift in form of fuel may necessitate changes not only for EV manufacturers and consumers but also for energy producers and distributors. Electricity operators must account for peak capacity to balance energy supply versus demand to recharge mobile assets which may increase geographic uncertainty of consumption. Demographic changes will accompany this mobile lifestyle evolution and usher in factors unrelated to the core business of EV manufacturers and EV recharging stations. These parameters are largely in the domain of social networks. Embedding social media attributes within the infrastructure or operating platform of EV related services may be crucial to profit from sales of such products and the survival of EV related services. The demise of fixed payment options for most services will increase the use of micro-payment methods which will rely on economies of scale for profitability. Hence, driving the traffic of users to engage with (mundane) EV products or services may require the attractive presence of social media because the demographic profile of prospective EV users may map to the lifestyle of the post-internet generation. The dynamics of the latter is farthest from the stoic practices of the utility industry which must fuel mobility. In part, this discussion may address ways to bridge this chasm between the 21<sup>st</sup> Century user and the utilities. Dynamic pricing of energy based on near real-time forecast of potential users per unit (grid) area (or plugged-vehicles as storage) may help the utilities industry to create its brand of social networks and reap profits from the internet of energy. **But, these advantages may be only temporary.** The need to bridge this chasm by extracting real-time demand profile to match supply will decrease over time as [0] the pattern of charging stabilizes or fluctuates with diminishing uncertainty with [1] predictable increase in saturation of EV users, [2] diffusion of home charging stations and [3] decrease in range anxiety with increasing range of EV. The latter may aid transportation and logistics operators to plan with precision the location of charging stations along highways or routes taken by fleet operators for movement of goods.

Hence, future lines of software and systems business requires a broad vision of **consumer-centric lifestyle** perspective where relationships and connections are the core drivers rather than the business-centric “product” development. The recommendation is to create business service platforms (rather than products) which can host ecosystem of converging software systems, semantic dictionaries, mobile money and cloud analytical capabilities. These functions must be open, dynamic and may be easily added (subtracted) to increase, modify or adapt value propositions to individual customers based on their demographics, preferences, segments and location awareness to offer near real-time service, predictions and forecasts. In other words, anchor and develop **lifestyle software**, as a business service to evolve the “intelligent interactive skin” which may be inseparable from the customer. Services via i-skin generate transaction micro-revenue, each time the customer touches the i-skin to transact. Capturing high volume granularity of pay-per-action billing is possible due to the vast (unique) addressing capability of IPv6 (<http://esd.mit.edu/wps/2007/esd-wp-2007-17.pdf>).

Policy discussions around the future of digital citizenship usually relate to the “long tail” or in other words what will be the big drivers to offer substantial benefits and financial incentives for users to adopt the first elements. Logically, it may be the big ticket items such as energy (<http://dspace.mit.edu/handle/1721.1/59804>) and preventative healthcare with remote monitoring (<http://esd.mit.edu/wps/2008/esd-wp-2008-17.pdf>). Extending the long tail effect means over time the digital convenience and familiarity would extend further along other verticals or segments where the benefits are less and/or the diversity of elements are larger or diffuse (retail). The dynamic connected online **lifestyle services** may be stimulated by adoption of such services by industry (utility, cleantech) and government (healthcare) in order to heed the consumer demand for a better deal and government ambition to reduce cost of energy and healthcare.

## PROPOSED HYPOTHETICAL SCENARIO

Koenigsegg Agera EV user Eva Gaëlle Green is at the intersection of Kirkham Street and 11<sup>th</sup> Avenue in San Francisco. Eva notes that her 245 mile range KAEV can travel 10 miles before the battery charge indicator may threaten to move from the orange to the danger (red) zone on her GE GARNET. She installed this new device and plugged it in her dashboard USB port after she “energized” her Koenigsegg Agera with a Tesla Roadster EV engine and battery operating system. Eva loves the Nordic contours of her Koenigsegg Agera but equally excited about her “green” engine from Tesla, especially BRUT, Tesla’s Bluetooth Remote Update in Real-Time (BRUT) feature. BRUT syncs with the GE GARNET system and using embedded Bluetooth in the battery system which transmits to the GARNET screen the status of her battery power, how many miles she can travel and the locations of the charging stations within her permitted driving radius before the vehicle battery is in a critical state. The GE GARNET app on her iPhone displays the same data if she wants to check the status of her battery and allowed miles before she leaves her house or gets in her car.

Eva reviews EVC (electric vehicle charger) locations in 1 mile and 5 mile radius on her GE GARNET GPS interface. She downloaded an app called ZAPP to refresh EVC locations on the GE VeriWise GPS embedded in GE GARNET. Eva locates an EVC location right down the road inside the UCSF garage (Parnassus and 3<sup>rd</sup> Ave) and another one 4.5 miles away in Japantown (directions synchronized with her pre-set lunch destination at One Market with her friend Vesper Lynd). She touches the “update status” button which reveals a wait time of 00hrs41min for the GE EVC inside the UCSF garage and 00hrs7min wait time for Japantown EVC location. She decides to recharge near Japantown at the Starbucks (1501 Fillmore Street) which offers the additional perk of being a wireless EV charging location (powered by WiTricity). When she approaches this location (while waiting at the traffic lights at Geary Boulevard and Steiner Street) her GE GARNET pops a 20% off e-coupon identification number (eCID) for any purchase in Kinokuniya Book Store (inside Japantown mall) valid for 120 minutes. She touches the “share” button coupled with the Facebook logo on the eCID skin on her GARNET touchscreen and shares the eCID with her friends who may be in the area. Her iPhone buzzes in seconds. Her “share” feature is linked to her Facebook app on her iPhone and the eCID from Kinokuniya Book Store is beamed to her iPhone (she doesn’t have to remember the eCID number). Her friend James Bundt uses the same convergence feature of Facebook-iPhone link and she wonders if James might walk over to the store (he is a front office manager at the Kabuki Hotel on 1625 Post Street). James may want to buy washi with the 20% eCID she shared. Seconds later her iPhone buzzes, again. This time Starbucks delivers to her iPhone a Groupon eCID for 10% off any beverage or purchase valid for 90 minutes from the time after docking at the WiTricity EVC at the Starbucks parking lot (1501 Fillmore Street). Just as Eva is driving on to the wireless EVC charging grid (parking lot space with white perimeter) her iPhone buzzes with a Google-Bundle. It contains coupon from competing Peet’s Coffee inside the Safeway Bakery (1335 Webster Street) offering a tall cup of free Peet’s Coffee if you buy groceries in Safeway (1335 Webster Street) for \$10 or more and in addition a handsome 20% off Peet’s Tea gift wrapped boxes if you visit Peet’s Coffee and Tea retail store near Japantown (2197 Fillmore St) in the next 24 hours. The Google-Bundle also delivers an eCID for 2 for 1 movie tickets (limit 4 pairs) for *The King’s Speech* at the Sundance Cinema (1881 Post Street) for any matinee.

Eva is parked on the charging grid and waits for her car to synchronize with charging system from PG&E. In moments the PG&E logo flashes on her GARNET screen. Pacific Gas and Electric (PG&E) flashes a live Avatar (bot) on the screen:

“Hi Eva Green, I am Erin Robotovich.”

ER: Welcome! I found out from BRUT that your car needs a 25 kWh for a full charge. If you charge your battery at this station for a full re-charge then you will receive a 5 cent per kilowatt discount for your next charging session at this station. Please say “yes” to accept or “no” to decline.

EG: Yes

ER: Thank you, Eva. Your VIN has been detected. Verify by touching the RFID button on your toolbar.

ER: Thank you. VIN accepted. Eva we are synchronizing your BRUT. It will take only a few seconds.

ER: Synchronization complete. Your vehicle will be charged with a wireless WiTricity 230 volt charger for 25 minutes to deliver a total full re-charge of 25 kWh. Please say “yes” to accept or “no” to decline.

ER: Thank you, Eva. Your credit card on GE GARNET profile will be charged for \$100. Please say “yes” to accept or “no” to decline” or “other” if you wish to use any other payment option.

EG: Other

ER: You are at station BUCS1501. Your payment options are [1] “cash at station” [2] “credit card at station” [3] “mobile ebill pay code” and [4] “GEMS” (GE Mobile Money System).

EG: 3

ER: Check your mobile phone for pay code and say “yes” if you received it or say “help” if you have not.

EG: Yes

ER: Please press reply and insert your bank details.

EG: BOFA1970

(Reply from Verfiy with Visa : Your payment code is PGEC0070. Resend code to vendor to pay ebill. Your code is valid for 60 seconds.)

ER: Thank you for your business. Payment received. If you wish to sit in your car and use WiFi, please say “yes” or say “no” if you are ready to leave the car. Please enter or exit only when controller light is green.

EG: Yes

Eva switches off the car and uses the WiFi to Skype her friend Vesper Lynd. But Vesper’s desk had a video-note for her to call Google Voice and leave a message. Eva calls and reminds her by voice mail to credit her mobile donation pot at Facebook Foundation which will run the nano-philanthropy collection for Dana Farber Cancer Center on Monday. Then she gets down from the car and walks into the Starbucks. She turns around to see the controller light just turned to red as her vehicle charging commences.

Inside Starbucks (IS)

EG: Hi, how are you? May I please get a Mocha Valencia grande with an extra shot of espresso, hold the froth, dust with cinnamon, please. Could you please blend in a smidgen of non-fat soy whipped cream? Thanks!

IS: Is that all today? (nod) It will be \$4.95. Cash, credit or mobile? Do you have an eCID?

EG: Mobile, please. Yes, I have an eCID, too. Will I read it to you?

IS: Yes, please.

EG: Got it? Is it in your system?

IS: Yeah, it is here. With the discount, it is \$4.45, please. Your ebill code is UR1QTPi

EG: Thanks, so are you!

Eva taps on her GEMS app on her iPhone. In the vendor box she inserts Starbucks unique vendor id displayed on the register (BUCS1501) followed by her ebill code in the next box (UR1QTPi) and finally the amount in the box below. Eva presses send. In moments she receives a confirmation with transaction id and a message box shows her that she now has accumulated 7.007 GEMS credit (that is, she can receive 7.007 cents off per kWh if she charges her car at any GE EVC location in the continental USA or she can gift her GEMS credit to anybody on her Facebook or LinkedIn network).

IS: Thanks, Miss Eva Green. Enjoy your Mocha Valencia.

Eva walks toward Kinokuniya Book Store and tries to figure out what she needs to take with her to Albert's dinner part, later that weekend. Albert loves broccoli, she thinks. Why don't I make him a grand serving of beef and broccoli stir fry with ginger and spring onions? She taps on a cooking app on her iPhone and Julia Childs inimitable voice welcomes her to the app. She plugs in the key ingredients (beef, broccoli) and receives 18 suggested recipes. She quickly browses and sees one with House of Chiang sauce. That's the one she will make. Albert's party is for about 10 people. She decides to pick up the groceries three days later (on Friday) for the party on Saturday. She taps on her iMAY app and selects Andronico's (1200 Irving Street) to send the grocery store a pre-alert that she "may" buy her ingredients from the recipe list which uses the House of Chiang sauce to make a beef and broccoli stir fry serving for about 10 people.

"Hi" – Eva looks up and there is James at the door of Kinokuniya. "Hi James, thought I would see you here!"

iPhone buzz. Andronico's delivers to Eva a 10% off eCID valid on Friday if the items bought in store on Friday include 2 lbs of beef and a bottle of Chianti or Valpolicella.

Eva says to James, "Going green really pays back. I get good deals. Micro-savings keep flowing to me all the time. I guess vendors are cashing in on micro-revenue, too. But, I still want to buy an A123 Systems charger for charging at home."

James It is far more convenient and I can monitor using a GE wireless sensor network. I bought a car charger from GE. But these e-coupons are great for vendors, they are earning micro-payments and saving on transaction cost.

EG So, James, how have you been?

James Great. My check-up was yesterday. I exchanged my Google Nexus S phone for the Google Nexus SM phone!

EG What's the SM?

James Same phone but with a built-in photoplethysmograph. See, how it records my heart beat and blood oxygenation level among other things. It uploads to the net via BlueTooth or WiFi or when I am connected it sends the data as a SMS to my cardiologist Dr Elyse Foster at UCSF School of Medicine. She is an expert on ischemia.

EG Is this because of your parents? (iPhone buzz) Oh! Here's my Mom on Facebook – she is in Harrod's!

James Yes, Eva. Although I am young I have a history of coronary heart disease. Dr Foster recommended eHealthRT so that she knows what's going on with me at all times. As many as 3-4 million Americans have ischemic episodes without knowing - silent ischemia. It could be deadly if I land up in the ER but with real-time eHealthRT monitoring hopefully I won't be that ER statistic.

EG You are right. I should do the same with my blood sugar. My Mom has severe diabetes and my granny had glaucoma. You have inspired me to use preventative practices.

James My colleague in Boston uses a remote glucose nano-sensor system and his blood glucose is uploaded via WiFi to his MedicalVault service at Mass General, round the clock. If his doctor senses anything wrong, he will be alerted, without any cost to the out-patient system or nurses or lab test for glucose.

EG Send me the link. I will get one. James, is this the same Secret Garden Tea House which is on Lincoln?

James Yeah. Kinokuniya struck a collaboration. Want a cup of tea and some crumpets with clotted cream?

EG Lovely! Imagine what a jolly good surprise – clotted cream and crumpets with Earl Grey tea!

James Please could we have a pot of Earl Grey and some cucumber sandwiches, crumpets, marmalade and clotted cream, please? Please heat the pot with hot water before steeping the tea. Warm cups, please.

Host Of course. That will be 22.90, please. I see you have a link to eHealth, should I enter 2? What is this?

James Yes, please. eHealth tracks my diet, food, groceries to keep me health-aware and track my wellness.

EG You are astute! Many people don't know how beneficial health prediction could be! (iPhone buzz) OK, that's perfect. I have 15 minutes before my charging is complete.

James Let's enjoy the tea and here's to real-time alerts for car chargers and remote health monitoring!

EG And to the digital life style conveniences made possible by Lifestyle Systems! (iPhone rings)

EG Hi Randi, how are you? Yes, you can change Monday's banner to MSF but Zuck needs a clip for MSF. OK, I will prepare a script and get a video clip with Zuck for MSF this afternoon. Bye. Sorry James, had to take this call.

James Is this your nano-philanthropy banner for the Facebook Foundation?

EG Yeah. It is great. Randi and I are really making it happen. By the way, this tea is really good!

James Who is your co-worker, Randi? Which organization is MSF?

EG MSF is Médecins Sans Frontières also known as Doctor's Without Borders. Randi is Zuck's sister.

James Randi Zuckerberg is Mark Zuckerberg's sister?

EG Yes. We have Zuck's attention on this project. It is really his personality that drives the success.

James But this was your idea, wasn't it?

EG Yes, I read about the suggestion in 2006 in a publication from the Government of Finland. The guy proposed using highly visible sites like Amazon to do the same as we are doing now with Facebook. It is just that we have more visitors but the original idea came from that article which was written by this guy from MIT.

James Would you please explain what is this idea? I think I know the basic theme but please explain. More tea?

EG Yes, please. Thank you. The idea is really simple. Zuck has a banner space on the Facebook log-in page. As soon as you log in or opens up he comes on and says ... wait ... why am I paraphrasing, here it is hear what Zuck says:

(EG opens the Facebook page on James' new Google Nexus SM and the video clip starts)

*Hi, I am Mark and welcome to Facebook. I am sorry to take your time and if you wish to skip this message please close the box. Thanks for not shutting me out. I appreciate it. To summarize, I am requesting you for your help. Each day Facebook chooses one worthy organization and we advertise on our site. Today we are hosting the Imperial Cancer Research Fund. Please donate one dollar or more using PayPal or GE Mobile Money or SONY Cash or deduct from your Facebook Foundation piggy bank. Help us to help the world through micro-philanthropy. Thank you for your contribution. If you click on the banner you will find out more about Imperial Cancer Research Fund and how to donate or how your money goes directly to the charity or organization.*

*I have more to say but if you wish to close the box, please feel free. I want to explain why I may be annoying some of you by requesting your help, every day, each time you log-on. We are here to connect people to friends and family. We are here to have fun but also to be responsible and caring as individuals. You have made it possible to create a country, Facebook, which has a population of over 500 million global citizens. We are the 3<sup>rd</sup> largest country, after China and India. Our population will soon exceed that of China and India. We will be the largest country in the world. As a global leader we have responsibilities. Your action today, contributing one dollar or equivalent in your currency of choice, is a part of that responsibility. It is part of our responsibility to share our good fortune with others, help in the progress of humanitarian values, improving the quality of life and building a better future for the civilization yet to arrive. Nobody can accomplish this task alone. I cannot. I need your help. I have agreed to donate half of all my fortune to philanthropy. I always wanted to do something good. I am fortunate that with your help we can all contribute to that process. Please spread the word to your friends and family, please ask them to join Facebook and log on to Facebook and contribute one dollar or equivalent, if you wish, to the organization of the day. Each day we will feature a different organization or global charity. Each day your help will count. Each day your generosity matters. Thank you for your time and support for Facebook.*

James That's remarkable, Eva! If 10% of 500 million Facebook members donate only one dollar then the charity or organization will reap 50 million dollars from a single banner on a single day with a couple minutes of video message from Mark Zuckerberg!

EG You are correct, theoretically. But at Facebook, we have a transaction cost to execute this activity 365 days a year. We keep 1% as cost, which means, the charity will get 49.5 million dollars and Facebook gets \$500,000.

James Are you saying that by enabling micro/nano philanthropy through this banner, Mark Zuckerberg has increased Facebook's earning potential by 182.5 million dollars per year simply by collecting a dollar from members?

EG Correct, again, theoretically. But you are assuming that every Facebook member donates one dollar every day. That may not be the case because that means all of our 500 million members are donating 365 dollars per year.

Eva's iPhone rings. It is Vesper Lynd. "Hi, I am having tea with James at Kinokuniya. I am good. Yeah, upload your wallet at the Facebook Foundation. No. We are changing Monday to Médecins Sans Frontières. UCSF could be pushed to Tuesday. Yes, they did. They received \$100 million from the founder of Sales Force. Yeah. Ciao!"

James I see. OK. Let me be conservative and say that 10% of Facebook members, that is, 50 million individuals, create a 100 dollar pot each year and they dip into it when they wish to donate to the charity on the banner. Fair? In that case, for organizations, Facebook helps to raise FIVE BILLION dollars each year and Facebook also earns 50 million dollars simply by facilitating a banner ad each day!

EG It's incredible what nano-philanthropy can accomplish with nano-contributions from Jane Doe. I prefer to apply the 80/20 rule, where 80% gives \$1 once a year but 20% donates \$1 each day. Facebook earns \$369 million a year for placing banners and helps to raise \$36.9 billion for the organizations that Mark chooses to sponsor.

James If I am Mark Zuckerberg then \$369 million may be chump change lying around in my car's glove compartment but imagine the good he will do for those organizations and charities which could raise millions, **IF** he supports.

EG Yes, that's the key. It is really Mark Zuckerberg putting his neck out and saying, hi, please donate to this cause.

James Who is your competitor?

EG **(LOL)** Competitor? There is only one Mark and only one Facebook, soon to be the largest country in the world!

James Bookians or Bookanese?

EG Zuckerians!

James Good one. Thanks for your lovely company and a scintillating view of the mega-world of nano-philanthropy!

EG Thanks, James. Let me turn on my washing machine before I forget (Eva takes out her iPhone).

James You subscribed to the GE Connected Sense! Great service. I can "sense" gas leaks, find out how much I spent this morning using my dryer or check my car battery charger status or turn on ac. All GE appliances are on i-skin.

EG It is Cisco's IPv6 under i-skin but it is great for energy optimization and my Mom uses it for health monitoring.



Later that evening, in her apartment, Eva Green pulls out her Xoom tablet and starts blogging @ EvaGreen.blogspot.com

Interactive-skin aka i-skin is gaining an ardent following and will prominently feature in the State of the Union address by President Barack Obama who will use its functionality to claim that the White House helped Americans by driving the rapid passage of the Resource Management Act (HR 2011) aka “waste control bill” which stimulated innovation, helped the economy and saves money for hard-working families. President will use this instance to demonstrate that “big brother” sometimes must step in and take the initiative before the market starts to lead.

Hence a discussion of the Resource Management Act and i-skin is well worth my blog. HR 2011 focused on reducing “excesses” in terms of petroleum and food. This Act mandates the introduction of higher fuel efficient vehicles by 2013 which will save an estimated one-third of the total fuel consumed by automobiles in the US. While some critics even warmed to the “big brother” syndrome in the government control over fuel consumption, most critics vociferously objected to the “big brother in your home” perception conveyed by the President’s second theme in HR 2011 - to reduce wastage of food. Currently, 26% of all food in the US land up as garbage. The bill calls for innovative use of analytics to determine demand, replenishment and perishability to control food items in US homes and coordinate that data with the food supply chain to better forecast or adapt inventory. The White House took clues from a little known suggestion made in a sub-section (section 5) in a book chapter published in 2004 (<http://dspace.mit.edu/handle/1721.1/41908>). C J Cregg, White House Press Secretary reminded the press and the obstreperous critics that in the 1920’s the government had to use law enforcement officers to pin-down adults in order to vaccinate them against chicken pox. What was then slammed as a civil liberties violation has morphed over time as a healthcare right that citizens demand from the nation for all citizens (in the US) to prevent recurrence of chicken pox, which is almost eradicated due to government intervention for greater good. It is one for the history books to determine if this bill (HR 2011) to reduce wastage of food through better coordination may fall in the same category of global public good.

i-skin is the proposed tool and the trinity of co-innovators are Whirlpool, GE and Cisco. GE wishes to move away from dumb appliances. Bill Ruh of GE wants a make-over of appliances and embed intelligent software as a service on the “skin” of the appliances that millions (billions) touch everyday in order to mine analytics. While, John Chambers of Cisco wants a better legacy than merely a plumber, albeit, plumber for the internet and indeed a plumber extraordinaire. OmniPresence is the new Cisco mantra which wants all things you touch to be with you or within your reach at all times, as best as possible. With the phenomenal ability of IPv6 to provide unique IP addresses, the internet can now connect million fold more data and Cisco wants to be the grande connector.

IP on everything is also the chant of Vinton Cerf, the father of TCP/IP. Look at Vint’s Facebook photo and observe his pun with IP (**I pee**) on everything (now he is at Google). It blends well with proceedings at MIT which includes Sanjay Sarma’s “Internet of Things” and Raffi Krikorian’s PhD thesis (leading to IP on all electrical switches at Neil Gershenfeld’s Center for Bits and Atoms). However, identifying everything uniquely, although necessary, is not sufficient, because, data is **not** information. Identifying information and extracting the knowledge required to execute an actionable transaction is the preferred outcome. “Learning” the outcome for a future “intelligent” decision support is an additional layer. For the latter, it may require convergence of IPv6 with semantics or the semantic web, a nexus still steeped in deep quagmire (<http://esd.mit.edu/wps/2007/esd-wp-2007-17.pdf>).

On a pragmatic level, Whirlpool's former executive Reuben Slone often wondered how to make the "skin" of appliances more useful in a manner that utilizes the vast external surface area, for example, the ubiquitous refrigerator. A meeting of minds produced the i-skin which extended the suggestion published in 2004. Generally, speaking i-skin is a service which can be adapted for use on almost anything with computing-compatible surface. It can be also accessed by any "surface" including PDA, iPhone, iPod and ERP systems such as SAP R/3 or healthcare software (Epic Systems, etc).

The i-skin in this blog will highlight food waste reduction usage. The refrigerator is probably the most common kitchen appliance globally used for most matters pertaining to food. Users of i-skin will belong to a specific group and we make certain assumptions which may not be globally applicable but applicable in the industrial world. One assumption is that many items we store in the refrigerator has a barcode and perhaps may have a RFID tag in the future. The i-skin serves as a "gateway" to manually enter or capture when presented (deliberate data input) the items you place in the fridge. If you are in the grocery store and do not remember whether you have milk in the fridge, you can query the fridge on your iPhone and your i-skin on the fridge surface will inform you that you placed a gallon container of 2% low-fat milk two days ago in the fridge. You may have taken out the carton umpteen times over the two day period but i-skin does not capture that data unless you configure the 'mode' of data capture. One may deduce from the basic data whether you still have sufficient milk in the carton or if it is better you pick up another carton of milk.

Similar deductions about item usage may be made by your local grocery store if they have the information that you bought a gallon of milk two days ago and your usage pattern. Analytics may forecast the probability that you may need another carton of milk on day three. This forecast may improve in accuracy with repeated data logging and refining the parameters (for example, eggs and toast on weekends for breakfast) that drive the data mining applications which may use artificial neural networks (ANN) as a part of the analytical software. The data collection may operate on multiple complimentary levels. First, the store relational database may connect the customer with the SKU of the item (assuming customer uses the rewards card). Second, if the refrigerator content data is permitted to be uploaded to "the cloud" (<http://senseable.mit.edu/wikicity/rome/>). As a part of the latter, the customer may feed the store receipt to the i-skin and the purchased products may be uploaded to the refrigerator (miniDB) inventory on the i-skin. Aggregated cloud analytics may forecast the demand for food products by zip code. The shared data may be used by retailers to optimize inventory hence reducing wastage, albeit, in part, that is, it excludes food wasting habits of people who are chronically insensitive to excesses. Customer driven aggregation of usage habit is also key to Amazon.com Subscribe & Save service.

Critics of President Obama's HR 2011 have issues with cloud data acquisition from individual users pertaining to their personal food purchases but the White House argument gains strength from *Pox: An American History (Penguin History of American Life)* by Michael Willrich. In an interview on BBC, Mr Josh Lyman, the White House Chief of Staff, said that it may be time for "big brother" to intervene in order to reduce the excesses of food wastage and rein in the 26% of food that fills our landfills when half of the world's 7 billion people are struggling on less than \$2 per day ([www.prb.org](http://www.prb.org)) and one child dies every five seconds due to hunger-related causes ([www.bread.org/hunger/global/](http://www.bread.org/hunger/global/)).

Social discourse aside, the fact is that Cisco's capability of uniquely identifying information using IPv6 coupled with GE's intelligent i-skin analytics and the usability of Whirlpool's surface computing capabilities based on MIT's "sense table" provides the necessary convergence of innovative tools to implement the President's policy as outlined in HR2011. Additional evidence that the technology can actually work may be gleaned from Google's Gas App (*gasup*) which you can download from the Android App Store. It enables you to visualize the gas prices in any area in the US and Canada. It uses a camera on the gas price sign of gas stations which uploads the gas prices as advertised while GPS coordinates the location and embeds it on Google Maps. Now you can survey your area of choice on your Google Nexus phone and drive to the gas station either by preference or by price. In the new line of refrigerators that GE and Tatung will soon market, there is a mobile camera inside the fridge (on a grid that can crawl anywhere you want to visit) and can show you on your iPhone what is in your fridge even if it lacks a barcode or if you forgot to enter the data on i-skin or if it is a case of (remaining) quantity or volume that i-skin may not capture. It makes my skin crawl just to think about it. Doesn't it?