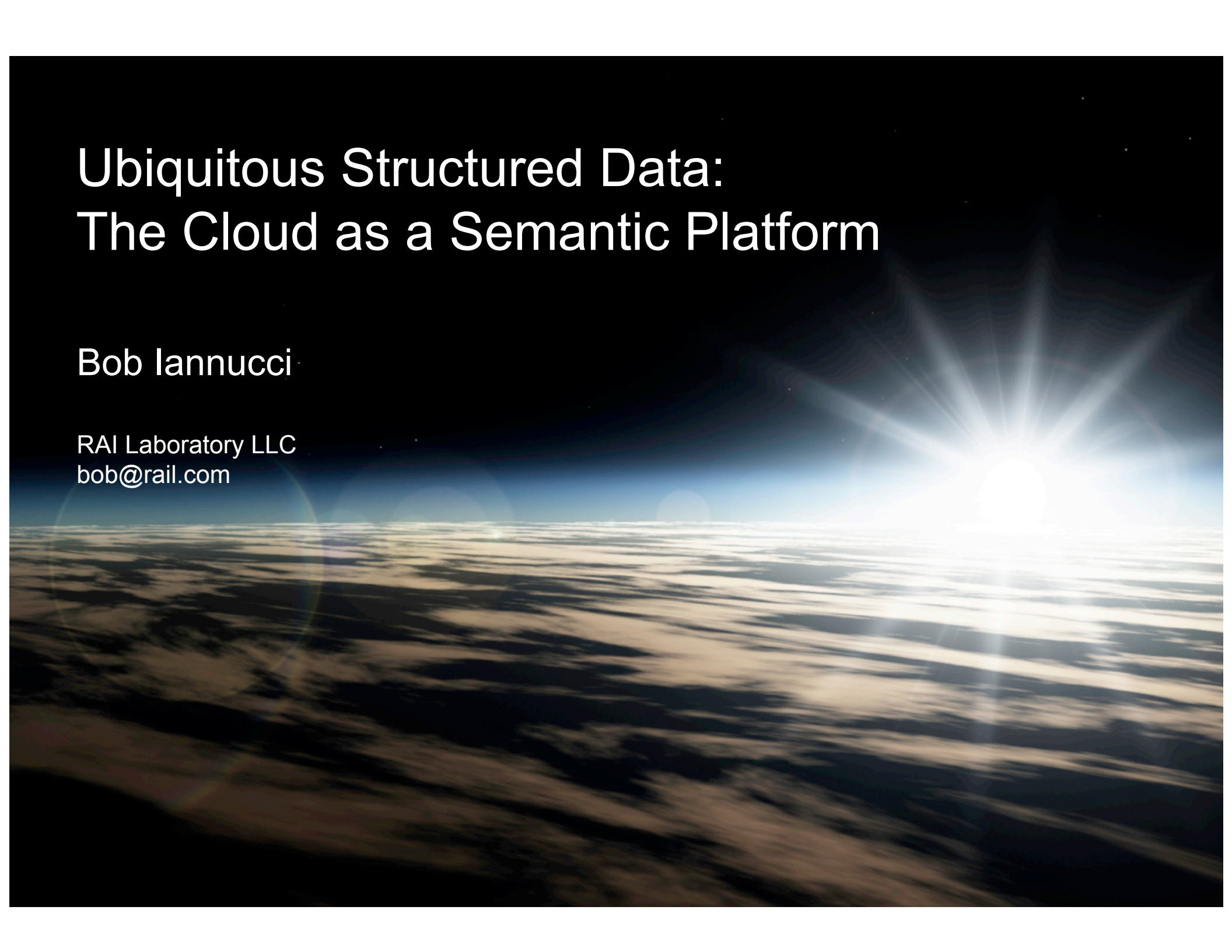


Ubiquitous Structured Data: The Cloud as a Semantic Platform

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The Cloud is the Great White Hope

(So to speak)

Massive problems remain untackled

- Little thinking about how the cloud integrates with devices
- Less thinking about how people will be able to conceptualize it
- Even less thinking about how developers will be incented to invest

The root of the problem goes
back to device UI



Observations, Motivation, Principles

- Simplicity and fitness for purpose are more important than features
 - The N95 & N97 crush the iPhone in capabilities, but iPhone is loved and admired
 - However, all current phones including iPhone, are a perpetuation of what is wrong
- Use concepts must remain constant – across phones and services
 - Based upon natural human dispositions, making them future-proof
 - Current user experiences present information in ways that don't match how people organize information in their heads
 - We have not been consistent – mixed metaphors in different applications
- Presentations (what we see) and input modalities will keep evolving
 - Significant change will come in the next five years
 - Our model needs to be able to evolve virtually infinitely
- The industry flourishes when there is a standard platform
 - Many different programming metaphors and core services across models and manufacturers discourage developers



Start Over at the Concept Level

Humans Are Relational

- This is reflected in how we named ourselves in simpler times:

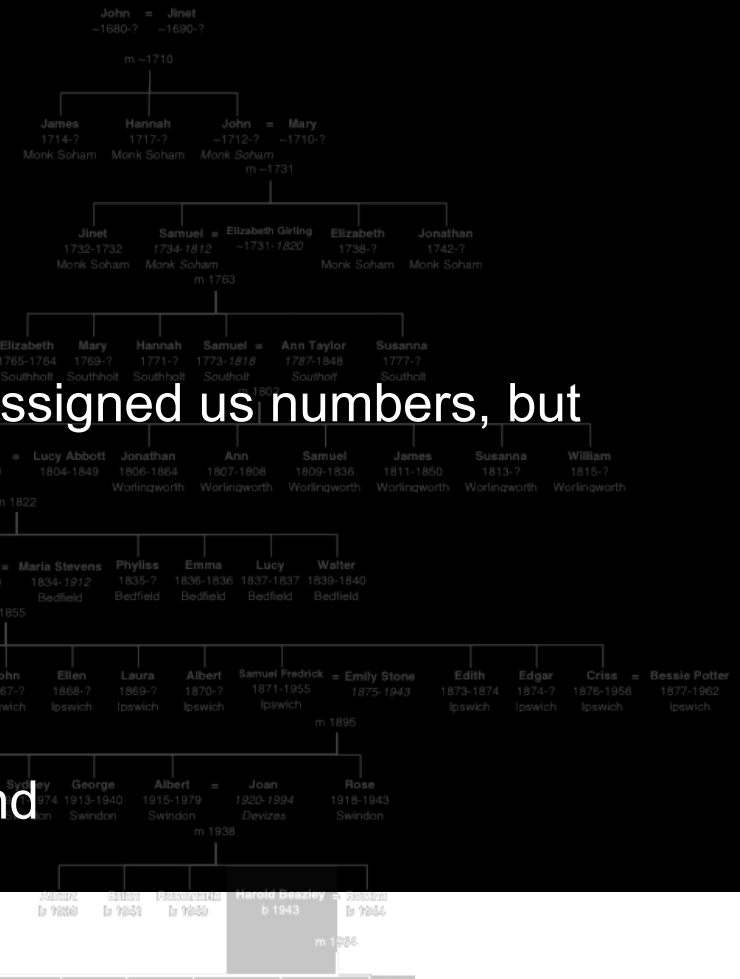
- What you do
- Where you live
- Who / what you are

...we all instinctively resist becoming a “number”

Technology has helped, and hurt

- Telephones removed face-to-face conversations, assigned us numbers, but gave us convenience
- Email vanquished the handwritten letter
- ATMs took the personal banker out of the equation

We need to reverse the trend



Unifying Approach

- Consistent application of the noun-verb style
 - Select an object and then perform an action
 - Application-less, more human, less “computer”
- Consistent use of one common data-structure, the “Social Graph,” in all devices and for all services
 - Precisely captures the noun-verb metaphor
 - Forms the basis for the look-and-feel concept we seek – this is what we govern
 - Extensible and future-proof
 - Facilitates innovation of presentation and modalities
 - Can be made open while preserving proprietary presentation styles
- A way to extend that representation across users, across phones, and into the cloud

Review: Noun-Verb style

- Nouns represent people, places and things
 - Often called “objects”
- In the context of user interfaces, verbs are actions that can be applied to nouns
 - Some are fairly specific (*Call* a person)
 - Some are more generic (*Cut/Copy/Paste* apply to all objects)
- The order is important in establishing the feel of the interface
 - Verb-noun order is the classic “application” UI: *Send SMS*, pick the recipient
 - Example: verbs that operate on music only appear in the music app
 - Noun-verb order is, in a strong sense, application-less: Select from a list, *delete*
 - Selecting an object brings up a list of the things you can do (the verbs)
 - Phone UIs are a mixture of verb-noun and noun-verb
 - Leads to confusion and frustration
- Arguably, noun-verb is more natural because it more readily matches the way people think about the world
 - Verb-noun is easier for programmers
- Even though noun-verb style is application-less, it is highly extensible

Message



You receive a message from an old college friend.

Contact



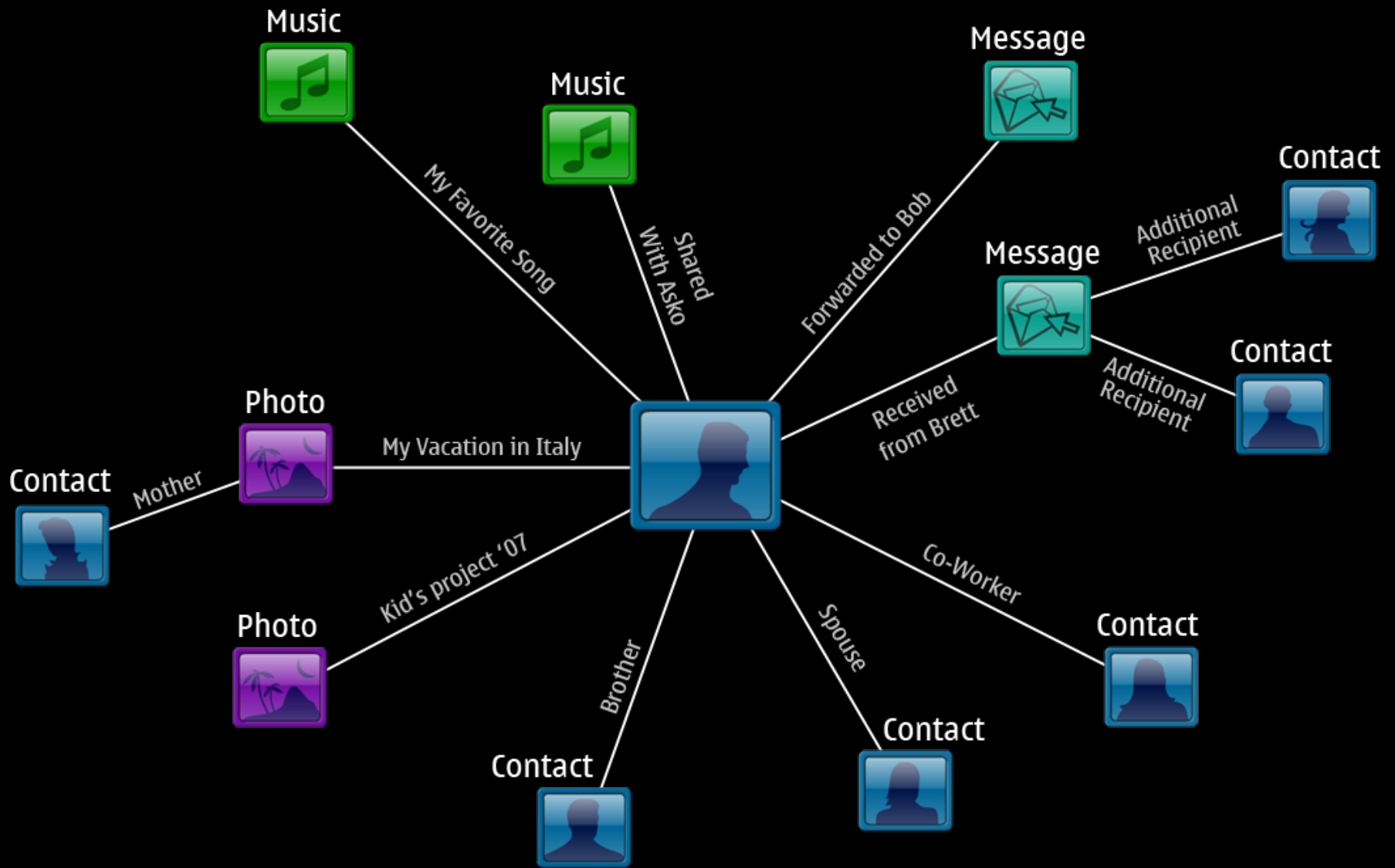
You add them to your social network

Event



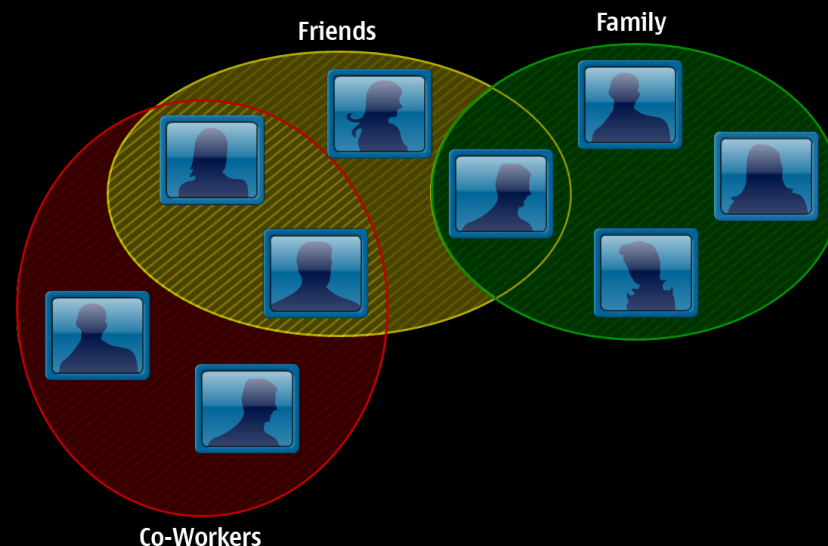
Respond with plans to catch up over dinner

The Social Graph and the Rise of Facebook-Like Sites
























But Facebook & Open Social Are Not Enough

- Sharing of information raises privacy issues
 - The SG framework allows for one consistent approach to grouping and protecting information that is related
 - *Security contours*
- Linking information across devices and to the cloud can be done economically and intelligently using modern techniques
 - Information signatures to detect changes to aggregated data
 - Local caching of remote information
 - Pre-fetching based on user activity (anticipating)
 - Summarization and intelligent compression to minimize bytes transferred
- Open extensibility essential
- Hosting needs to be a self-sustaining business – neutral, auditable



Whither The Standard Mobile Platform

Evolution of the Computer

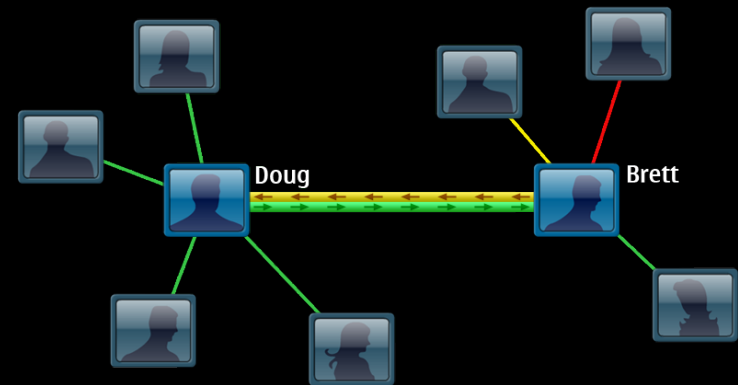
<p>► Mobile</p>					
<p>► Desktop</p>					
<p>► Mini</p>					
<p>► Mainframe</p>					
	<p>Golden Age</p>	<p>Standard Platform</p>	<p>Buildup of Compatible Hardware</p>	<p>Value Shift to Software</p>	<p>Value Shift to Services</p>

Iannucci

Thinking Bigger

One Global Graph to Rule Them All

- With more devices live-linked, the value of the SG grows according to Metcalfe's law
 - Value grows as the *square* of the number of users
- If opened, the global SG could become the *standard mobile platform*
 - Extensible
 - New noun types that leverage existing verbs
 - New verbs that expand the usefulness of existing nouns
 - New relationship types
 - Service oriented
 - Provides a very powerful framework for data-mining
 - Why? Structured user data is much more informative than raw user data
 - Service delivery can be highly tailored
 - Has the potential to shield developers from some device-specific coding
 - Web-aware
 - Matches the evolution toward separation of data and representation and has the potential to *accelerate this transformation*

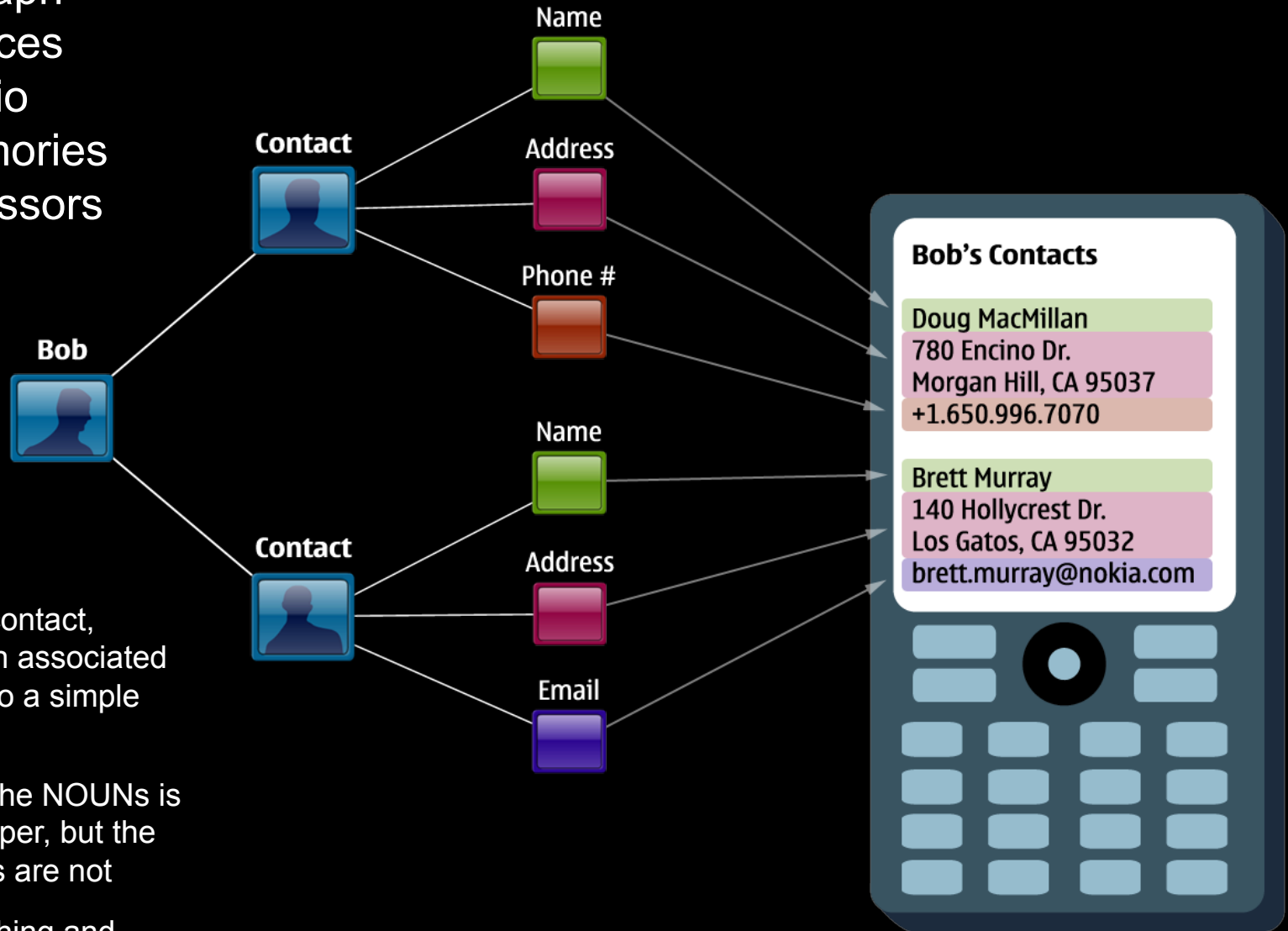


Powerful Possibilities

Thinking Smaller

- If the on-device information is organized as a SG, can SG browsing (in a simple way) be done on even very low end devices?
 - Answer not known but strong sense that this can be done
 - Clear value in expanding the base
 - Developers: one set of information sharing metaphors across the industry BUT...
 - ...The tools that enable such a programming style MUST respect the “3 Watt Limit”
- The SG may provide a framework for extending the reach of our devices to wireless sensor networks
 - Services that reach through devices to the sensors beyond

Mapping the Graph
onto 3 watt devices
with anemic radio
links, small memories
and small processors



In this example, each contact, which each has it's own associated NOUNS, is mapped into a simple address book UI

Visual presentation of the NOUNs is up to the phone developer, but the semantics and the links are not

Problems to solve: caching and memoization, coding/representation, synchronization, offline access

One Graph

Many Possibilities

- Aggregating massive data sets in real-time
 - User's interests
 - Patterns in behavior and movement
 - Collection of environmental sensory data
- Empowering users to reclaim their personal data
 - Constructing an open marketplace where users can reveal as much of their data as they desire in exchange for benefits or compensation
- Surfacing hidden connections

Surfacing The Unseen

Who Will Architect This Cloud?

No Single Entity

The answer is unclear...

- A standards body won't be it. Too slow, too trailing.
- One company by fiat? No way.

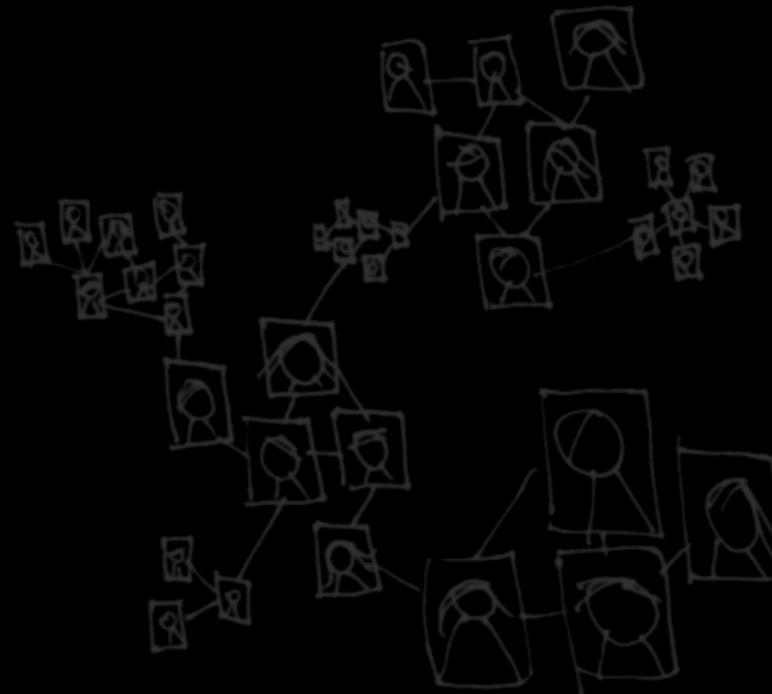
Privacy and security demand a radical new model for data

- 100% user owned and controlled
- To be locked up, used, loaned, or sold, by the user as they see fit in an open marketplace
- What industry players already have portions of this solved?
- What new business opportunities does this generate?

Summary of the Concept

We propose a new application & data framework focused on simplicity, consistency and fitness for purpose that becomes the Standard Mobile Platform

- Clearly separates presentations (what we see) and input modalities from the concepts that the user needs to know
- Embodied in a Global Social Graph
 - The fundamental concept of noun-verb style
 - Extensible
 - Combines an on-device and a services UI point of view and blends them seamlessly



Challenges ABOUND

How will...

- we structure this data in a way that people will be able to conceptualize it? Make it “human” and natural?
- data migrate and update across these distributed systems?
- these devices cope with semi-connected environments?
- we insure privacy and security in such a dispersed data field?
- devices get smart enough to determine if it is optimal to process onboard or in the cloud?
- we create a true flexible marketplace for individuals’ data?
- we incent the developer community under this model?

We can't solve problems by using the same kind of thinking we used when we created them.

– Albert Einstein