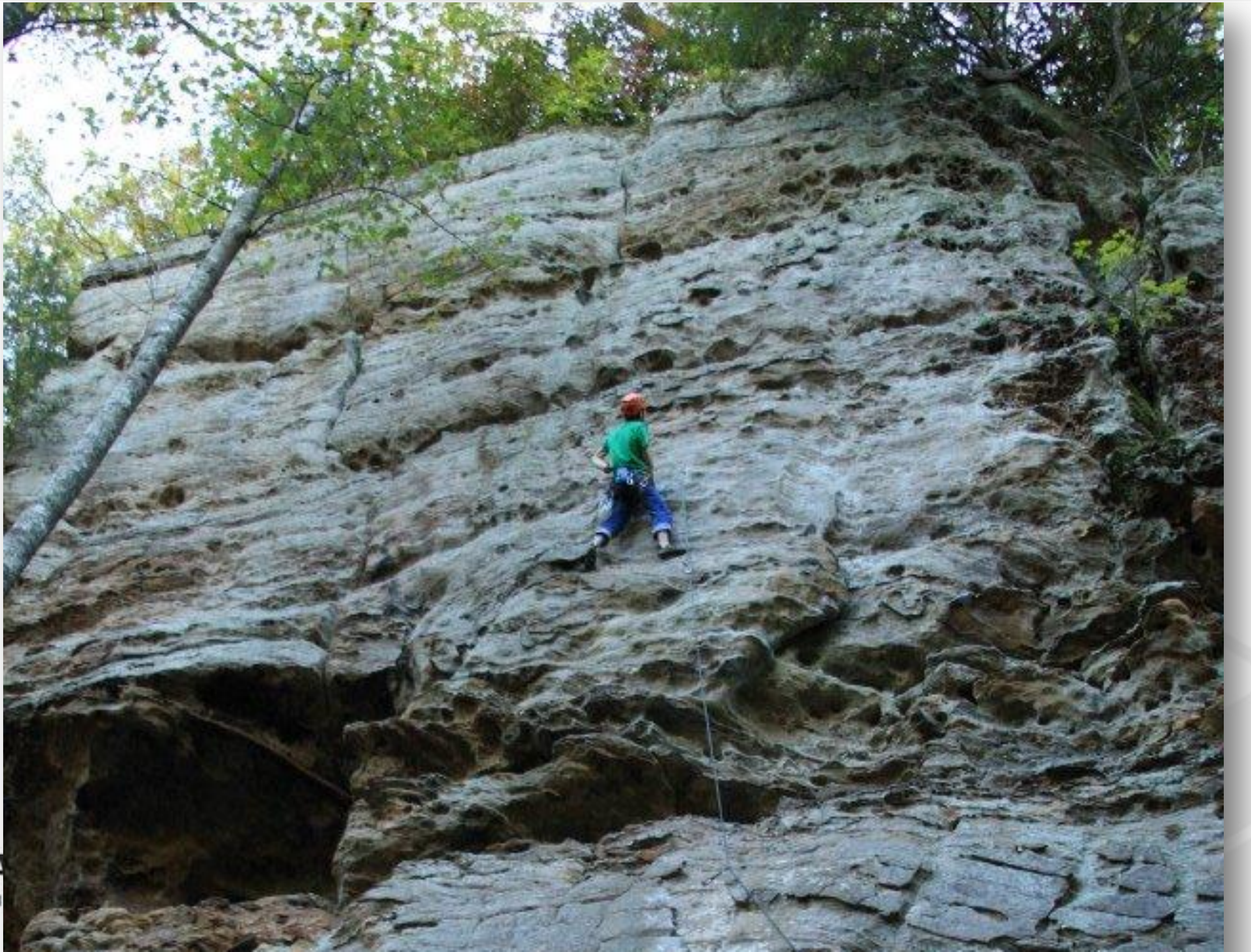
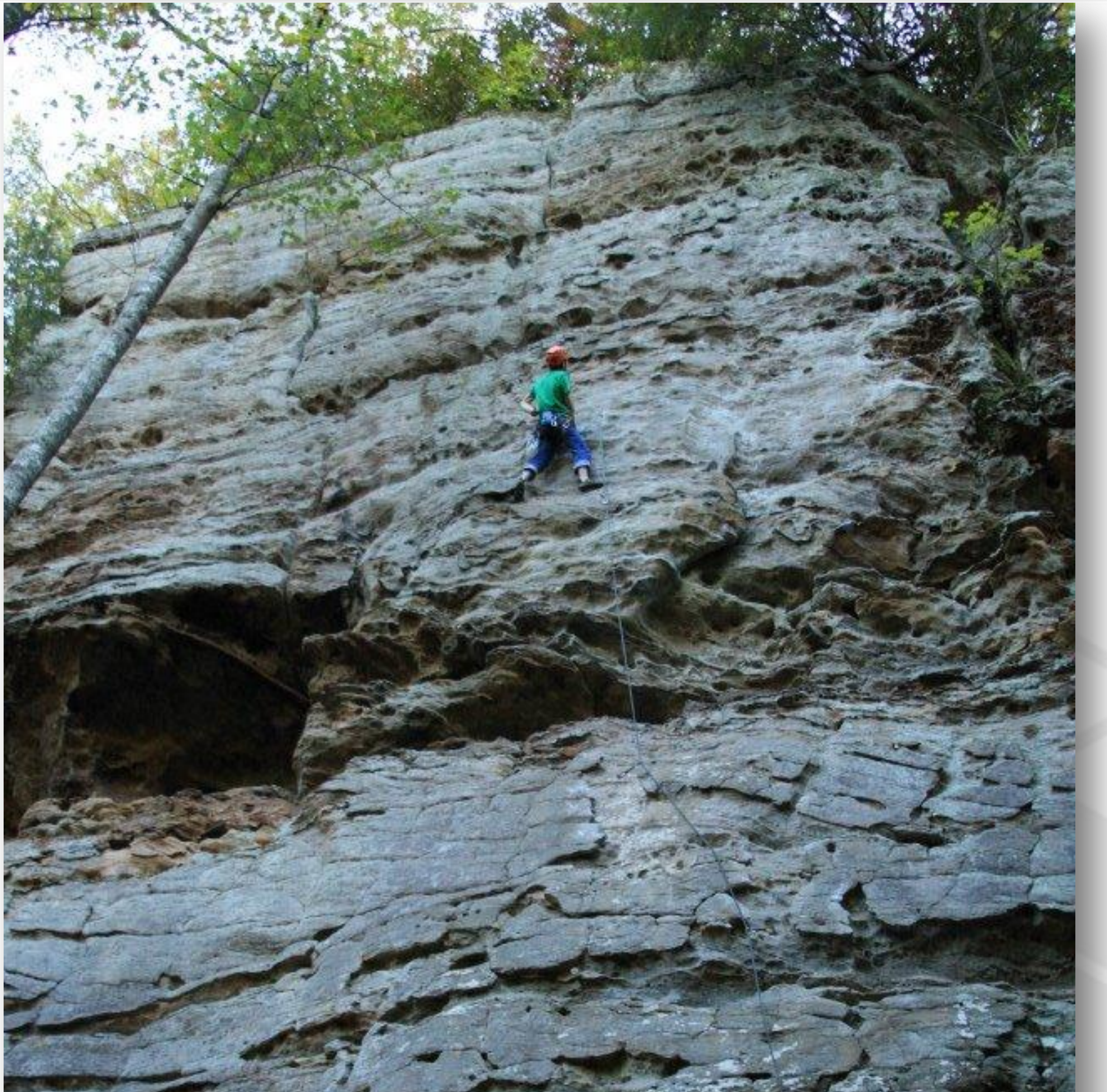
SOA and APIs:
Fearless Lessons from the Field

Mike Amundsen
Principal API Architect
@mamund

Fearless

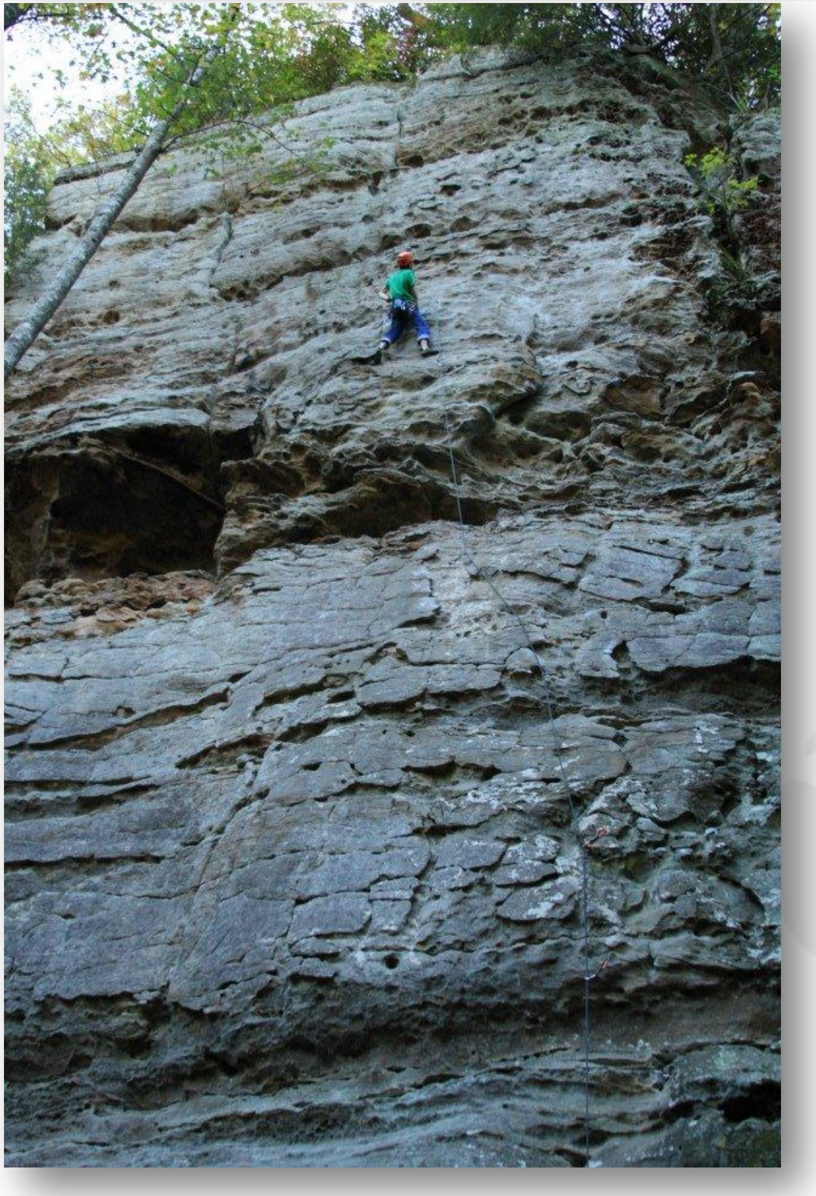


Fearless



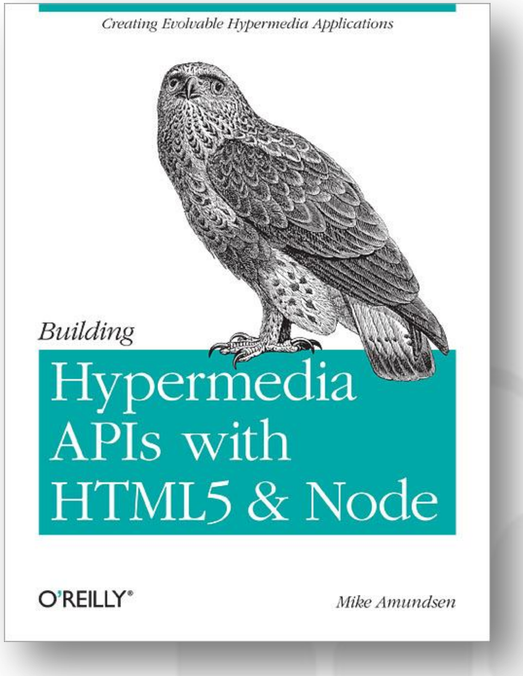
LAYER 7 TECHNOLOGIES

Fearless



Mike Amundsen

- Architect, Developer, Presenter
- Hypermedia Junkie
- Principal API Architect for Layer 7
  "Help people build great APIs for the Web"
- Personal Mission
  "Improve the quality and usability of information on the Web."



Creating Evolvable Hypermedia Applications

Building Hypermedia APIs with HTML5 & Node

O'REILLY®

Mike Amundsen

THE CHALLENGE

More Devices

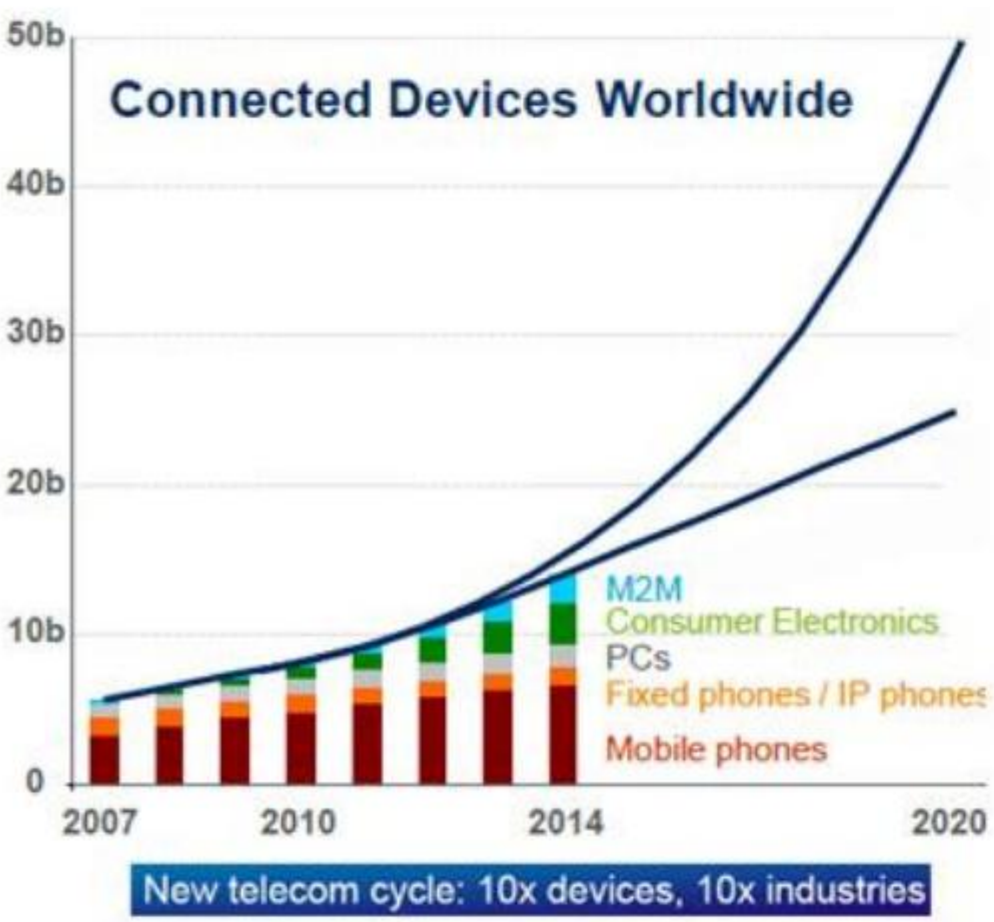


Figure 1: From Ericsson : 50b devices by 2020

More Apps

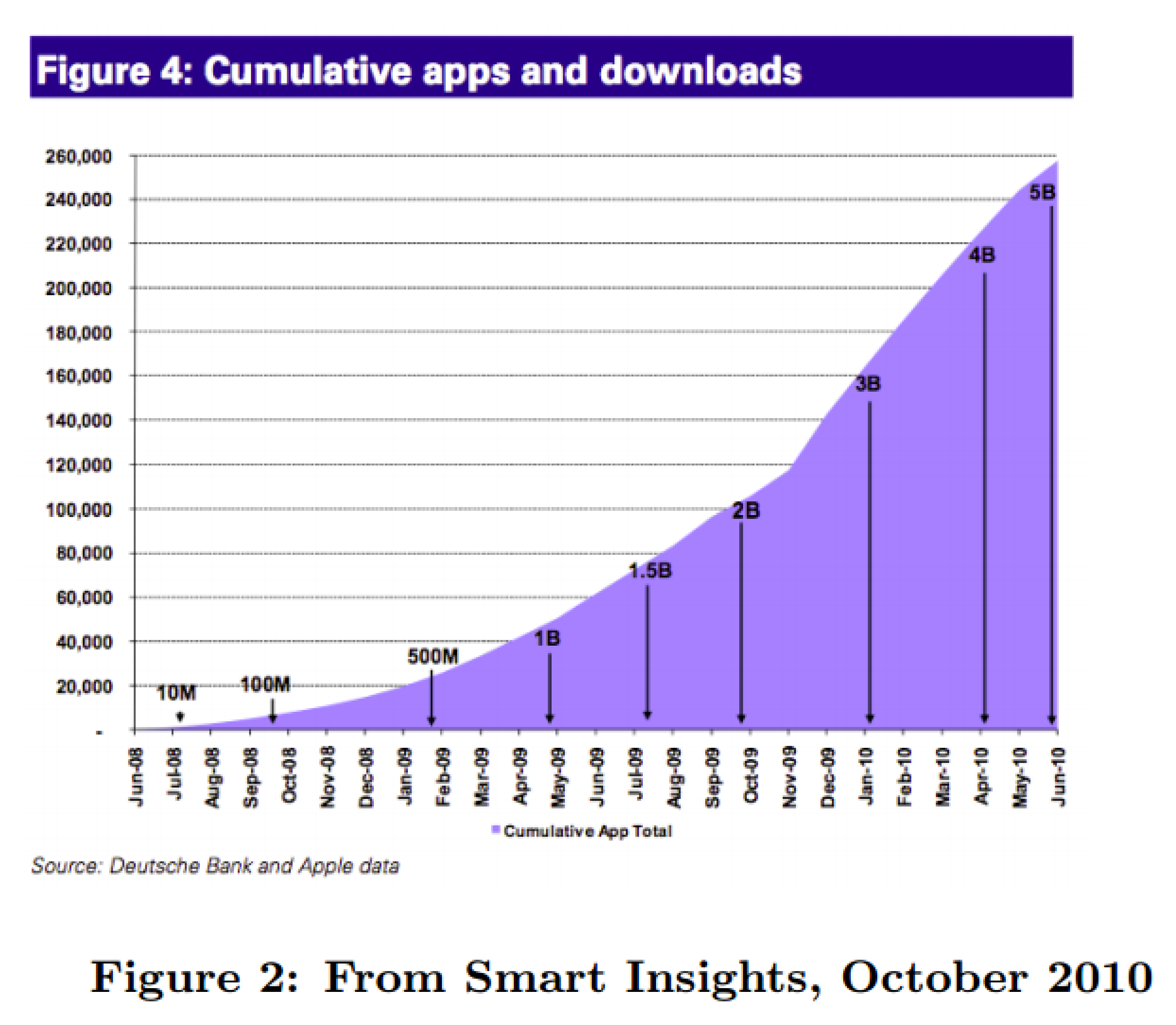


Figure 4: Cumulative apps and downloads

Source: Deutsche Bank and Apple data

Figure 2: From Smart Insights, October 2010

More APIs

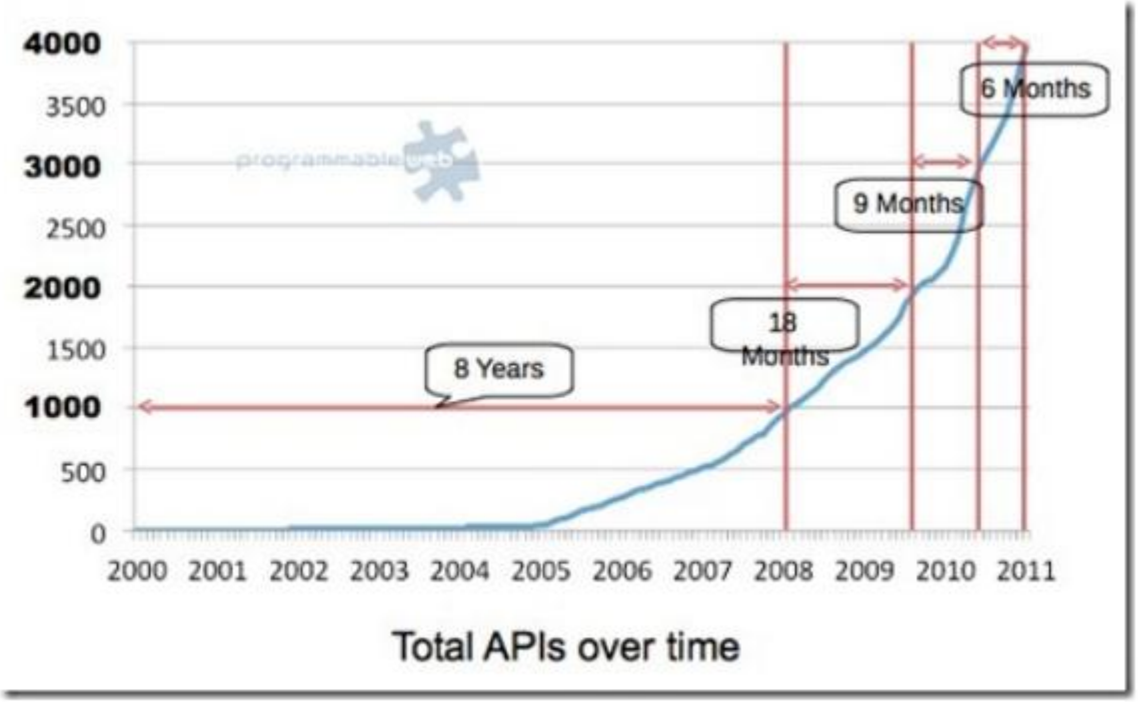


Figure 3: From the Programmable Web

The Challenge

Mobility

The Challenge

Agility

The Challenge

Mobility = Agility

The Challenge

Increase Agility

The Challenge

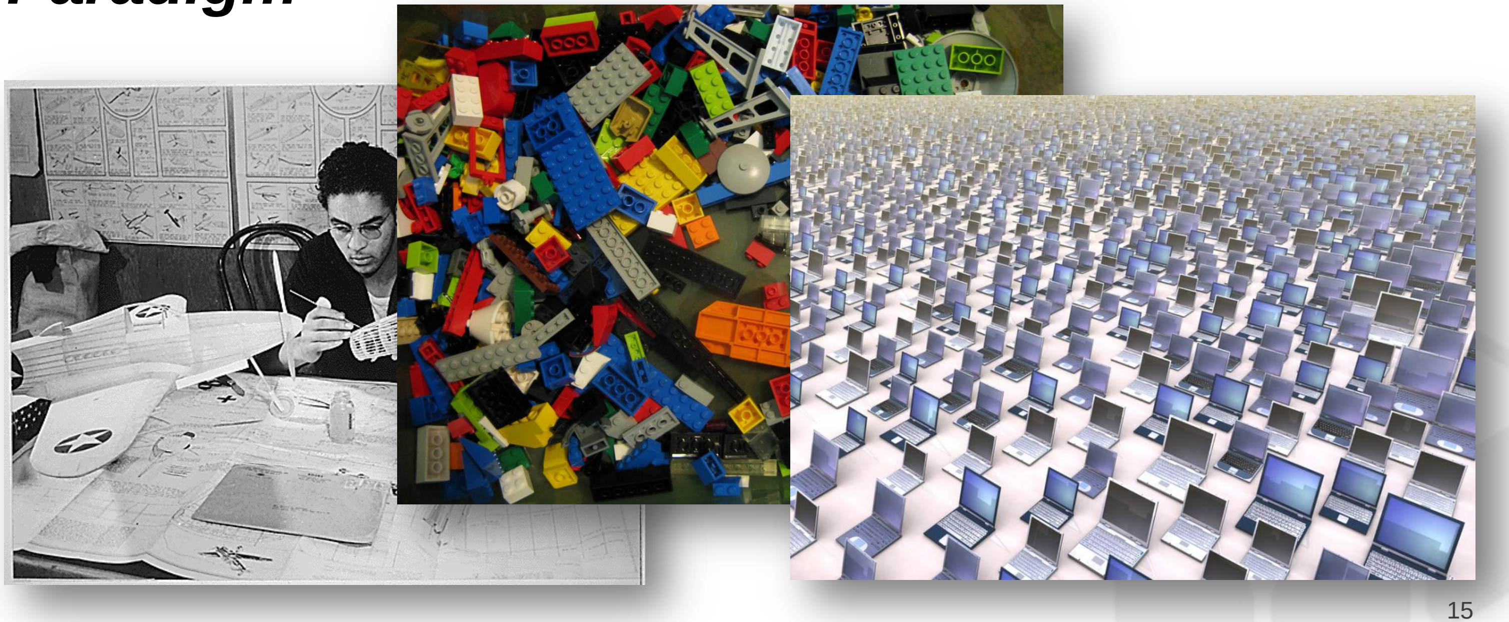
Maintain Stability

Lessons from the field

- Models and tools
  REST and Hypermedia

- Broad Experience
  SOAP, CRUD, and Hypermedia

- High-level View
  The USE Paradigm



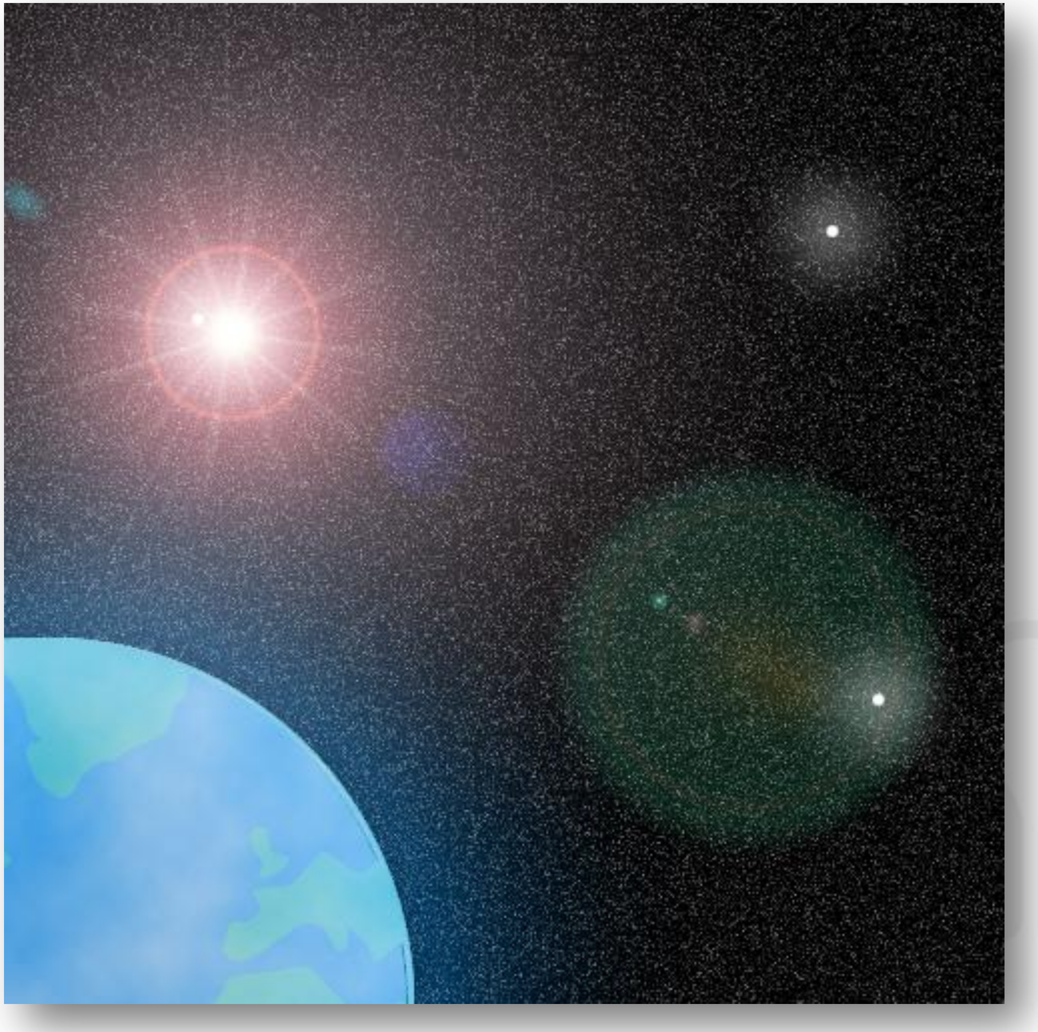
LAYER 7 TECHNOLOGIES

REST AND HYPERMEDIA

REST and Hypermedia

REST is an architectural model for widely distributed systems

REST and Hypermedia - Space



http://www.flickr.com/photos/jram23/3088003105/

REST and Hypermedia - Time

http://www.flickr.com/photos/alancleaver/2661425133/

REST and Hypermedia - Model

http://www.flickr.com/photos/usnationalarchives/5476286211/

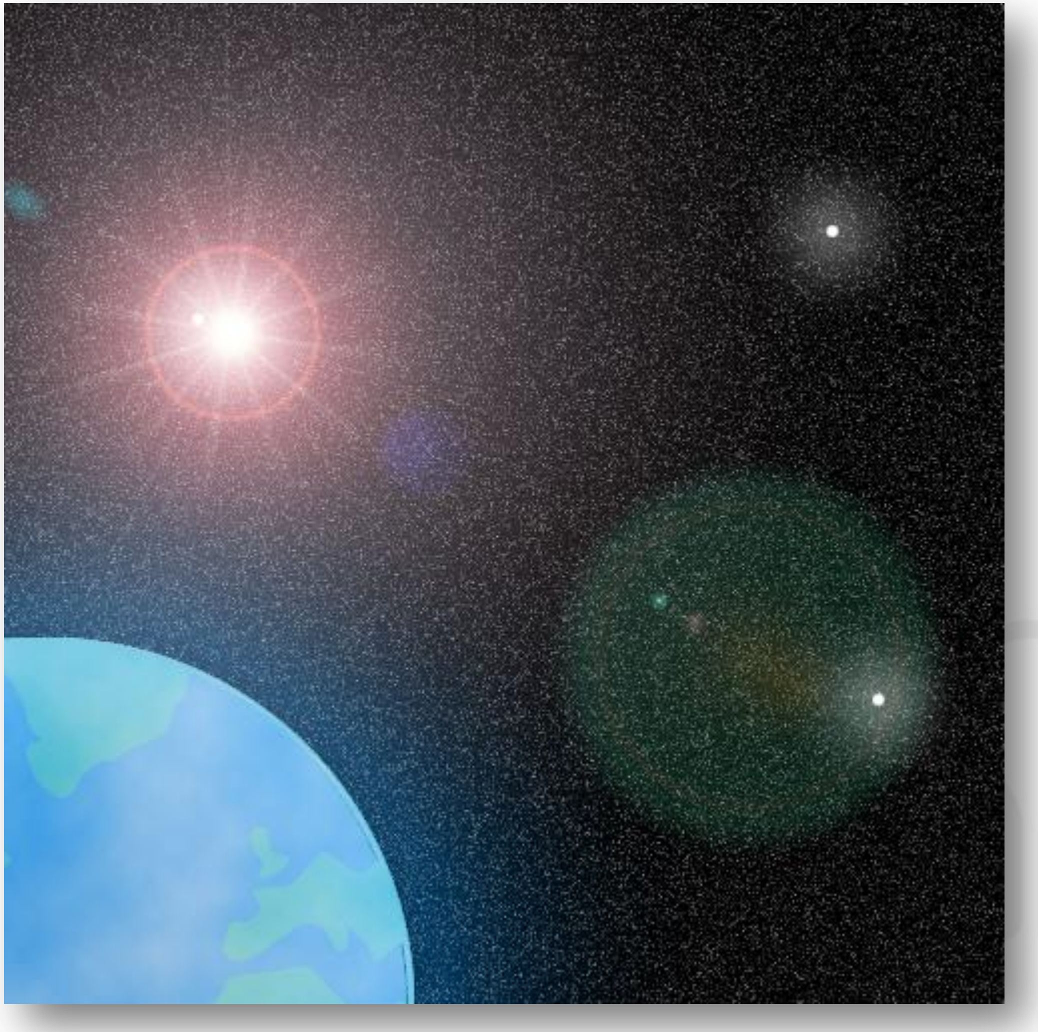
REST and Hypermedia - Tools

http://http://www.flickr.com/photos/36247316@N00/3108399560/

REST and Hypermedia

Hypermedia is a tool for implementing remote, evolvable systems

REST and Hypermedia - Space



http://www.flickr.com/photos/jram23/3088003105/

REST and Hypermedia - Time

http://www.flickr.com/photos/alancleaver/2661425133/

REST and Hypermedia – Evolvable

http://www.flickr.com/photos/isherwoodchris/5811756295/

REST and Hypermedia – Evolvable

http://http://www.flickr.com/photos/ecbiosheron/4139220163/

REST and Hypermedia – Evolvable

http://http://http://www.flickr.com/photos/nrg07/4735858552/

REST and Hypermedia – Real World

RICHARDS-WILCOX
5 TONS
9215
AIRCRAFT PARTS HANDLE WITH CARE
AIRCRAFT PARTS HANDLE WITH CARE
FEATHERLITE

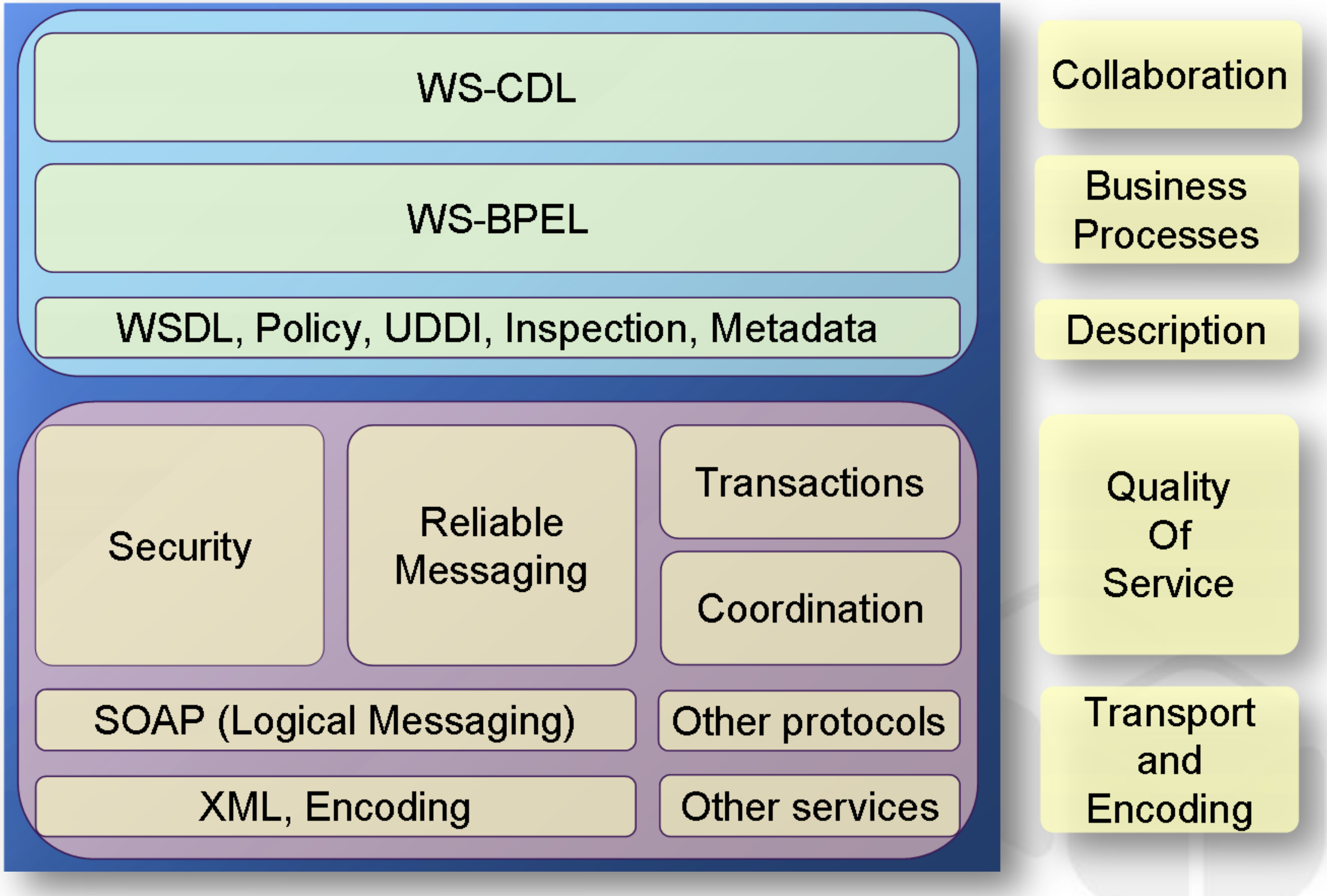
http://www.flickr.com/photos/smaku/233763545/

SOAP, CRUD, AND HYPERMEDIA

SOAP is for Components

http://www.flickr.com/photos/amberwalker/5755325926/

SOAP is for Components



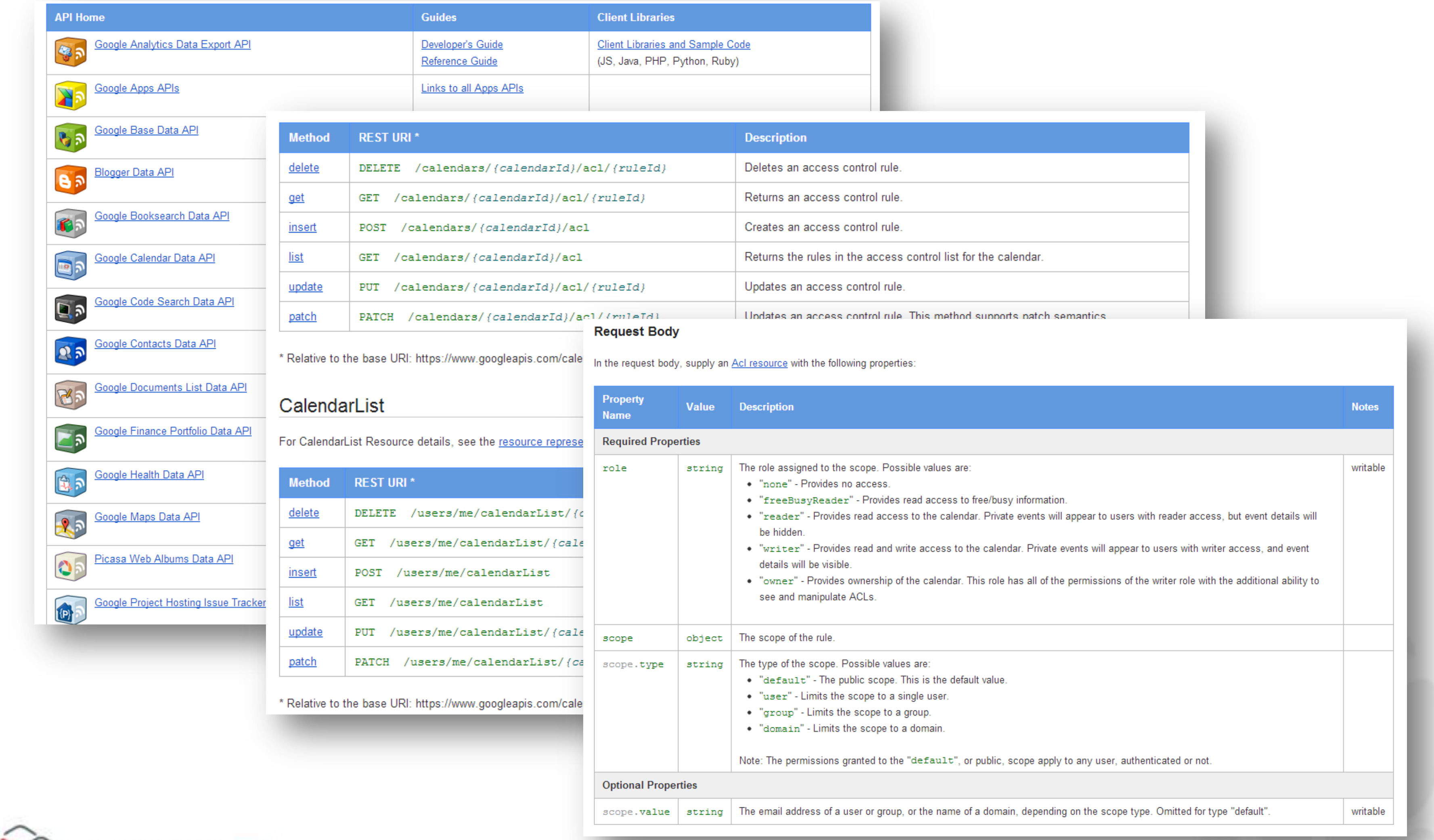
SOAP is for Components

Strong on XML, Weak on HTTP

CRUD is for Objects

http://www.flickr.com/photos/topekalibrary/4294393624/

CRUD is for Objects



API Home	Guides	Client Libraries
Google Analytics Data Export API	Developer's Guide Reference Guide	Client Libraries and Sample Code (JS, Java, PHP, Python, Ruby)
Google Apps APIs	Links to all Apps APIs	
Google Base Data API		
Blogger Data API		
Google Booksearch Data API		
Google Calendar Data API		
Google Code Search Data API		
Google Contacts Data API		
Google Documents List Data API		
Google Finance Portfolio Data API		
Google Health Data API		
Google Maps Data API		
Picasa Web Albums Data API		
Google Project Hosting Issue Tracker		

Method	REST URI *	Description
delete	`DELETE /calendars/{calendarId}/acl/{ruleId}`	Deletes an access control rule.
get	`GET /calendars/{calendarId}/acl/{ruleId}`	Returns an access control rule.
insert	`POST /calendars/{calendarId}/acl`	Creates an access control rule.
list	`GET /calendars/{calendarId}/acl`	Returns the rules in the access control list for the calendar.
update	`PUT /calendars/{calendarId}/acl/{ruleId}`	Updates an access control rule.
patch	`PATCH /calendars/{calendarId}/acl/{ruleId}`	Updates an access control rule. This method supports patch semantics.

* Relative to the base URI: https://www.googleapis.com/cale

CalendarList

For CalendarList Resource details, see the resource represe

Method	REST URI *
delete	`DELETE /users/me/calendarList/{c`
get	`GET /users/me/calendarList/{cale`
insert	`POST /users/me/calendarList`
list	`GET /users/me/calendarList`
update	`PUT /users/me/calendarList/{cale`
patch	`PATCH /users/me/calendarList/{ca`

* Relative to the base URI: https://www.googleapis.com/cale

Request Body

In the request body, supply an Acl resource with the following properties:

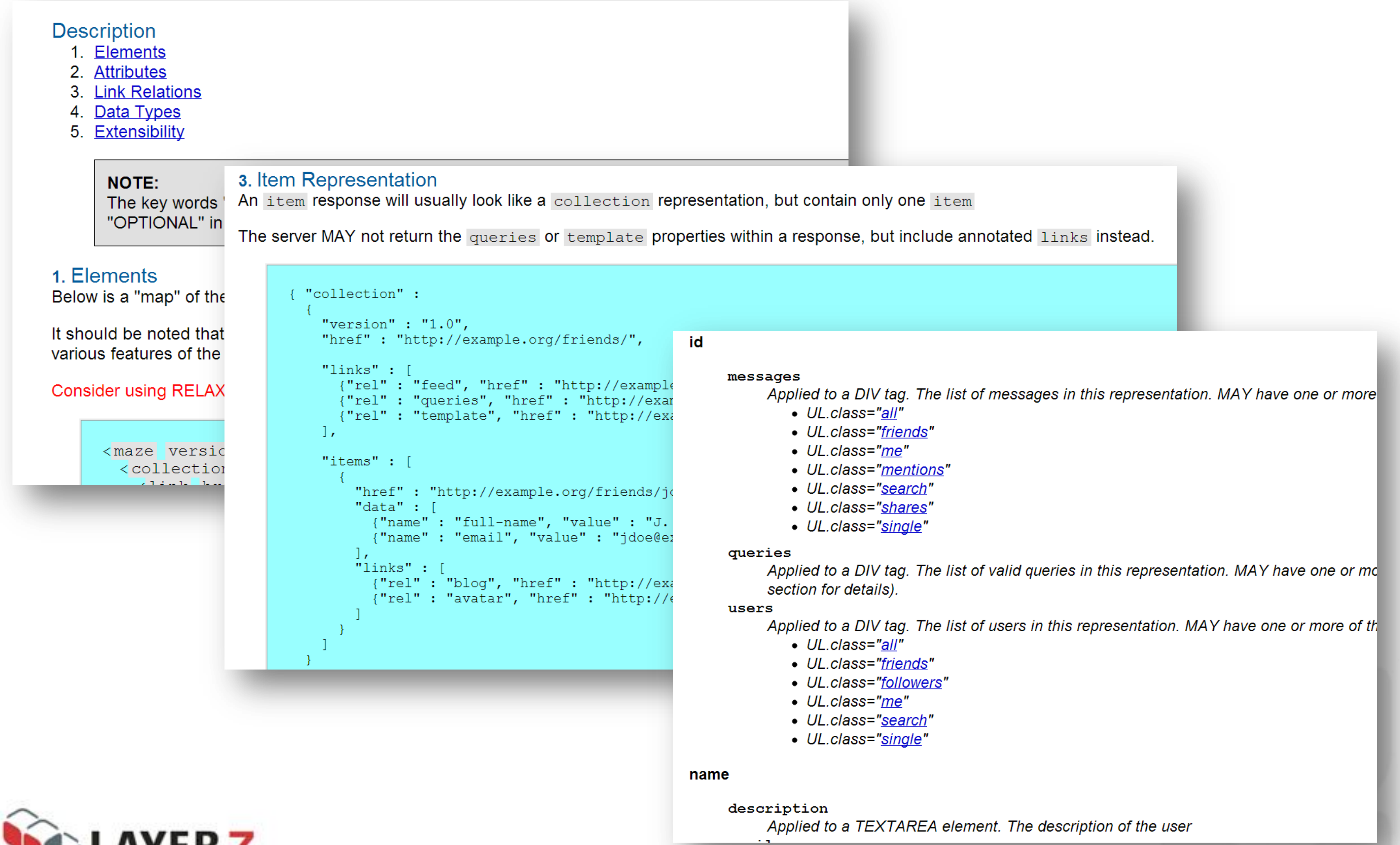
Property Name	Value	Description	Notes
Required Properties			
`role`	`string`	The role assigned to the scope. Possible values are: • "`none`" - Provides no access. • "`freeBusyReader`" - Provides read access to free/busy information. • "`reader`" - Provides read access to the calendar. Private events will appear to users with reader access, but event details will be hidden. • "`writer`" - Provides read and write access to the calendar. Private events will appear to users with writer access, and event details will be visible. • "`owner`" - Provides ownership of the calendar. This role has all of the permissions of the writer role with the additional ability to see and manipulate ACLs.	writable
`scope`	`object`	The scope of the rule.	
`scope.type`	`string`	The type of the scope. Possible values are: • "`default`" - The public scope. This is the default value. • "`user`" - Limits the scope to a single user. • "`group`" - Limits the scope to a group. • "`domain`" - Limits the scope to a domain. Note: The permissions granted to the "`default`", or public, scope apply to any user, authenticated or not.	
Optional Properties			
`scope.value`	`string`	The email address of a user or group, or the name of a domain, depending on the scope type. Omitted for type "default".	writable

CRUD is for Objects

Strong on HTTP, Weak on Workflow

Hypermedia is for Messages

Hypermedia is for Messages



Description

1. Elements
2. Attributes
3. Link Relations
4. Data Types
5. Extensibility

NOTE:
The key words "
"OPTIONAL" in

1. Elements

Below is a "map" of the

It should be noted that
various features of the

Consider using RELAX

```
<maze versio
  <collection
```

3. Item Representation

An `item` response will usually look like a `collection` representation, but contain only one `item`

The server MAY not return the `queries` or `template` properties within a response, but include annotated `links` instead.

```
{ "collection" :
  {
    "version" : "1.0",
    "href" : "http://example.org/friends/",

    "links" : [
      {"rel" : "feed", "href" : "http://example
      {"rel" : "queries", "href" : "http://exar
      {"rel" : "template", "href" : "http://exa
    ],

    "items" : [
      {
        "href" : "http://example.org/friends/jo
        "data" : [
          {"name" : "full-name", "value" : "J.
          {"name" : "email", "value" : "jdoe@ex
        ],
        "links" : [
          {"rel" : "blog", "href" : "http://exa
          {"rel" : "avatar", "href" : "http://e
        ]
      }
    ]
  }
```

id

`messages`
Applied to a DIV tag. The list of messages in this representation. MAY have one or more

- *UL.class="all"*
- *UL.class="friends"*
- *UL.class="me"*
- *UL.class="mentions"*
- *UL.class="search"*
- *UL.class="shares"*
- *UL.class="single"*

`queries`
Applied to a DIV tag. The list of valid queries in this representation. MAY have one or mc section for details).

`users`
Applied to a DIV tag. The list of users in this representation. MAY have one or more of th

- *UL.class="all"*
- *UL.class="friends"*
- *UL.class="followers"*
- *UL.class="me"*
- *UL.class="search"*
- *UL.class="single"*

name

`description`
Applied to a TEXTAREA element. The description of the user

LAYER 7
TECHNOLOGIES

Hypermedia is for Messages

Strong on HTTP, Strong on Workflow

SOAP, CRUD, Hypermedia

Moving away from SOAP

Implementing CRUD

SOAP, CRUD, Hypermedia

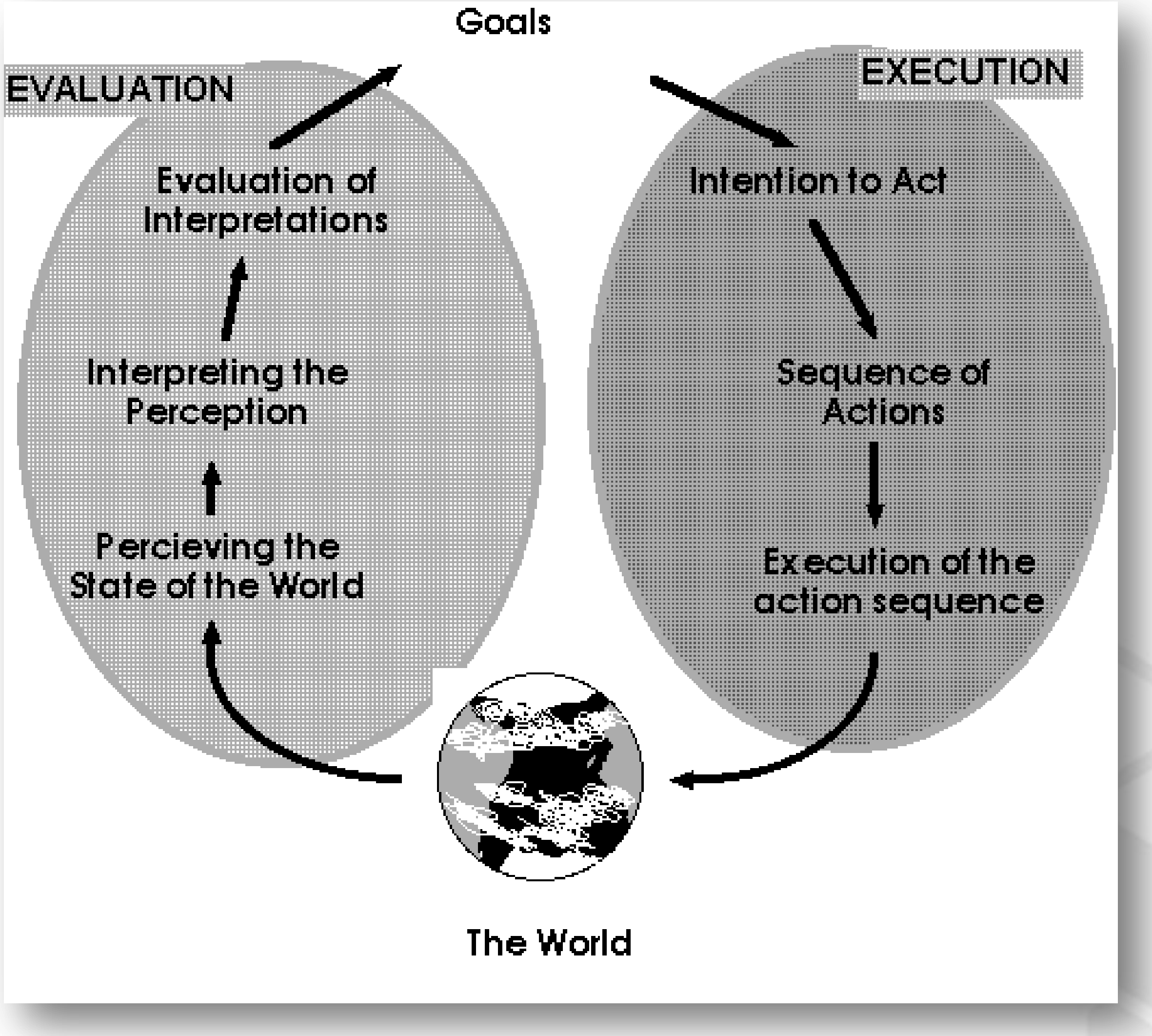
Heading toward Hypermedia

THE USE PARADIGM

Usable

Usability is the ease of use and learnability of a human-made object.

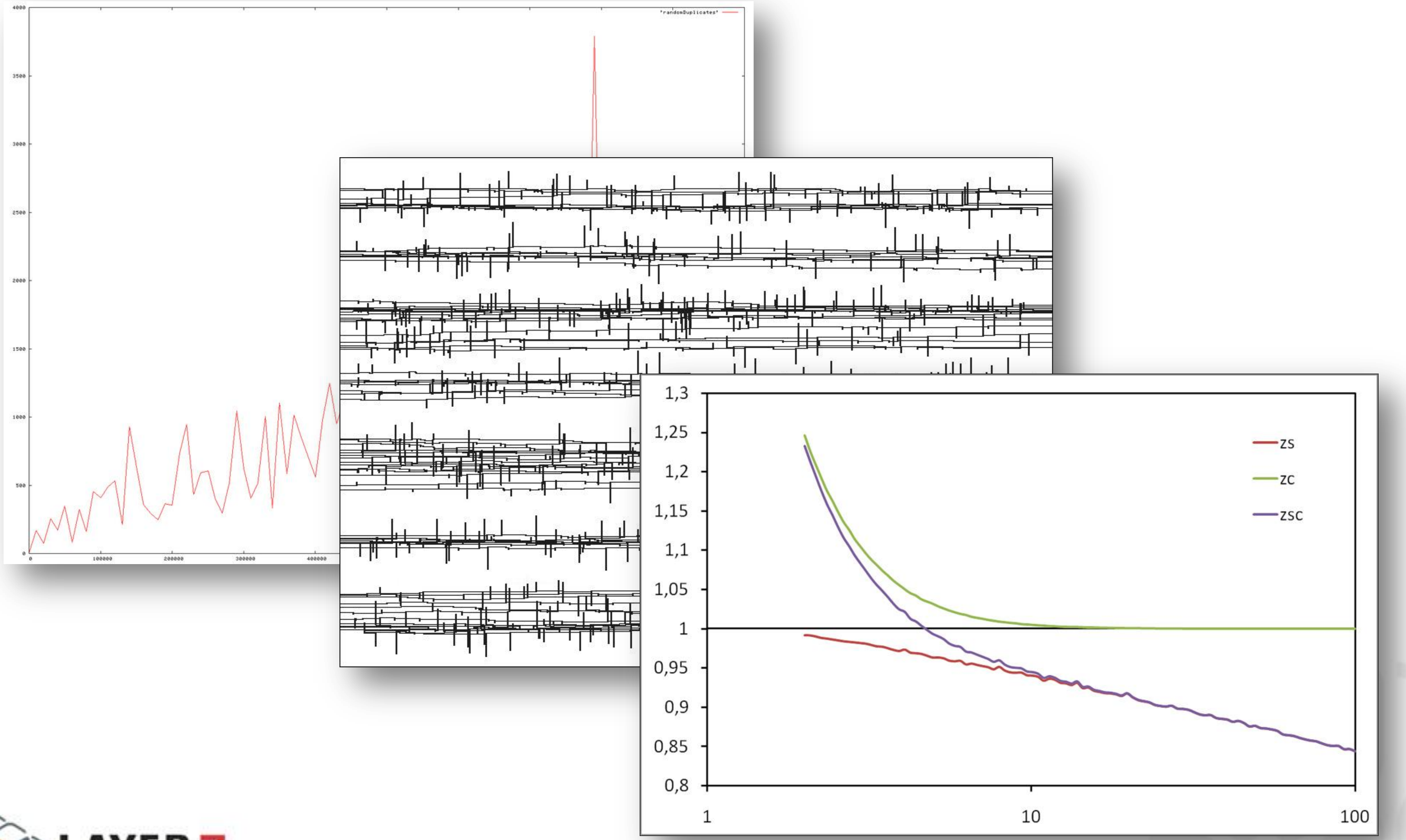
Usable – Action Life Cycle


Goals
EVALUATION
EXECUTION
Evaluation of Interpretations
Intention to Act
Interpreting the Perception
Sequence of Actions
Percieving the State of the World
Execution of the action sequence
The World

Usable – Focus on tasks

http://www.flickr.com/photos/somoamsterdam/4833837888/

Usable – Employ empirical measurement



Usable – Iterative design

http://www.flickr.com/photos/aajbutler/5448088057/

Usable

Focus

Usable

Measure

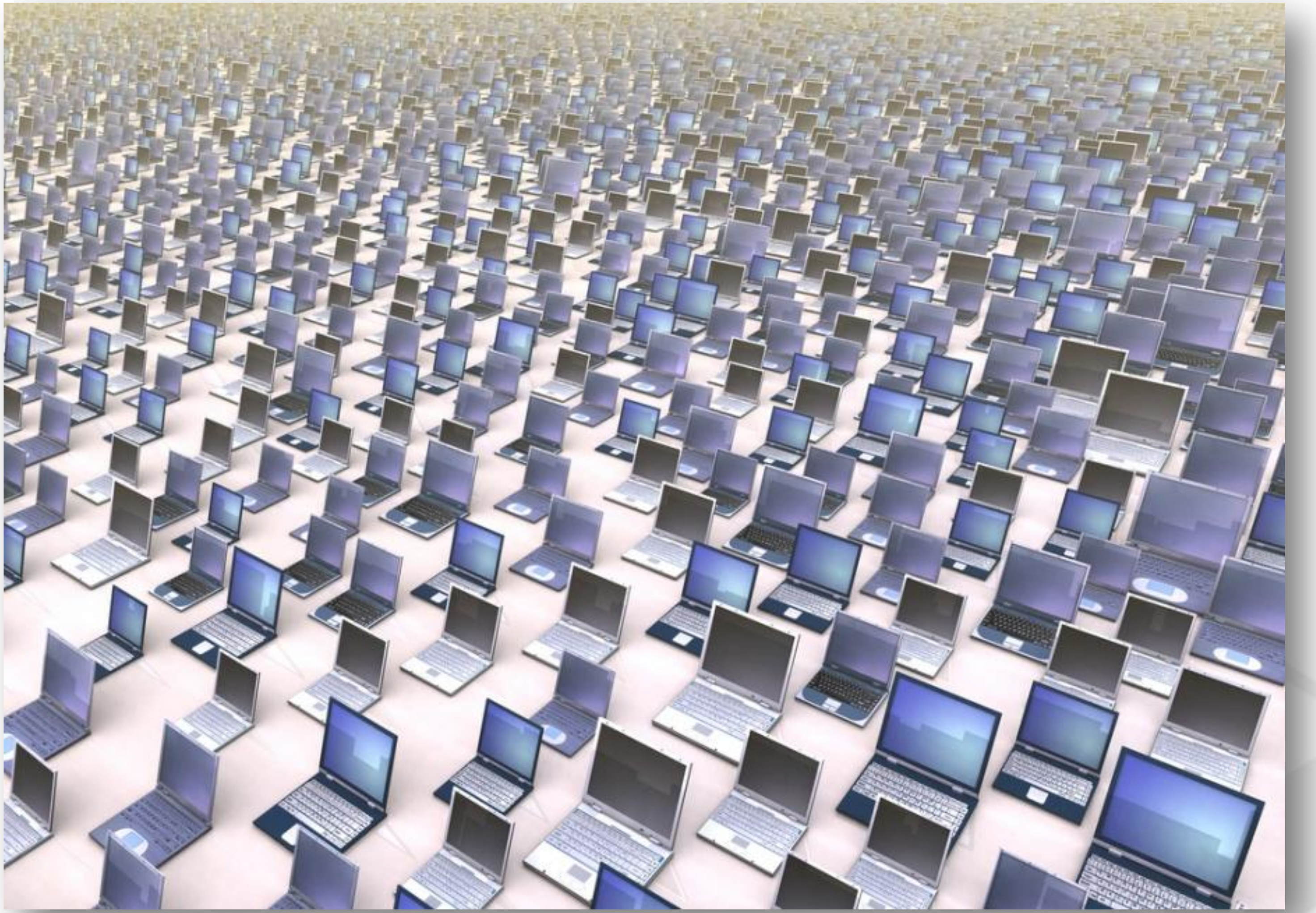
Usable

Iterate

Scalable

Scalability is the ability of a system, network, or process, to handle a growing amount of work in a capable manner.

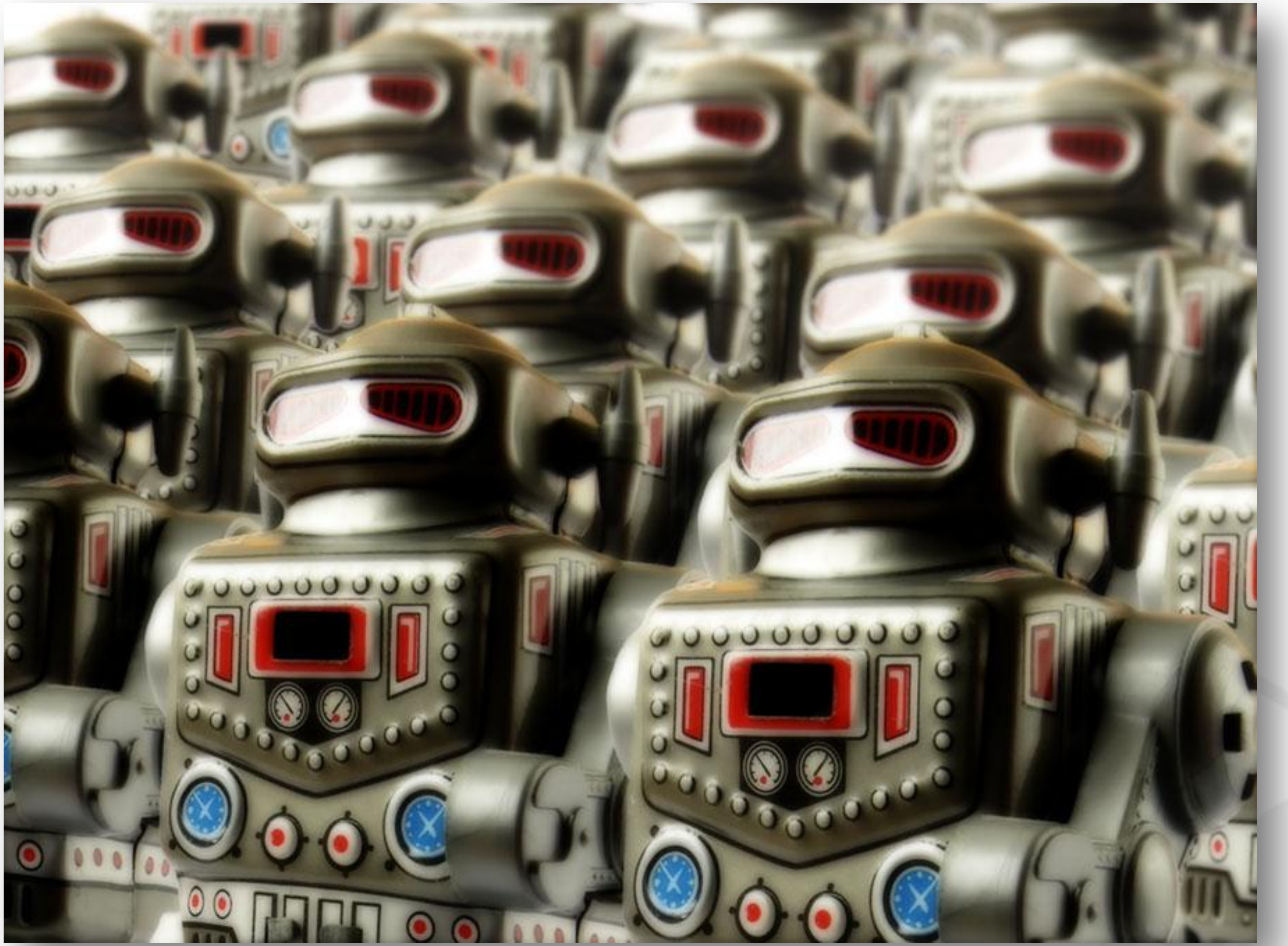
Scalable – Out vs. Up



Scalable

http://www.flickr.com/photos/27976837@N00/4347462236/

Scalable – DevOps



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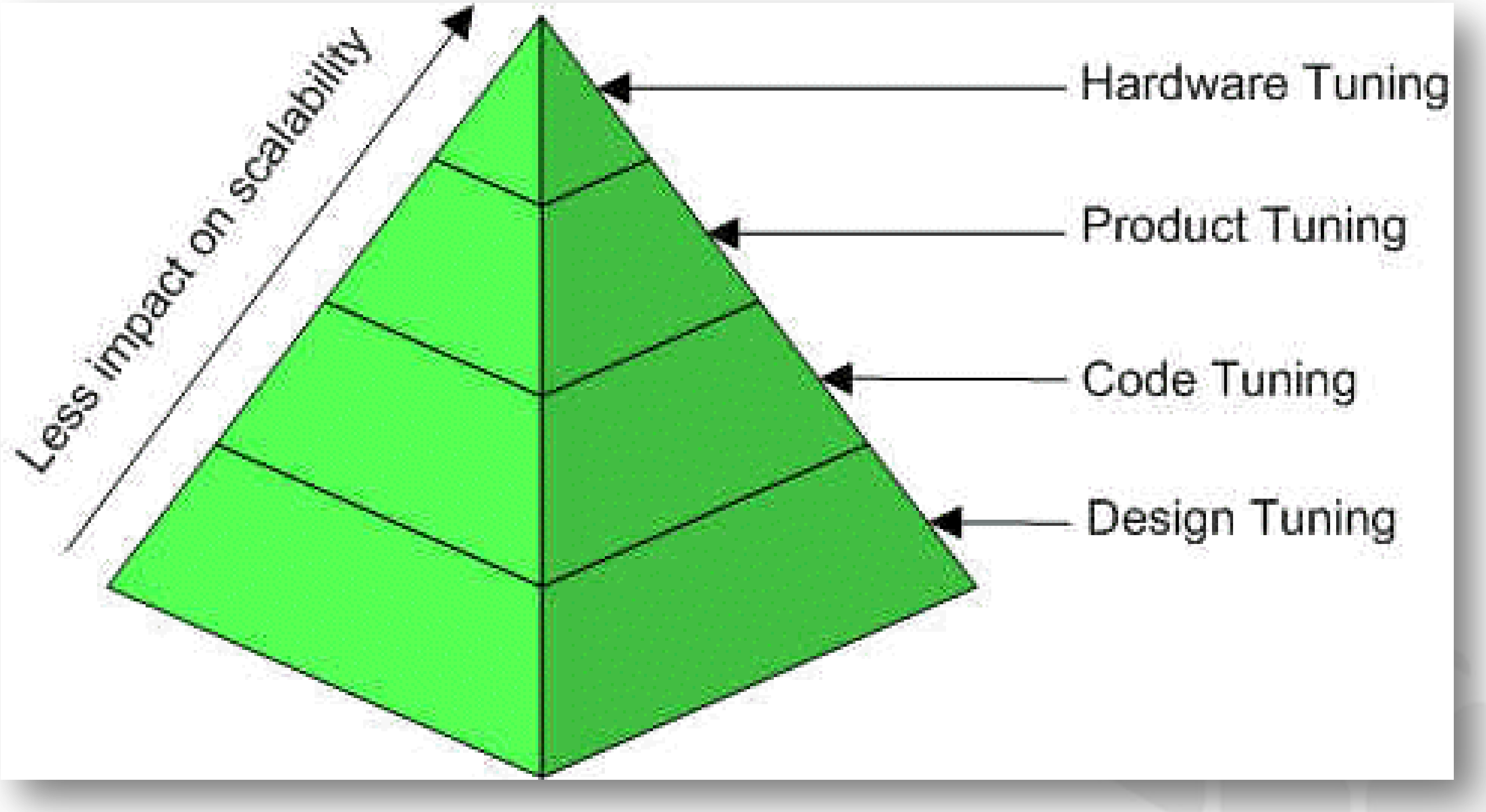
Scalable – Where it counts



Scalable

Scale Out

Scalable

Automate

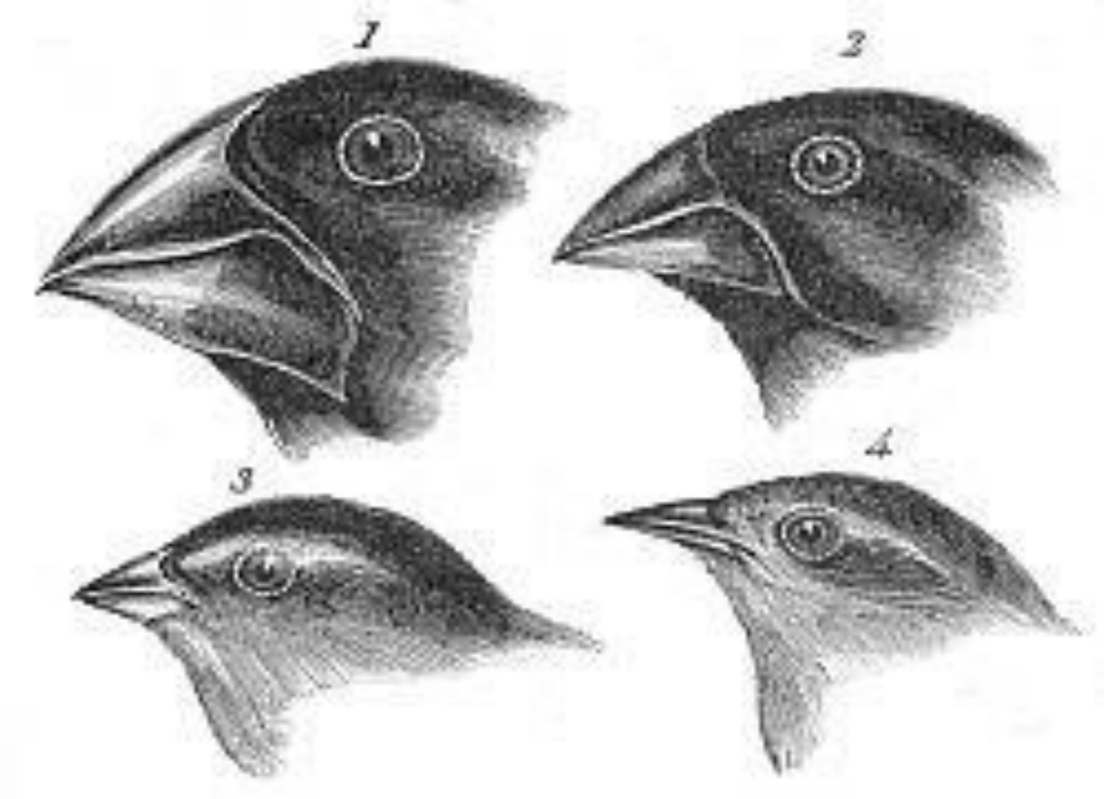
Scalable

Where it counts

Evolvable

Evolvability is defined as the capacity of a system for adaptive change.

Evolvable



1. Geospiza magnirostris
2. Geospiza fortis
3. Geospiza parvula
4. Certhidea olivacea

Finches from Galapagos Archipelago

Evolvable (*pandere* – to stretch)

http://www.flickr.com/photos/kenjonbro/6277623578/

Evolvable (vertere – to turn)

http://www.flickr.com/photos/erdero/2274374743/

Evolvable

Versions “break”, extensions don’t.

SUMMARY

Summary - Challenge

Mobility

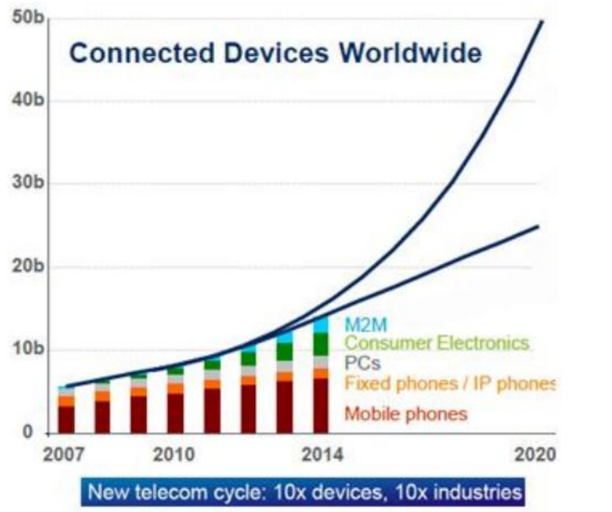
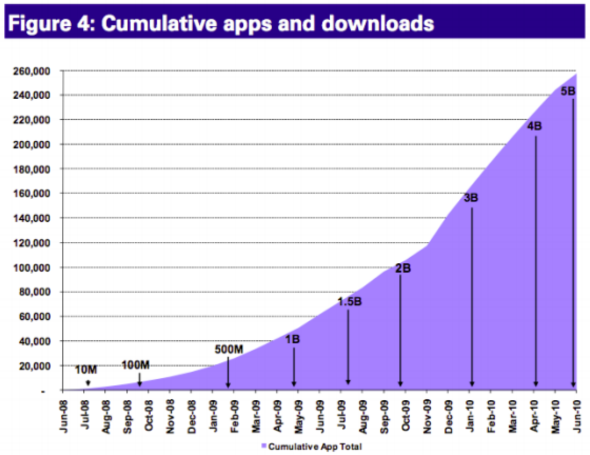


Figure 1: From Ericsson : 50b devices by 2020

Agility



Source: Deutsche Bank and Apple data

Figure 2: From Smart Insights, October 2010

Stability

Summary – Models

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Summary – Tools

http://http://www.flickr.com/photos/36247316@N00/3108399560/

Summary – Components

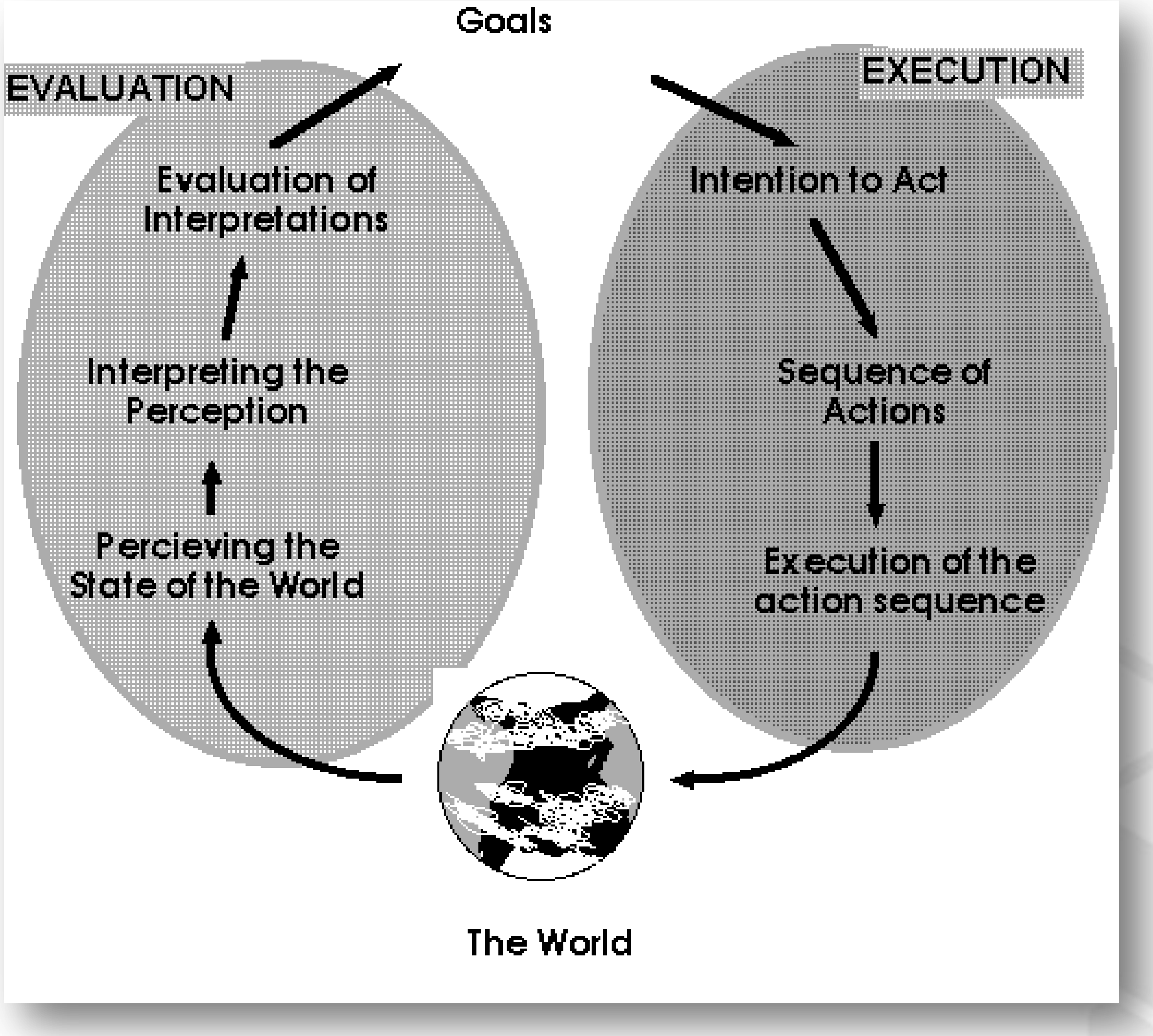
http://http://www.flickr.com/photos/36247316@N00/3108399560/

Summary – Objects

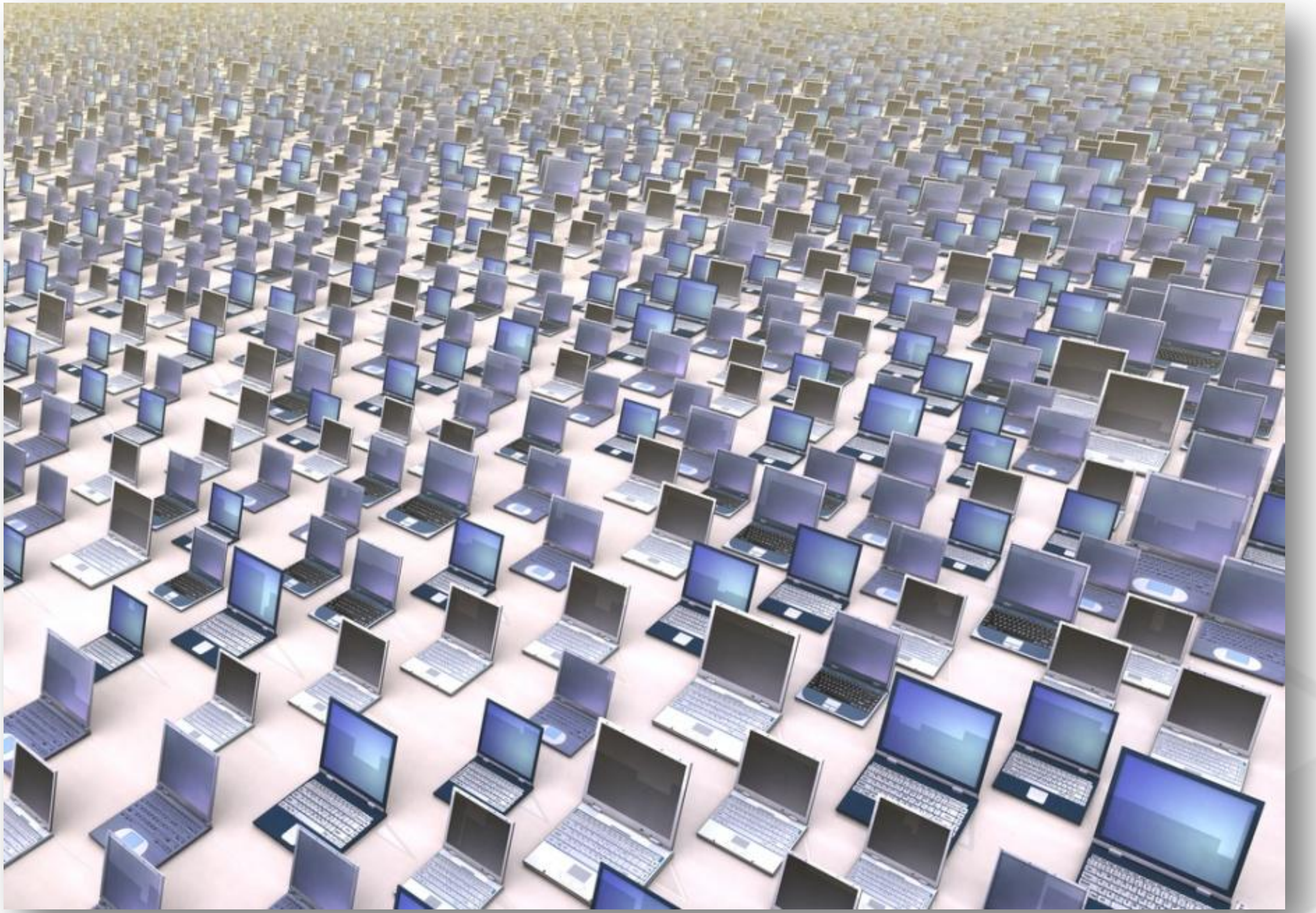
http://www.flickr.com/photos/topekalibrary/4294393624/

Summary – Messages

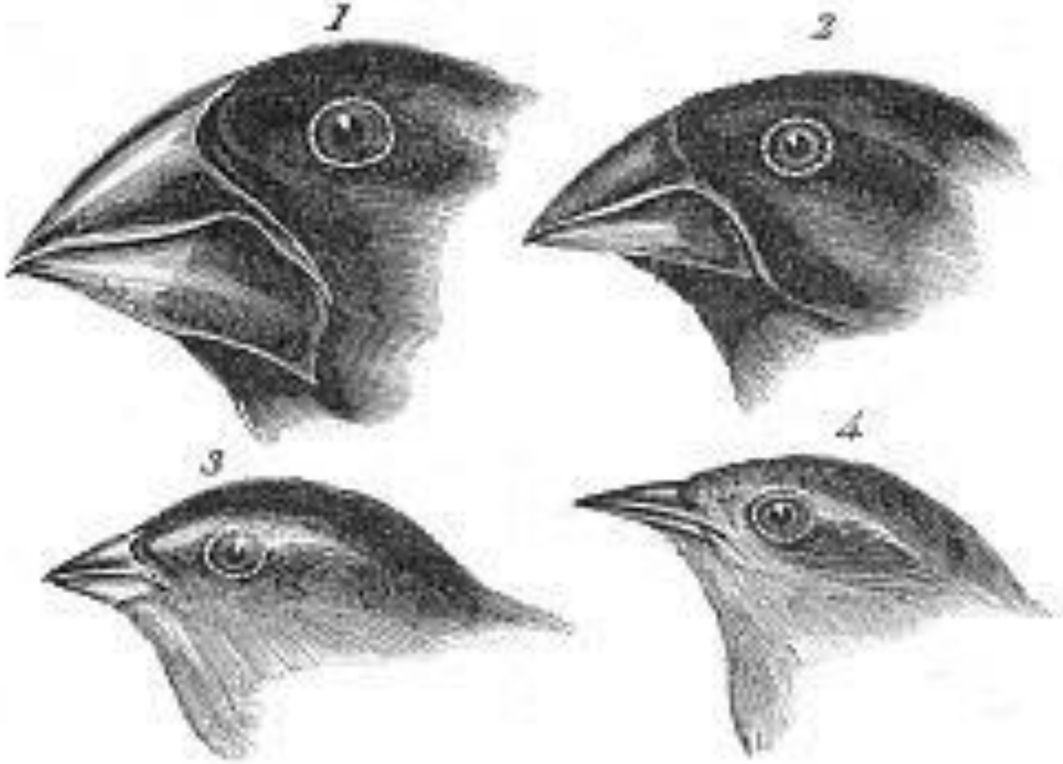
Summary – Usable


Goals
EVALUATION
EXECUTION
Evaluation of Interpretations
Intention to Act
Interpreting the Perception
Sequence of Actions
Percieving the State of the World
Execution of the action sequence
The World

Summary – Scalable



Summary – Evolvable



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