open source as a disruptive technology

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Last year, I had the pleasure of hosting a
conference about open source GIS software
in my home town.
And my favorite conference story,
is from a couple guys
who were having a beer in the pub
shortly after getting to town,
and the server asked them
"what brings you to Victoria"?
And they answered "we're here for a
conference about open source".

“who would want to go to a conference about open sores?”

To which she replied,
"open sores?
who would want to go to a conference
about open sores?"
Which seems like
a pretty fair question!

open source

- itchy
- painful
- a source of infection

open source
itchy,
painful
and a source of infection.

Actually,
If you've been listening to
Steve Balmer, the CEO of Microsoft
over the past few years,
you'll have heard him make
at least the last of these claims.

Steve Ballmer
CEO Microsoft

“Linux is a cancer that attaches itself in an intellectual property sense to everything it touches.”

He has said,
"Linux is a cancer
that attaches itself
in an intellectual property sense
to everything it touches"
A cancer!
Come on, Steve, don't soft-pedal it,
tell us what you really think! :)

Jim Allchin
VP Microsoft

“Open source is an intellectual-property destroyer... I can't imagine something that could be worse than this for the software business and the intellectual-property business...”

Or
perhaps you heard
the former head of the
Microsoft operating system division,
Jim Alchin,
"Open source is
an intellectual-property destroyer...
I can't imagine something
that could be worse than this
for the software business
and the intellectual-property business..."
Ouch.

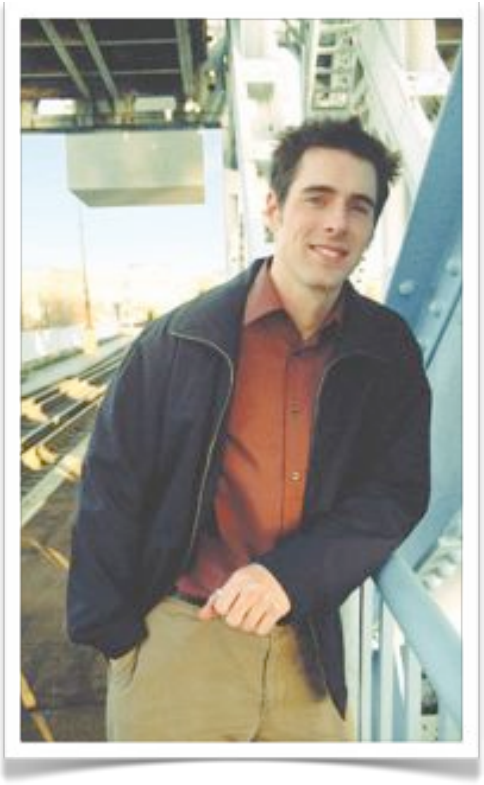
Normally, you only encounter this kind of overheated rhetoric in a war,
or an election campaign.
But something about open source really has Microsoft riled up.

And what it is, is,
they see something of
themselves in the rise
of open source.
Microsoft rode to prominence on the
back of a disruptive technology,
the PC, which tore down the previous
mainframe and mini-computing edifices.
And they fear that open source is
a disruptive technology that might
do them in, in turn.

anyhow...

Anyhow...

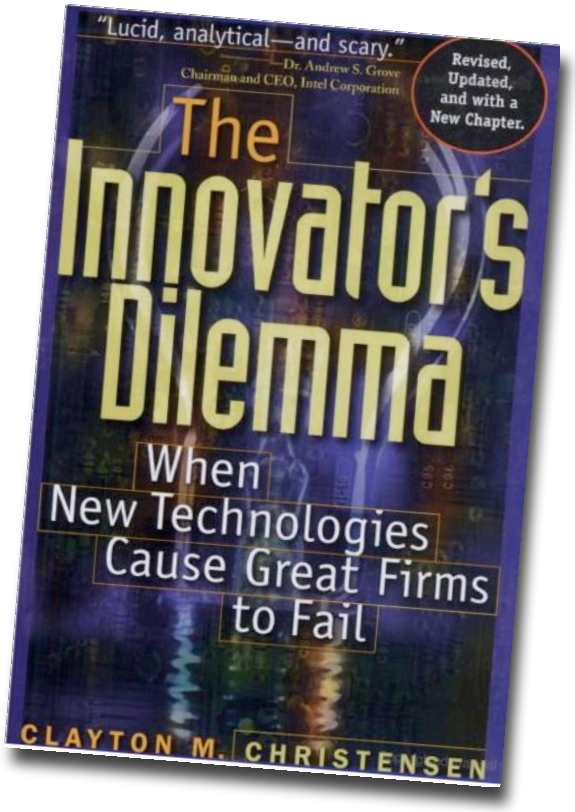
steve myhill-jones @ latitude geographics



I came to this topic in a roundabout way.

About six months ago,

I had lunch with friend of mine,
Steve Myhill Jones,
who is an avid reader of business books.
He runs the Latitude Geographic Group,
which is in Victoria, where I live.



And over lunch he said
"you have to read this great book,

the 'Innovators Dilemma',
by Clayton Christensen
I'll loan it to you!"

So I took it home,
and put it on the back of my toilet,

and over the course of several, er,
"study sessions" worked my way through it.

innovator's dilemma

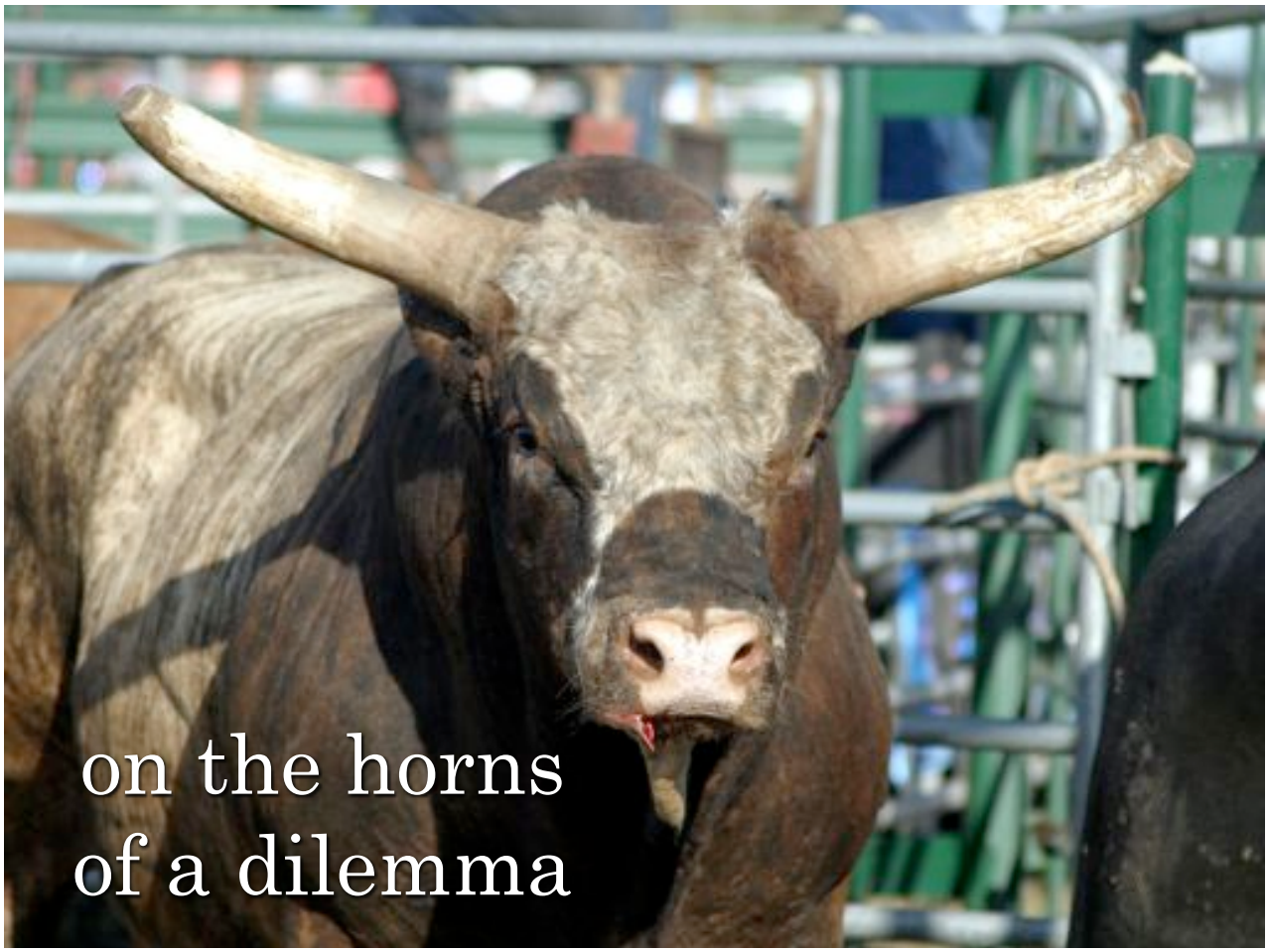
So,
what is this "innovators dillemma"
referred to in the title?

“blindly following the maxim
that good managers
should keep close to their customers
can sometimes be a
fatal mistake”

Christensen boils the "innovators dilemma"
down to this warning to managers.

"Blindly following the maxim
that good managers
should keep close to their customers
can sometimes be a fatal mistake."

Hmmm, OK.
But,
Where's the dilemma?



A dilemma is a choice between two paths,

both equally unpleasant.
Hence the term
"on the horns of a dilemma".

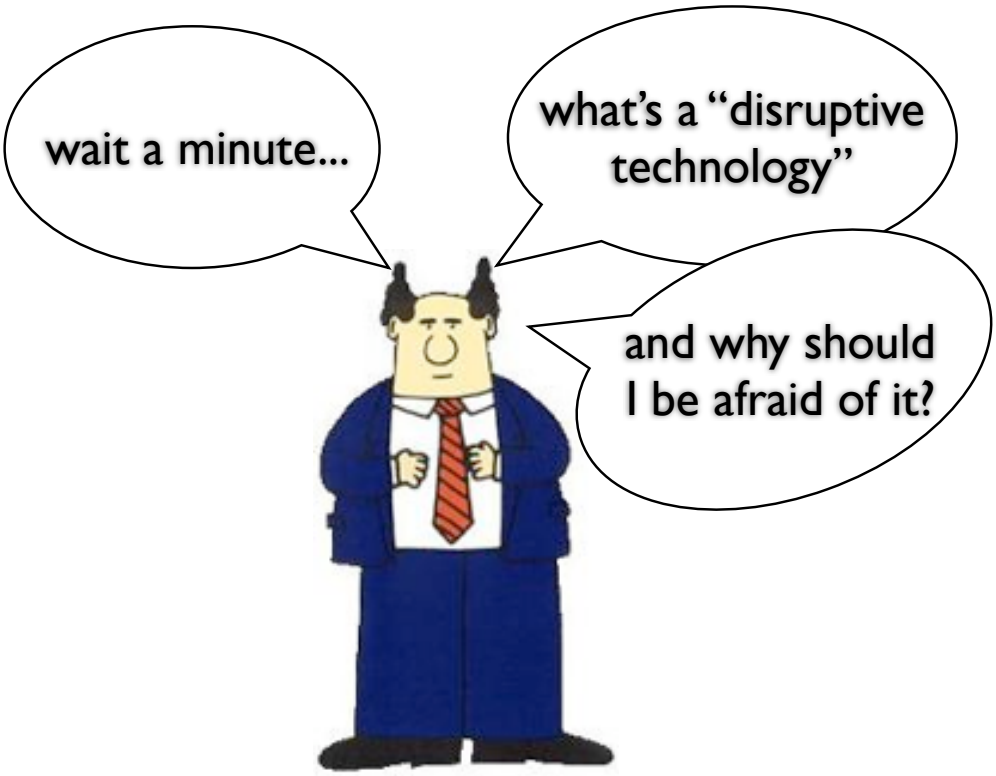
Pick a horn, any horn.

lose to more responsive competitor

Horn #1: if you fail to pay attention to your customers current and future needs, you'll lose them to a competitor who does a better job of listening.

lose to disruptive technology

Horn #2: if you
do pay attention to your
customers current and future needs,
your organization will be
vulnerable to destruction by a
"disruptive technology"



Uh,

Wait a minute, says the manager,
that second one doesn't sound so dangerous.
What's a "disruptive technology"
and why should I be afraid of it?

Fair question.

First of all,

this is not lightweight,
class-room style "disruption",
like Johnny used to make
back in fourth grade.

This is full-on
Klingon disruptor beam
style disruption.

This is the kind of thing
that rearranges every molecule
in your body
and leaves behind
nothing but a pink mist.

The example of disruptive technology
Christensen hangs much of his analysis on
is the lowly hard-drive.
He chooses hard-drives because
the pace of change in the
hard drive market has been
so intense that several
cycles of disruption have played
out in just 30 years.

[1953]
random access method for accounting and control (RAMAC)

Hard drives have actually
been around for a long time,
they were invented in 1953 by IBM.

The "Random Access Method for
Accounting and Control" (RAMAC)
had 50 24" platters and could store ...
wait for it ... 5MB.

worst.

iPod.

ever.

Just enough to store an MP3,
if the song isn't too long.

Of course, in 1953, there wasn't
a computer powerful enough to decode
the MP3 in real time, so moot point.

Anyhow...

[1970] system360

The market for hard drives grew
along with the market for computers,
which at the time were mainframes,
made by IBM and a handful of competitors.

CONTROL DATA
COMPUTER SYSTEM

Memorex

TELEX

Century Data

AMPEX Corporation

Wherever There's Business There's Burroughs

EMM

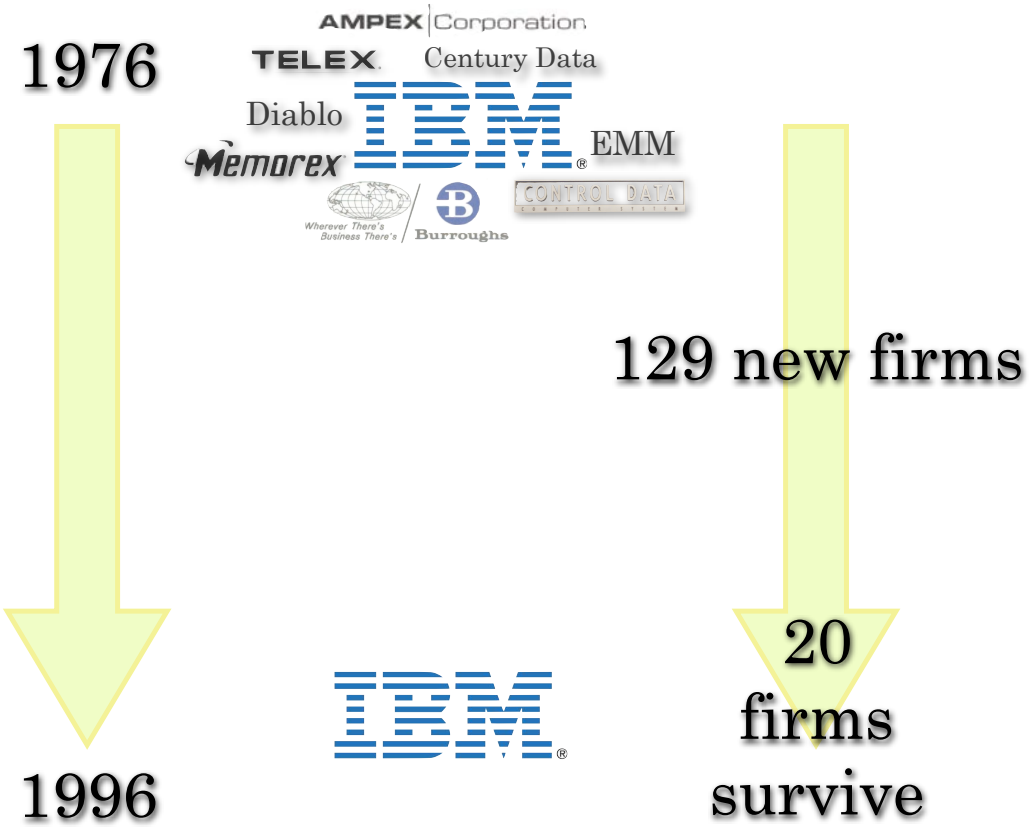
Diablo

IBM

IBM-2311 direct access storage facility

In the hard-drive space,
"plug compatible" companies
grew up who made drives
that could be plugged into IBM computers,
but sold for a much lower price
than IBM storage systems.

They also began supplying drives
compatible with other manufacturers,
so that by 1976 there was a
stand-alone hard-drive market
that was selling about $1B a year
of mostly 14" drives, like this IBM unit.



There were 17 firms
in the drive industry in 1976.
By 1995, every one except IBM
had gone out of business
or been taken over.

Over the same 30 year period
there was tremendous innovation
and market upheaval,
129 new firms sprang up.
But only 20 of them still
survived at the end of the
period.

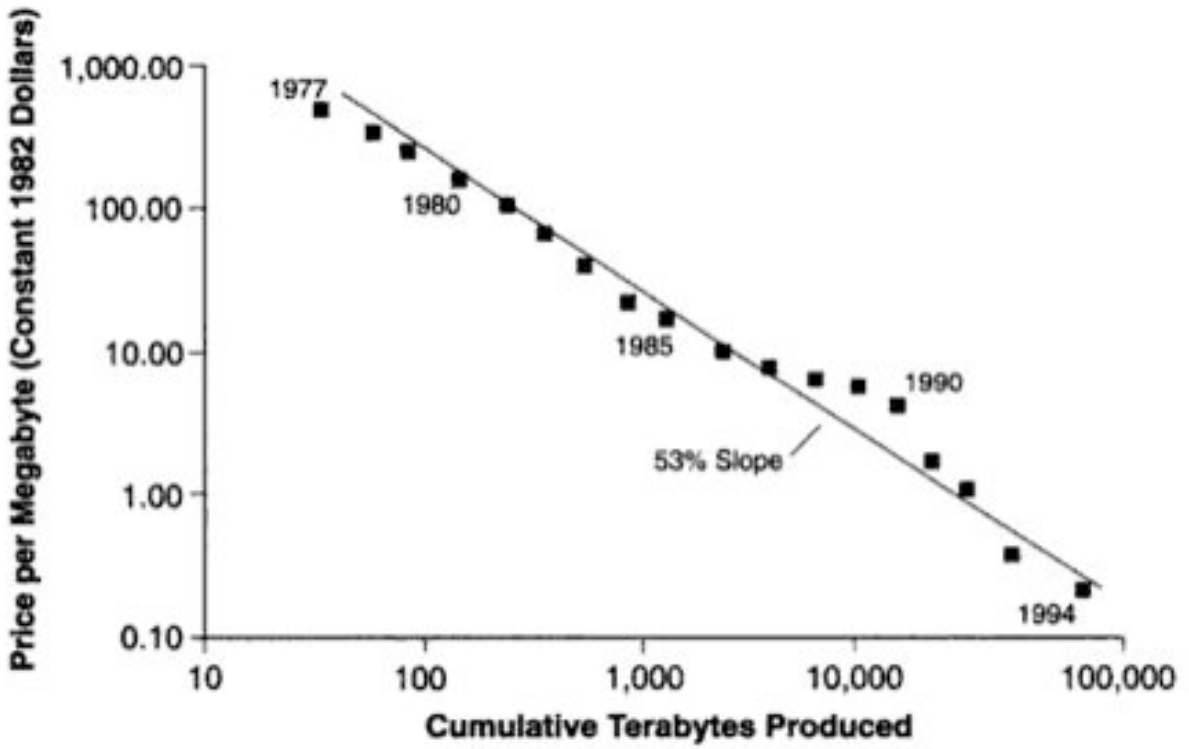
what happened?

So, what happened?

We didn't stop using hard-drives
between 1976 and 1995.
In fact, the market grew
from $1B to $18B.

Then,
what killed off the 16 profitable firms,
who owned the marketplace in 1976,
with experience in manufacturing
and selling storage devices.

Figure 1.3 Disk Drive Price Experience Curve



Source: Data are from various issues of *Disk/Trend Report.*

The quick and easy answer is
"technological change",
the drive industry has endured
insane rates of change,
in technology and volume of production.
Price per megabyte has gone down
5% per quarter,
for more than
twenty years.

sustaining

disruptive

But just saying "technological change"
is too broad brush.
Christensen proposes
two kinds of technological innovations,

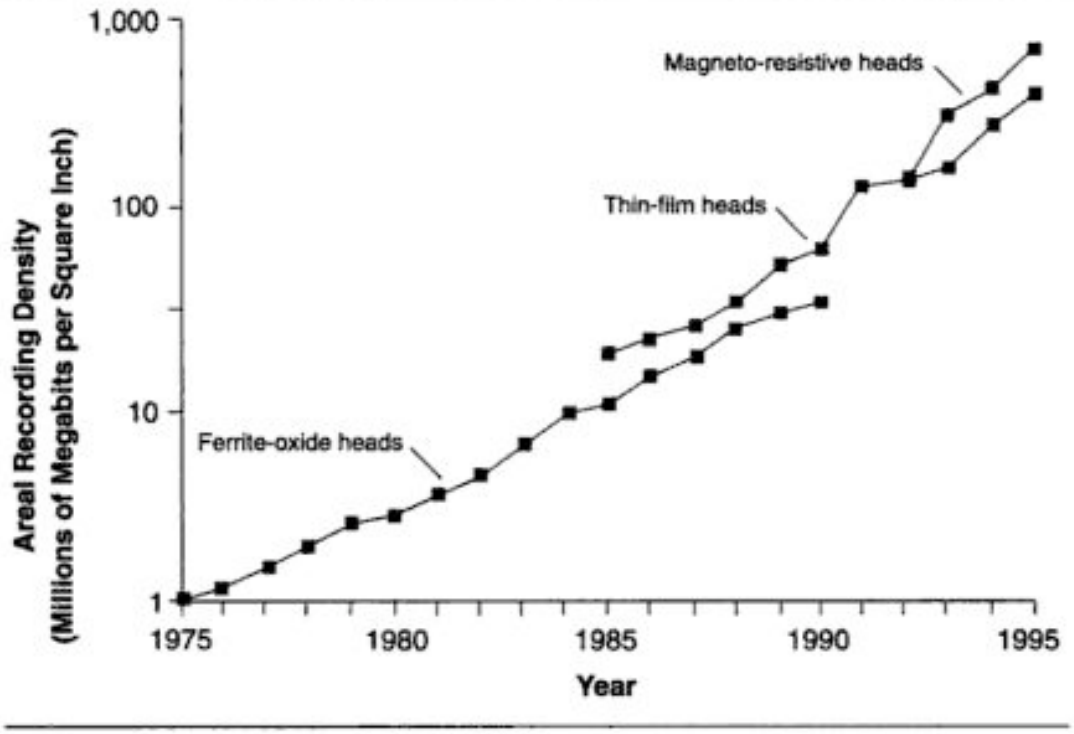
"sustaining innvations" and
"disruptive innovations".

Sustaining innovations are
"more of the same, only better".
it's the kind of innovation that
existing customers demand.

boeing

For example,
Boeing transitioned from
open planes to pressurized planes
to jet planes, to jumbo planes,
to composite planes.
Each of these changes was
technologically difficult and
very expensive,
but each was needed by Boeing's
existing customers.
Boeing didn't go out of business,
it navigated 50 years of massive
technological change easily,
building on existing engineering skills
and sales channels over time.

Figure 1.4 Impact of New Read-Write Head Technologies in Sustaining the Trajectory of Improvement in Recording Density



Source: Data are from various issues of *Disk/Trend Report.*

The disk drive industry went through
similar core technology changes
between 1975 and 1995.

Each of these changes
to ferrite-oxide, thin film,
and magneto-resistive heads,
required hundreds of millions of dollars in R&D,
and re-tooling of product lines.

And in each of these changes,
the established firms led the way.

Even though these changes were
technologically huge,
taking years to complete,
they were "sustaining".
They improved products in ways
that made them more desirable
to the existing customer base.

disruptive

"Disruptive change" is different.

It does not address the needs of the
existing customer base.
Disruptive change
is what happened to the 14" drive makers
who dominated the market in 1976.

14” hard drive

- Mainframe makers
- Mainframe users
- 300-350MB
- Expensive
- Very profitable

The 14" drive firms
sold to customers who used or made
mainframes.
The mainframe customers required drives
of about 300-400Mb.
They had already invested
millions and millions of dollars
in their computers,
and they could afford to pay
top dollar for storage.

So the 14" firms
had nice lists of customers
willing to buy high margin products,
who were all asking for
more storage,
faster storage,
in the same basic form factor,
Something the size of a washing machine.
like this IBM 2311

8” hard drive
(in this PDP-11)

- 20-40MB
- Minicomputer makers
- Minicomputer users
- Low-end computing
- Less expensive
- Less profitable

But, around 1978,
a group of new companies sprang up,
[Shugart, Micropolis, Priam, Quantum and others.]
making drives with 8" platters.
The 8" drives introduced by
these companies
offered capacities of just 10Mb-40Mb.

Mainframe users did not want them,
they had too little capacity.

However, the 8" drives were physically smaller,
and they were cheaper,
so they fit nicely with the
emerging market for minicomputers,
like the beloved PDP series
from Digital Equipment Corporation.

> digression

Digression...
The PDP-11 shows up in old stories of
UNIX and free software quite often.

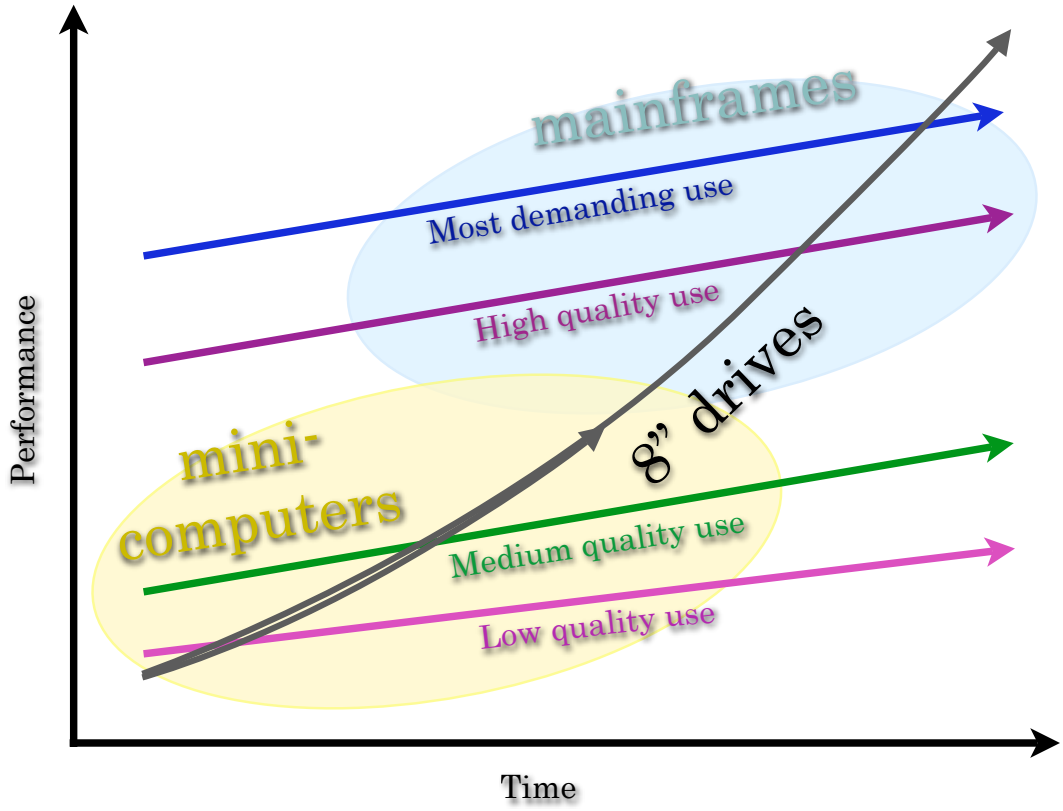
Ken Thompson developed the original UNIX
as a Multics hack for the PDP.

Richard Stallman came up with the concept
of free software while wrestling with a
proprietary PDP-11 printer driver
in the MIT computer lab.

Bill Joy built the first
BSD Unix distribution on a PDP-11 at Berkeley,
before he went on to Sun Microsystems
to write SunOS (now open source Solaris).

anyhow...

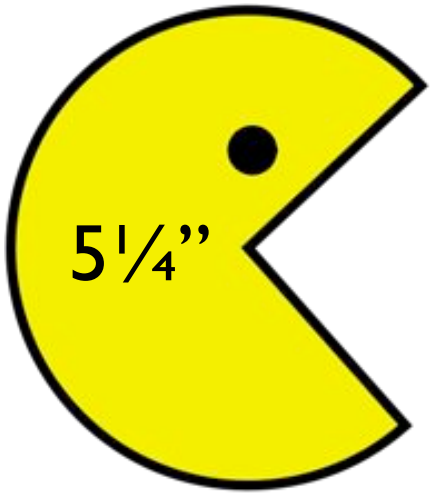
Anyhow...



The minicomputer market was small,
and the cheaper components had
lower profit margins,
so the incumbent 14" drive makers had
no interest in the market.
They stayed up at the top of the market,
where the volumes were
large and the margins high.

At first.

But by the early 1980s,
The 8" drives had increased their storage
so much that they were useful for mainframes.
They also had a larger unit volume,
from selling to the rapidly
growing minicomputer market,
so the 8" makers had economies of scale
that the old firms couldn't match when they
introduced their own 8" models.



But here's the
really strange thing...
even with the knowledge of their
own history,
the 8" drive makers had the
same thing happen to them
a few years later.

minicomputer makers on 5¼” Drive:

“not enough capacity”

“not reliable enough”

The initial capacities 5.25" drives
were 5-10Mb,
too small for minicomputers.
And data centers needed reliability.

Who would want
these crappy 5.25" drives?

Cha ching!

pc makers on 5¼” Drive:

“capacity is acceptable”

“reliability is acceptable”

and…

“it fits on a desk”

“it’s cheap”

The early PC market was small,
but they didn't see the same
drawbacks as the minicomputer makers
and they valued two attributes of
the 5.25" drive that the 8" drive lacked,
small size and
low price.

So, despite the lessons of their
own history,
only half of the 8" makers
introduced 5.25" drives.

Of the top four 8" firms,
only one
survived as a top maker of 5.25" drives.

And then,
it happened again with 3.5" drives,
which found an initial market
with portable computers.

And it's happening again
with 1.5" drives,
which have found an initial
market in digital music players.

It also happened in computers.

Each computing generation
was initially defined within a niche use,
then expanded into general use.

Minicomputers were for
scientists and engineers,
then they were for everything.

PC's were for spreadsheets,
then they were for everything.

Notepooks were for road warriors,
then they were for everything.

Netbooks are for college students.
iPhones are for hipster doofusses.
How long until they become people's
primary computing platform?

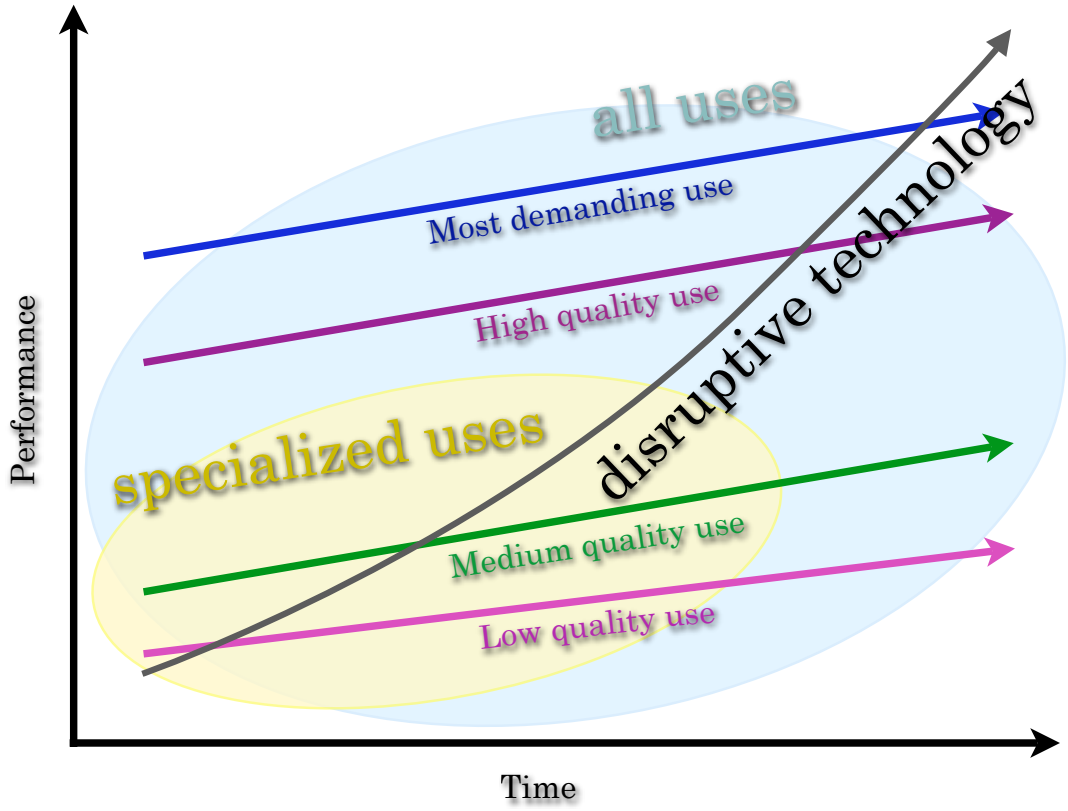
“Because it can be a music and video player, Internet access device, e-mail and instant messaging platform, camera and many other things, the iPhone gives cash-strapped consumers more for their money than do single-purpose products, and because it can be used on the go, it can help people make better use of their time.”

http://www.itworld.com/personal-tech/57039/low-income-users-latch-iphone

Not long, perhaps,
here's a quote from
IT World magazine, on the uptake of the iPhone
amongst "low income" people:

"Because it can be a music and video player,
Internet access device,
e-mail and instant-messaging platform,
camera and many other things,
the iPhone gives
cash-strapped consumers
more for their money than do
single-purpose products,
And because it can be used on the go,
it can help people make
better use of their time."

Is the iPhone a disruptive technology? May be...



Each disruptive transition
brings a host of new companies
into the market,
and unseats many of the
incumbents,
as the disruptive technology moves

out of its niche and
into general use.

So,
What is wrong with these
established companies?
Why can't they protect their
old market
and enter into a new one?

Can't they do two things at once?
No. Not well.

“held captive by their customers”

First of all,
the incumbent companies are
"held captive by their customers".
"The customer is
always right" is a great
business maxim, but it does

limit the options of managers
planning for the future.

what is your bidding, sire?
faster!
more storage!
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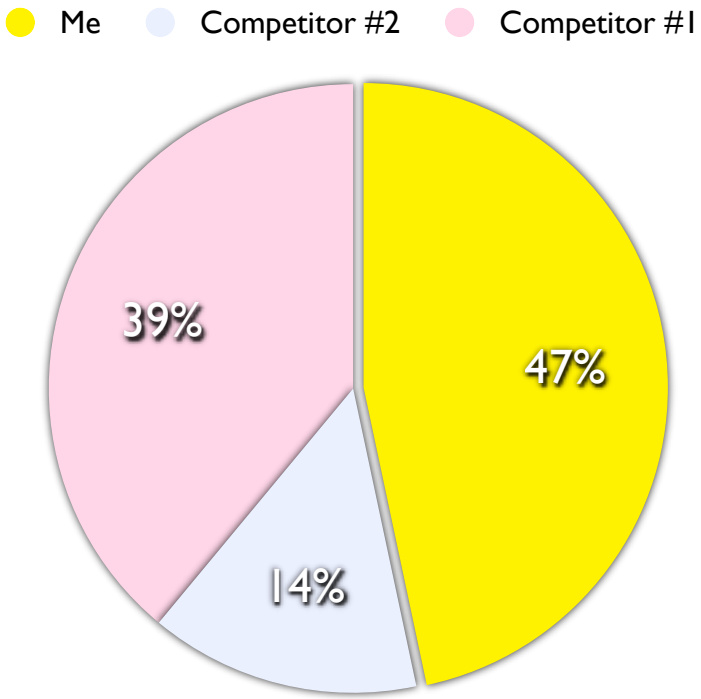
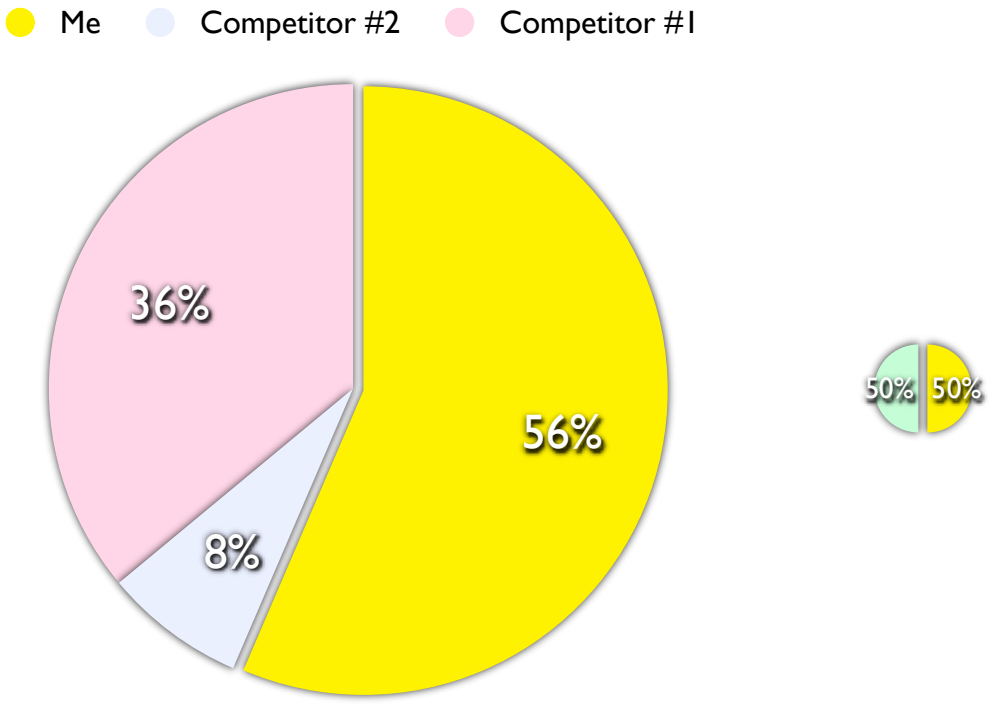


Also, financially,
expanding your share of a
large market makes
more sense than



scrapping for a share of a

tiny market.

So, the need to maintain
market share,
and follow the signals
provided by the
existing market,
means that
customers dictate what technologies
"make sense" to pursue.

rational resource allocation

Second,
Well managed companies make
good decisions about resource allocation.

What projects should I put my
dollars and
engineering effort into?

Sustaining Research	Disruptive Research
Known market	Unknown market
Well-defined goal	Poorly-defined goal
Improve profitability in short term	Lower profitability in short term

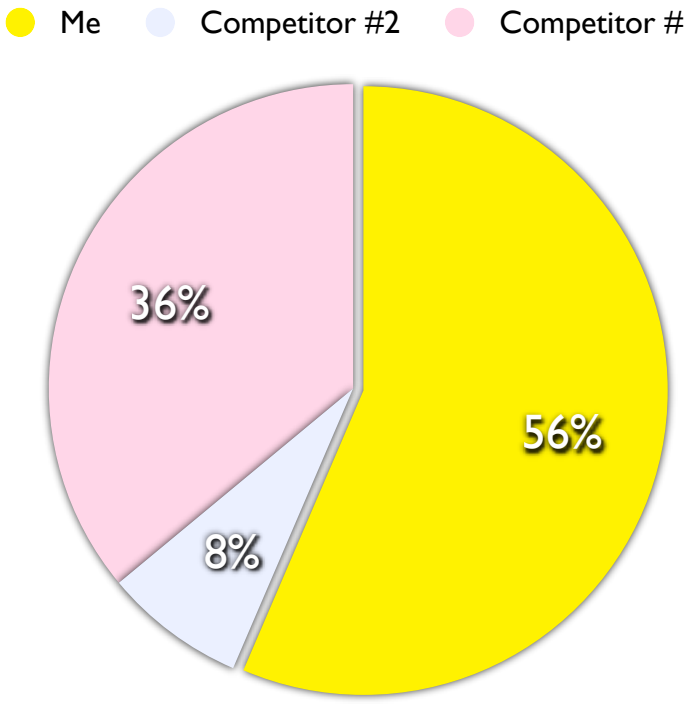
Sustaining technologies have a known market, an existing customer base, they are well defined, because the customers are providing requirements, and they will immediately be sellable, to a large pool of high-margin customers.

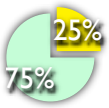
Disruptive technologies are the opposite, they have an unknown market, which means poorly defined requirements, and low profitability in the short term.

But, but,
in the long term, the

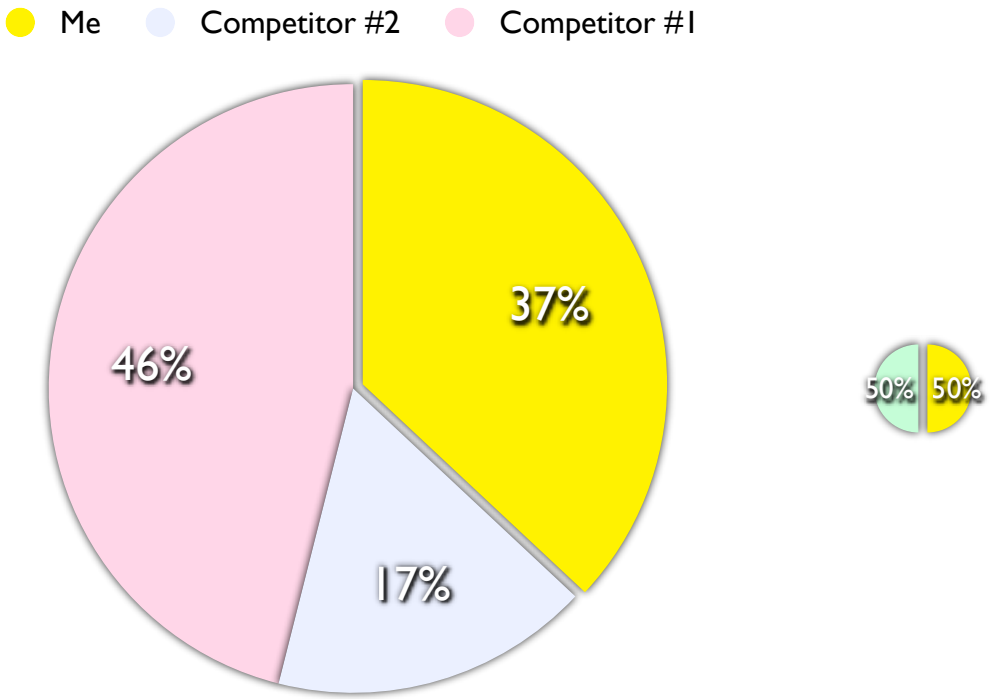
disruptive technology could put you
out of business!
So these established organizations
should be focussing on
disruptive threats! Right?

No,
wrong.





An established organization
that is focussed on a
low margin emerging market
will be
ignoring and



losing market share in a
high margin established market.
That can
make the difference between
profit and loss,

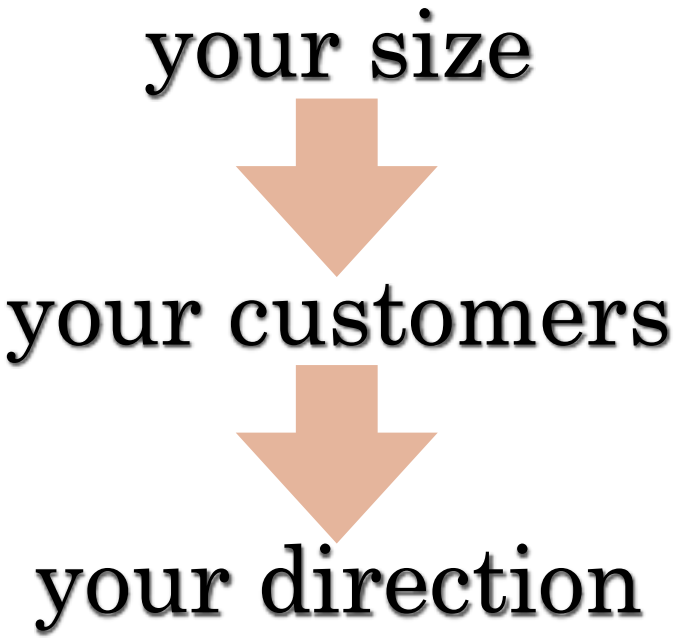
success and failure.

breakfast

The ability to concentrate on
small, potentially disruptive markets,
is a matter of scale...

Small organizations can afford
to focus their resources on small markets,
and can survive on the thin margins
available in emerging technology.

Big organizations
have to operate at a scale
sufficient to meet their
daily revenue needs.



Operating at large scale
provides efficiency,
but
at the expense of flexibility.

Your size dictates
who your customers are,
and who your customers are
dictates your corporate direction.

disruptive technologies

- start crappy and get better
- enter new markets and then move into existing markets
- are not profitable enough to sustain existing enterprises (at first)

So, to recap,

disruptive technologies
start crappy and get better,

they don't enter existing markets,
they gain a foothold in a
new market that
doesn't mind their crappyness and
likes some of their
other attributes, and

they are not
initially profitable
enough to sustain
existing enterprises,
this leads to
new small enterprises springing up,
that eventually
supplant the existing enterprises,

So, is open source a disruptive technology?

Should

these guys be worried?
We don't *really* know yet,
but we
can evaluate the character
of open source
in the marketplace.

open source

- is very cheap
  ($0)
- is infinitely replicable
  (cost of N units = N * $0 = $0)
- is highly re-purposeable
  (take the bits you like, change the bits you don't)

It has three properties
that really
differentiate it from
proprietary software in the
marketplace:

it's very cheap
($0)

it's infinitely replicable
(cost for N units = $0)

it's high re-purposable
(take the bits you like,
change the bits you don't)

existing vendors

- sell software for $N
  ($0 looks like bad price)
- are used to high margins
  (Microsoft corporate profit = 25%)

The incumbent vendors don't want
any part of open source,
because the margins are
terrible, and they are
structured to operate on
very high software sales margins.
For example,

profit

Microsoft Office + Windows	$28 BILLION
Everything Else Microsoft Does	-$3 BILLION
Total Corporate Profit	$25 BILLION

http://www.microsoft.com/msft/reports/ar08/10k_fr_dis.html

The Microsoft Office and
Windows divisions earned $25B in 2008.

The whole of Microsoft
earned $22B.

So, all the other things
Microsoft does
(MSN, Search, Ads,
SQL Server, Visual Studio,
XBox, Mice, Keyboards)
lost $3B.

existing customers

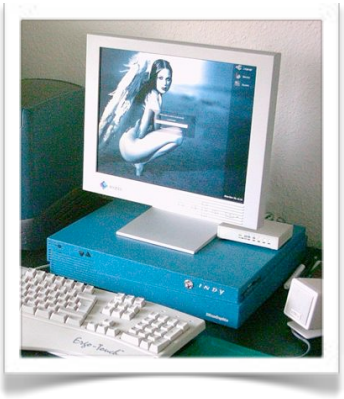
- have long feature lists
- do not like the cost of change

The incumbent
customers generally
don't want any part of open source
either, because the
feature list is usually
shorter, and because of
organizational inertia.

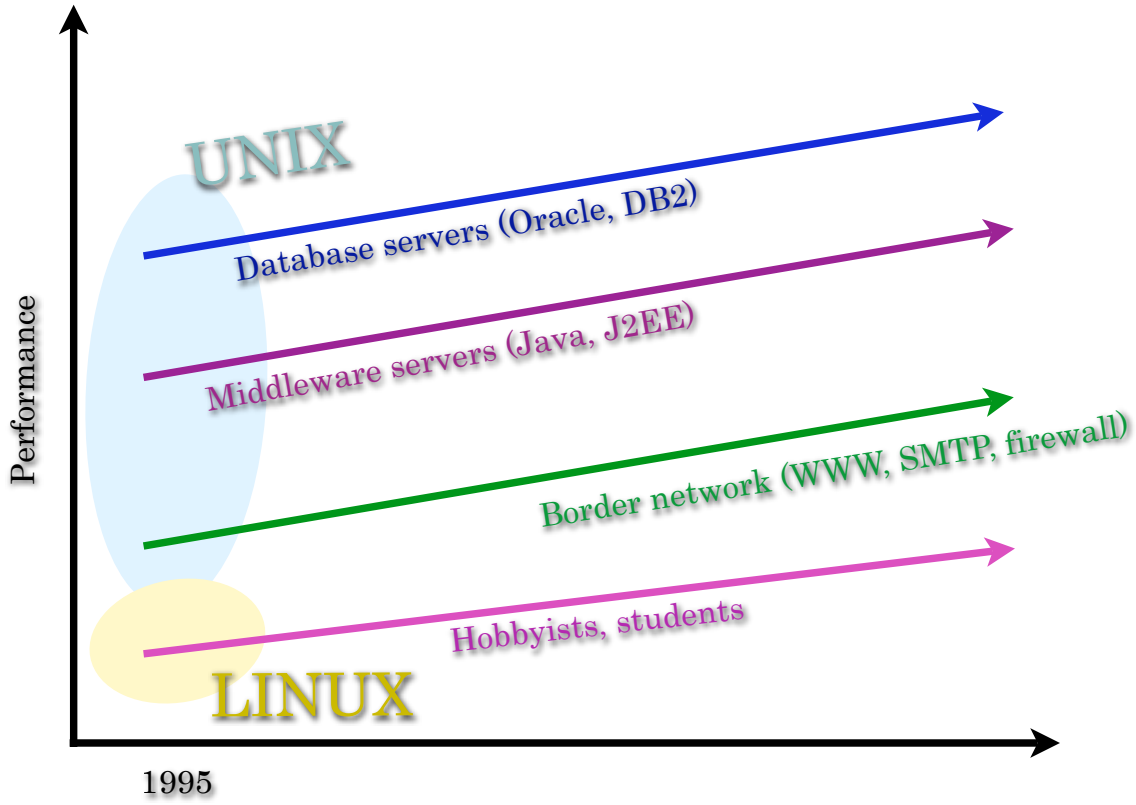
Change is expensive.

But
history is a funny thing.

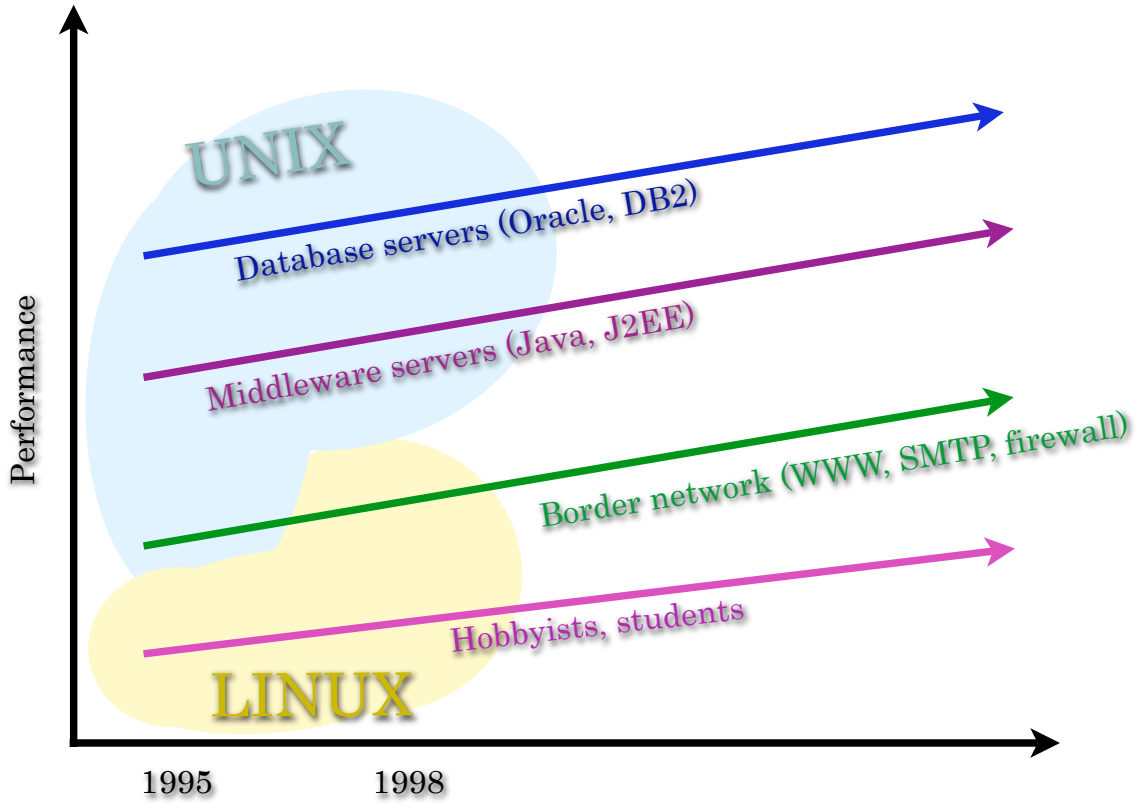
Sometimes,
things can change and
quite quickly.
In fact,
we have already seen
one marketplace flip to open source,
over about 10 years,
and that's UNIX servers.



In 1995,
UNIX servers were made by
Sun, HP, DEC, SGI, IBM.
They used expensive
RISC chips and SCSI disks.
They ran proprietary versions of UNIX,
like Solaris, HP/UX, OSF, IRIX, AIX.



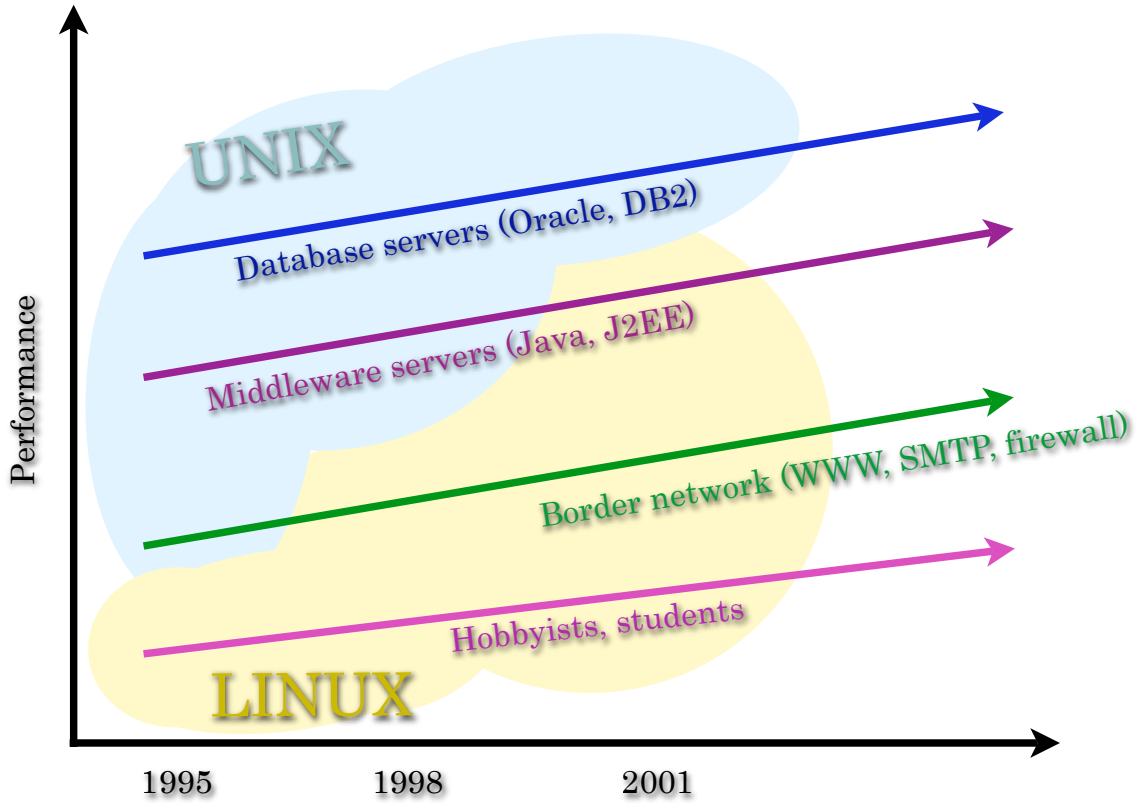
They could handle
big tasks, like running databases
and data processing
(and GIS workstation software!)
and could run network services,
like web servers and mail servers.
Linux was used by
hobbyists and people
(like me)
learning to use UNIX at home.



But, over time,

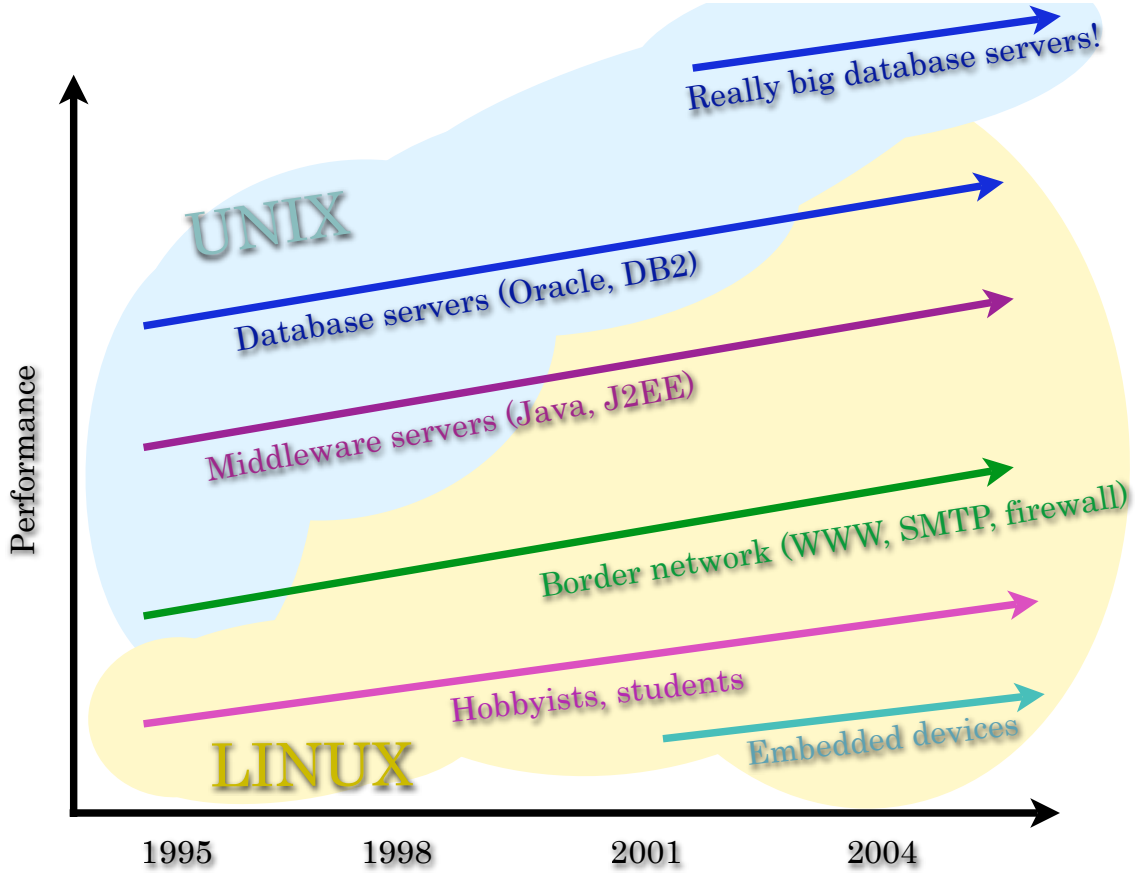
Linux got good enough to run
web services and mail services.
Internet service providers
started to use it
for their infrastructure.

The incumbent vendors
could not lower their prices
enough to compete for the ISP business.
(Which was high volume,
but low margin: ISPs were cheap.)
But they still had
lots of business selling to
Fortune 500 clients who
wouldn't touch Linux.



Linux got better,
the proprietary UNIXes got better.

New Linux companies added things like
support and training
to the Linux value chain,
and the
quality difference between the two got
smaller.



And then
Oracle ported their database to Linux.

Now Fortune 500 companies could migrate
to Linux without being forced
to change their database
at the same time.
Many did.
And
the proprietary UNIXes retrenched
up-market yet again,
to the realm of very expensive
multi-way servers.

- “unix on x86 is a toy”
- “try Solaris x/86 if you want unix on x86”
- “we’re open sourcing java!”
- “we’re open sourcing everything!!”
- “we’ve bought MySQL!!!”
- “help, help!!!!”

Here's how Sun Microsystems reacted to the
encroachment of Linux.

First they tried to laugh it off.

Then they tried to staunch the bleeding
by putting a direct competitor to Linux in the field,
but they couldn't compete on price,
and they never provided the same level of
engineering support asSolaris on Sparc got.
Why? Because Solaris on Sparc had
lots of high margin customers... rationally
resources were better spent there, than on the x86 line.

Finally, Sun tried to coopt the open source spirit in Java.

Then, in their whole software line.

Then they started thrashing about.

And here we are now.

Despite seeing the
Linux/x86 train coming,
Sun has been driven
upmarket to the point

where its remaining
high margin business is
selling servers like these,
ultra-parallel,
huge memory monsters for
high-end databases.

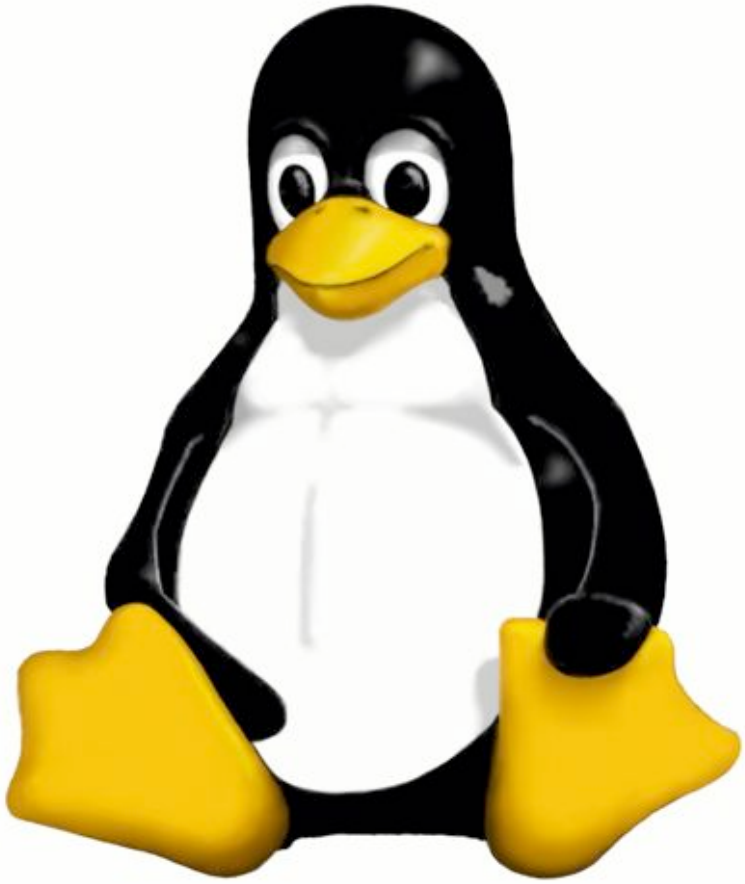
And what happened to the other UNIX server makers?

Compaq bought DEC and killed the Alpha chip and OSF, they were then bought by HP in turn.

SGI left the UNIX business early on, as PC workstations gained enough power to do 3D visualizations.

IBM and Sun have both retreated to the high end.
HP also retreated, and is now selling HP/UX with Intel Itanium servers that nobody seems to want.

Some went out of business, some shrunk their market, all of them basically ceded their relevance to this

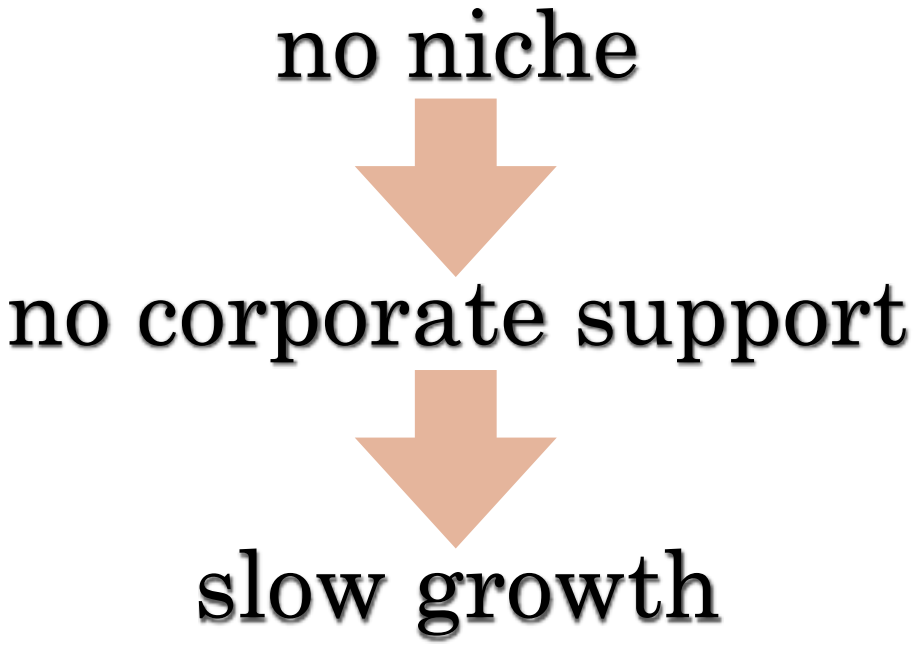


800lb gorilla.
Er, penguin.

OK fine, so
open source has taken
over UNIX servers,

What about desktop Linux?

Like
nuclear fusion
and
universal health care,
the "Linux desktop" has been
"just a few years away"
for the last 10 years,
ironically, the same
years in which Linux
has eaten and fully
digested the UNIX server market.



Why so little success?

First there has been no
uncontested market niche to
carve out a lead.

Which means there has been
no place where a large capital investment in
Linux desktop technology can land,

Which means the pace of development
has been slow.

(As an aside, if Linux were proprietary,
the pace of development in a low investment environment
wouldn't have been slow, it would have been
zero.
The "unkillable", "upstoppable" nature of open source
makes it that much more threatening to existing vendors.)

linux (open source)

- is very cheap
- is infinitely replicable
- is highly re-purposeable

So,
what would a Linux desktop
niche look like?

It would be a place
where the Linux desktop
is relevant to a
wide base of users.

It would play to the open source
strengths, of
cheapness,
replicability and
customizability.

- slow processor
- small memory
- $200 price point

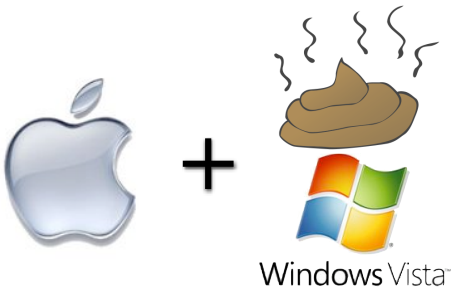
- Windows
  - fast processor
  - large memory
  - $20-50 OEM price
- Linux
  - slow processor
  - small memory
  - $0 price

The niche may have arrived, with introduction of the netbook computer, and the resurgence of Apple as a viable competitor in the notebook and desktop computer market.

Netbooks retail for only a couple hundred dollars,

They have technical specifications that play to Linux's strengths. Most importantly, the margins on selling operating systems for netbooks might just be low enough that Microsoft won't enter the market.

strategic
- IE
- MSN
- XBox



defensive
- protect windows

Microsoft has traditionally treated Windows as a cash cow, directing profits from the operating system monopoly into strategic investments aimed at fending off disruptive change.

The return of Apple, and the failure of Vista has put Microsoft on the defensive in their core business for the first time in 15 years.

The fact that early models of netbooks shipped with Linux operating systems, that they were generally described as "good enough", and readily accepted by the student target market could be bad news for Microsoft.

iPhone

- proprietary
- premium priced
- superior product

Android

- open
- mass-market priced
- adequate product

Ironically, Apple may find a similar dynamic
at work in the smart phone business.

I assume everyone knows about the iPhone already.

Google Android is not a phone, it's a phone operating system.
Google developed it, then open sourced it.
Phone makers will supply their own hardware,
and customize Android to supply the software
interface for their hardware.

The iPhone OS is a superior product,
but with a price premium
and a closed development process --
what apple wants, apple gets.

The Android OS is not as good as the
iPhone, but it's "good enough", and it
will be ubiquitous and free to any
phone manufacturer.

So, who would you bet on?

Bear in mind,

the last time a superior
Apple product met an adequate but
more open solution
in the marketplace,

the result wasn't pretty.

anyhow...

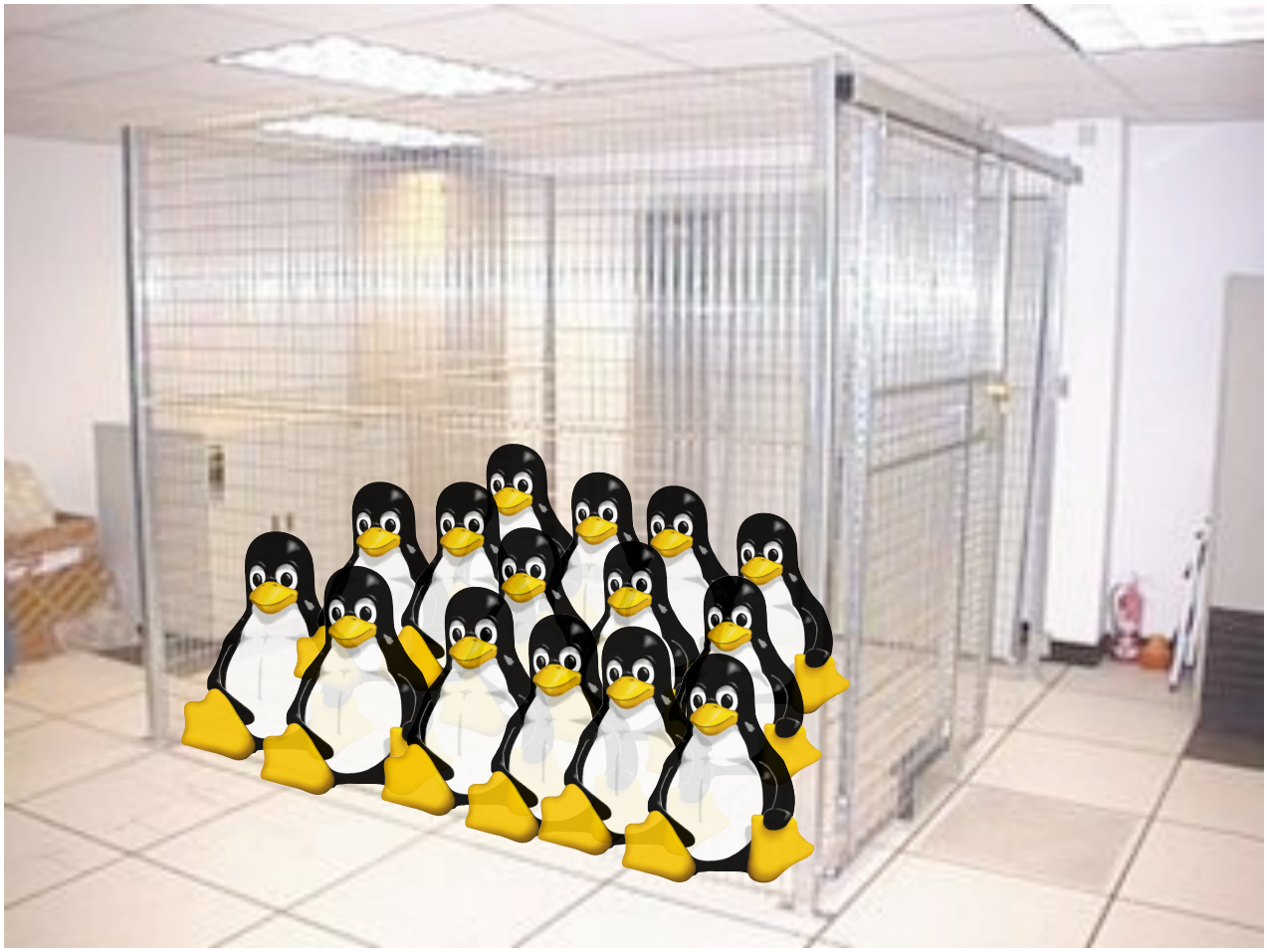
“When will there be an open source replacement for ArcMap?”

So,

let's address an incredibly
common question I get when
talking about
open source to
geospatial audiences:

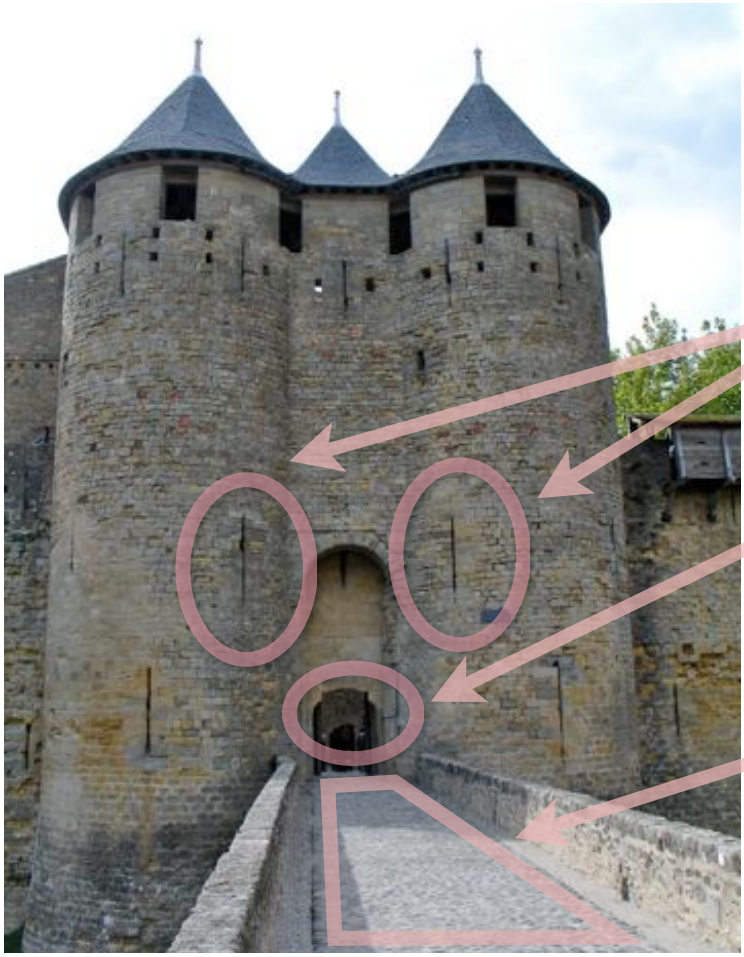
"When will there be an
open source replacement for
ArcMap?"
I think the "when" is a
particularly nice touch.

Not for a while.



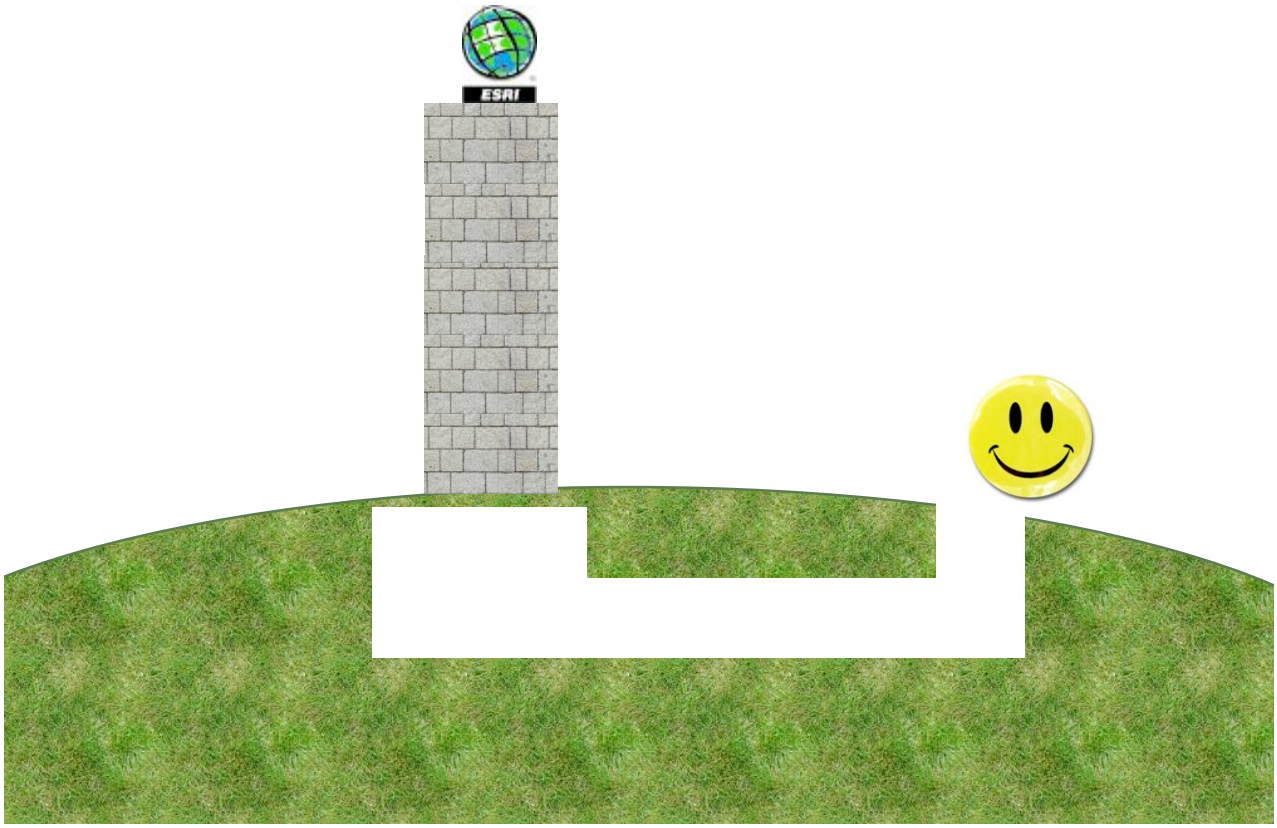
3.5" drives didn't
replace 5.25" drives
right away.
They found a
side market and
eventually were
good enough.

Linux servers didn't
drop from the sky running Oracle,
ready to
handle the data center,
it took a decade.
And on the desktop,
things seem to work the
slowest.
Linux only now
starting to crack
new niche markets for
desktop software.



Disruptive change is
like storming a castle.

You don't want to rush the gate.
because you have to cross a
kill zone, where you'll be subjected to a
withering cross-fire, from the
arrow slits, and your reward when you
reach the gate will be getting
trapped behind a portcullis and
drenched in
boiling oil.



What you want to do,
is find a safe place,
far from the walls,

and quietly dig a tunnel.
Undermine the walls,
over a course of several weeks,
and eventually they will tip over naturally,
of their own accord.

“The stone age didn’t end for lack of stones.”

"The stone age didn't end
for a lack of stones."
The Saudi oil minister
liked to use this phrase
in the 1970s
when asked about future oil supplies,
which I think was
mighty cheeky of him.
But it is true
of all
kinds of things.

mainframe
1970

mainframe
2008

The mainframe age didn't
end for lack of mainframes.
In fact, you can still
buy a mainframe from IBM,
if you want one.
What did end was the
relevance
of mainframe technology
to the larger computing marketplace.
The mainframe was
driven
from the mainstream into a niche.

“What is IBM’s next move?”

1970

“Tell me, I must know!”

2008

yawn

In 1970, the question
everyone in IT wanted the answer
to was
"what is IBM's next move?"
If was a question
with great strategic value.

If you knew what IBM was going to do,
you knew what IT would look like in the future.

Now we don't care.

anyhow...

What were we talking about again?

Ah right!

“When will there be an open source replacement for ArcMap?!?”

Ah right!

The age of ESRI dominance of GIS
won't end with ESRI going into Chapter 11,

“What is ESRI going to do?”

it will end when
"what is ESRI going to do"
ceases to be a question of import
when discussing the future of GIS.

where is the cutting edge of GIS?

In some ways,
the age of ESRI is already over.

The growth of internet mapping,
and the entrance of
huge firms not named ESRI
has already changed the
market dynamic incredibly.

- data capture
- ad hoc analysis
- cartographic production
- scientific users
- desktop software

- mass markets
- real-time constrained analysis
- consumer products
- multi-user web systems

The places where ESRI has built an insurmountable lead in technology and processes the traditional GIS operations of capture, analysis and printed map making, are not the places where our field is going to be growing for the next decade, the mass market of consumer applications delivered over the web to new devices in real time.

scratch a startup, find open source

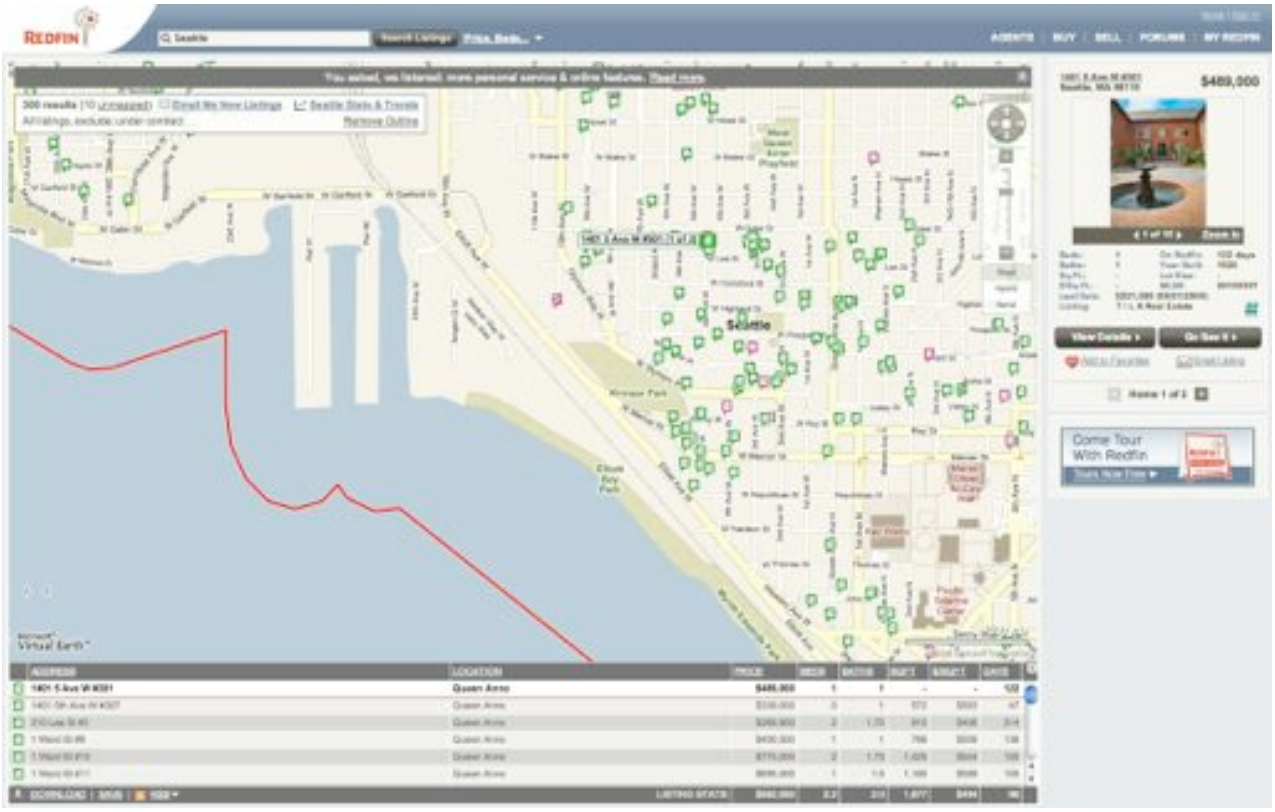
You can already see
this trend in the new
non-traditional GIS
marketplace.
The people building the
next-generation
of consumer facing apps are using
open source tools, and tools from
Google and Microsoft.

Here's a bunch of
brand new companies,
many venture funded,
with very spatial centric
businesses, and the
technologies they are using.

(I know PostGIS,
so there's a
PostGIS-centric bent to this list.)

ZONAR Systems

Zonar Systems,
builds their own
fleet tracking GPS devices and
manages all the data streamed
back in PostGIS,
with Google Maps and Mapserver
as other components of their application.

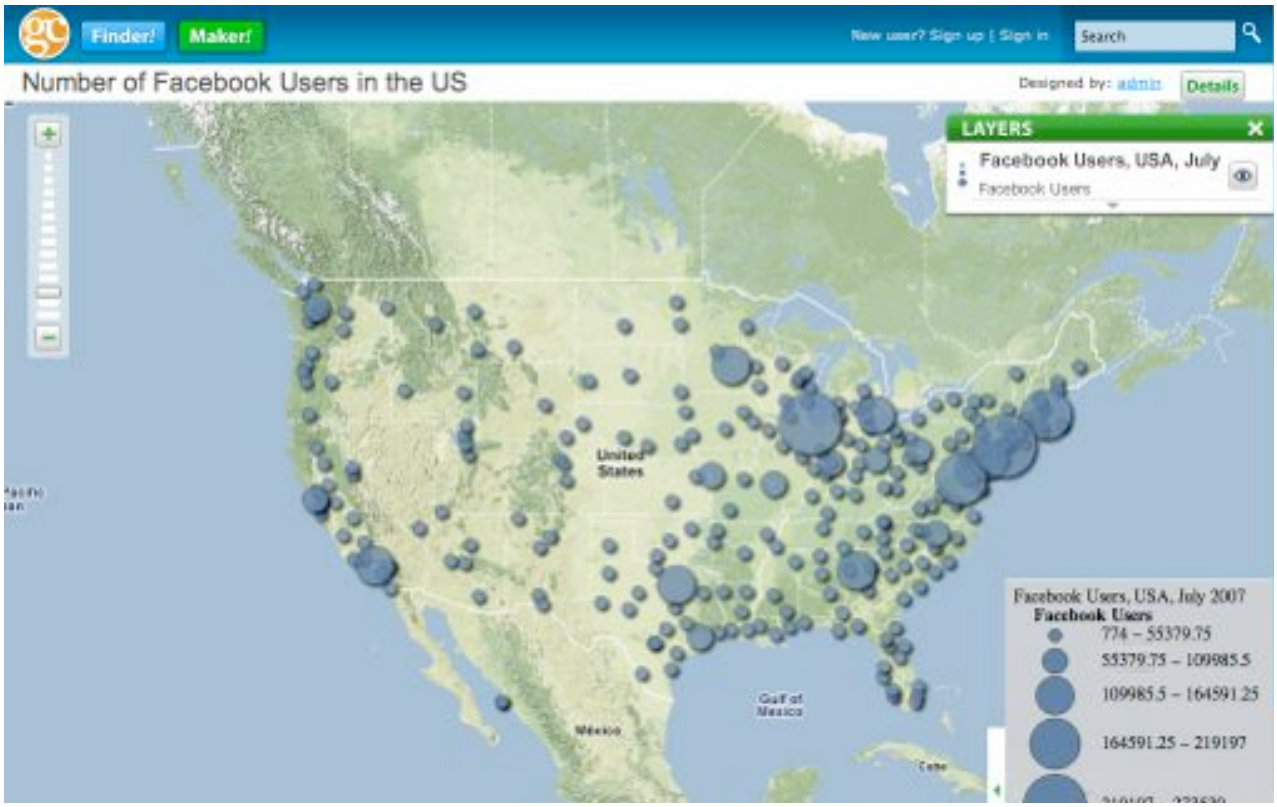


REDFIN

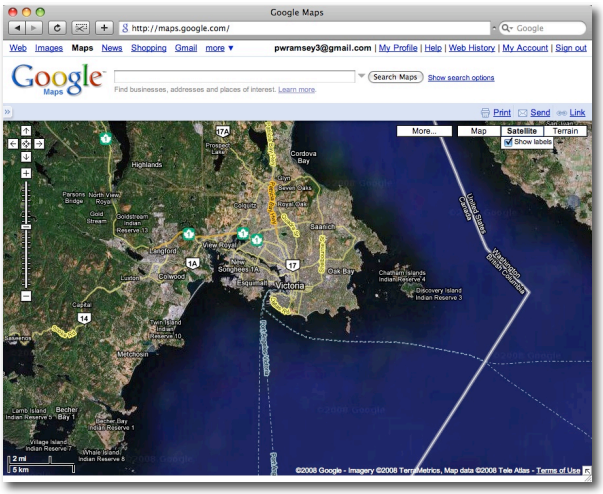
RedFin, a real estate data startup,
(yeah, bad timing)
manages all their data in
PostGIS and uses Virtual Earth for the UI.

WeoGeo, a map sharing site, manages their data in PostGIS

geocommons Beta

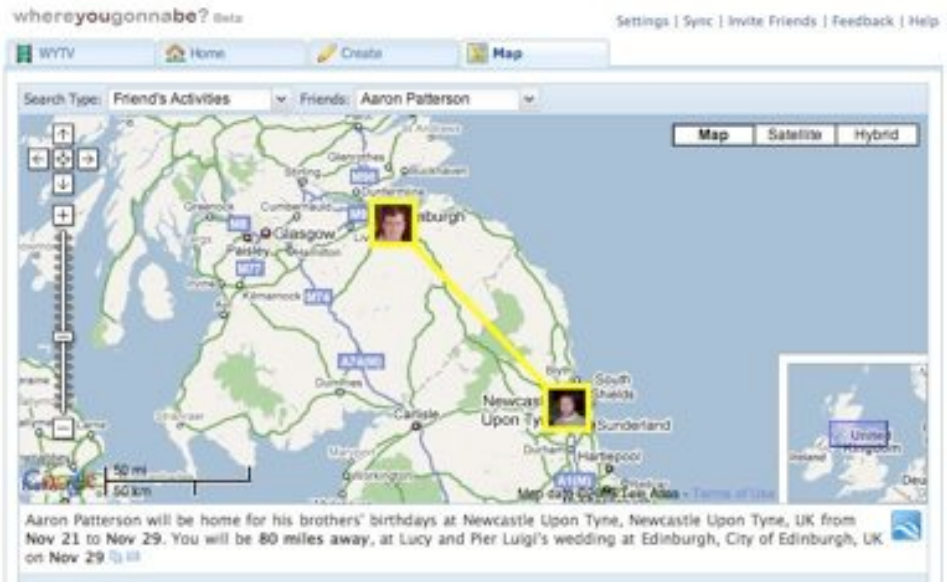


GeoCommons, a data sharing site, manages their data in PostGIS, and uses Google Maps for their UI.



Google itself, uses PostGIS to manage the metadata associated with their vast holdings of raw imagery.

whereyougonnabe

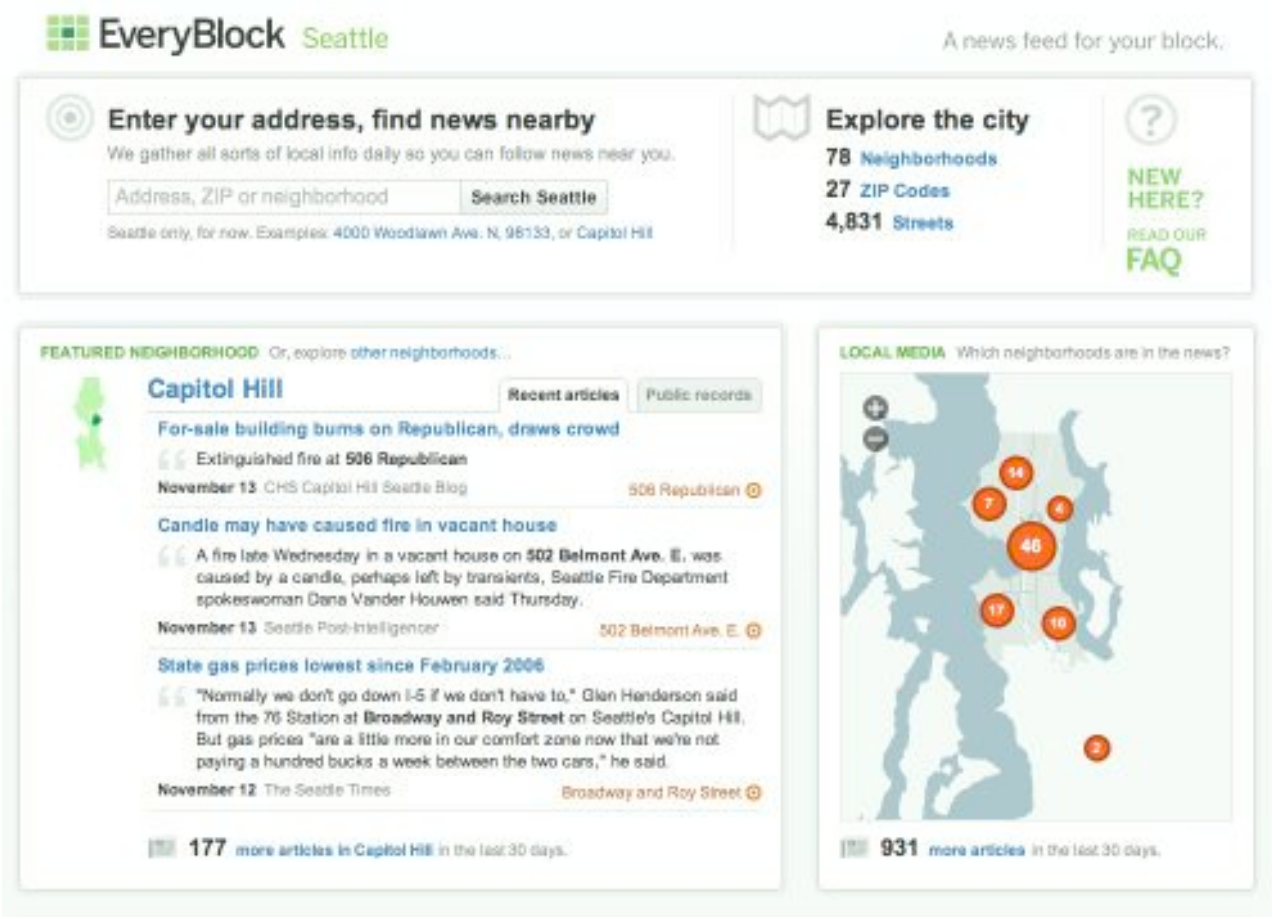


WhereYouGonnaBe,
a spatial add-on for FaceBook,
founded by
Peter Batty, the former CTO of
InterGraph uses
PostGIS for their data.

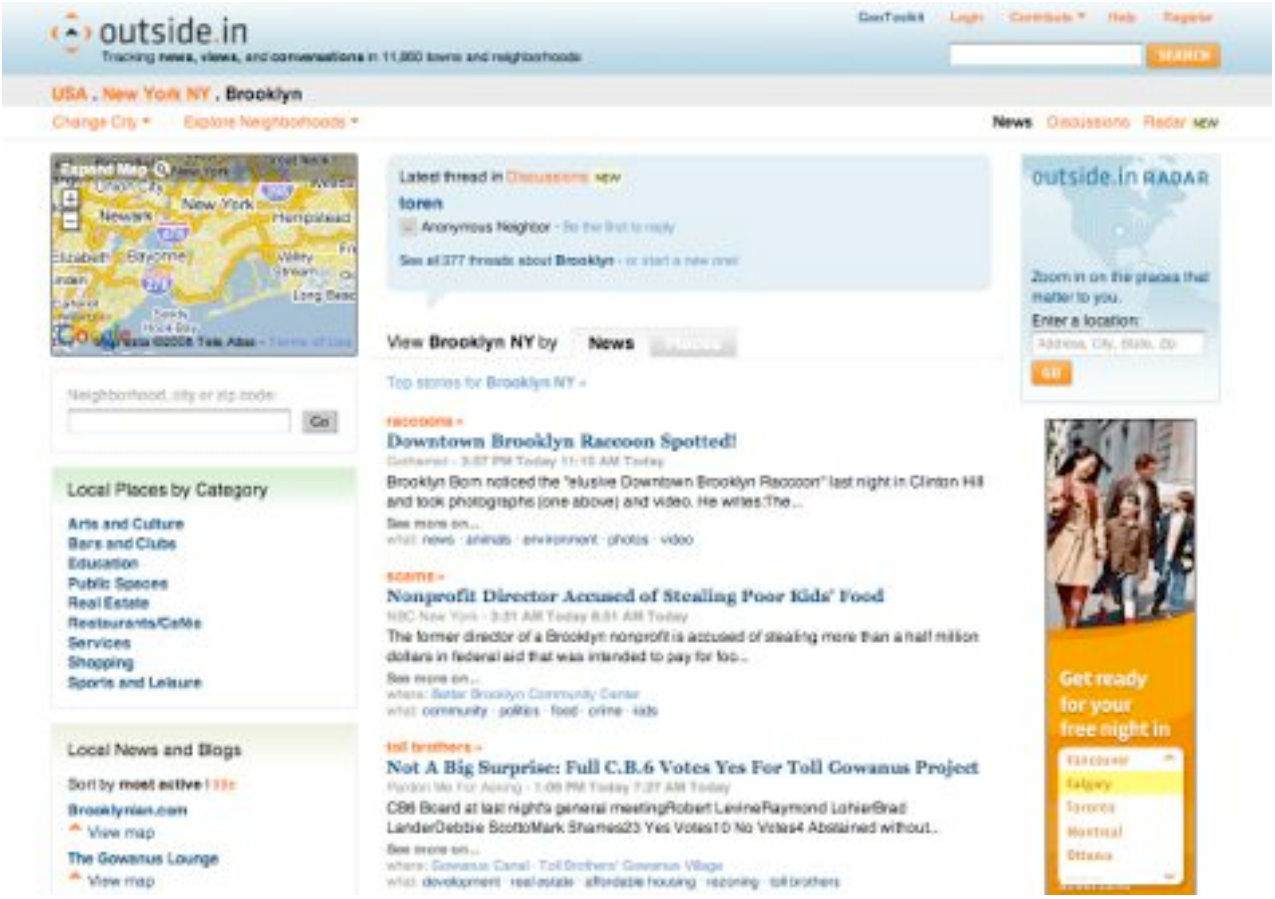
GlobeXplorer

DIGITALGLOBE

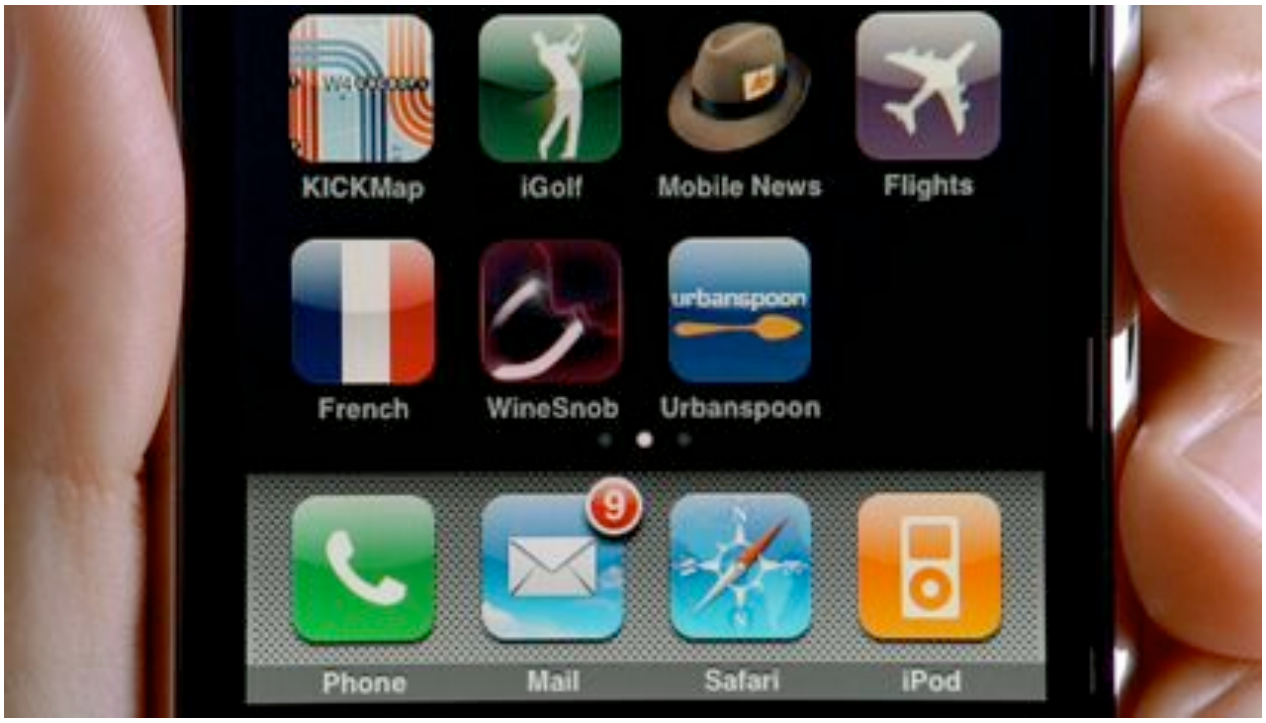
GlobeXplorer uses
PostGIS to store image metadata,
and vector data, and
Mapserver to render vector data.
They were purchased by
DigitalGlobe three years ago.



Everyblock, a "hyperlocal news services"
stores their data in
PostGIS, uses
Mapserver to render their map tiles and uses
OpenLayers for their UI.



Outside.in, Another "hyperlocal news service", also stores their data in PostGIS.



The Urban Spoon,
which I recently saw featured
in this Apple television commercial,
uses MySQL to drive their
"shake'n'eat" iPhone application,

recently
recently

All these folks have in common that they
built their
infrastructures
recently and
therefor evaluated their technical
options

recently.

open source is good enough

and it's a heck of a lot cheaper

And for building a
web-based multi-user service,
most evaluations are going to come to the
same conclusions:

"open source is good enough"
"and it's a heck of a lot cheaper"
Does this formulation
sound familiar at all?

How about...

the minicomputer
is good enough

and cheaper than
the mainframe

or

the PC is good enough

and I don't have to beg IT for system time

or

this laptop is
good enough

and I can take it
with me when I
travel too

it's the disruptive technology
soundtrack, this is what you hear

this [option] is good enough
[for the default need]

and [has some extra compelling attribute]

as a disruptive technology moves upwards into the space previously held by an incumbent technology.

We are just beginning to see open source poke it's head into the geospatial world.

But it's not going away.

It's a disruptive technology.

And it's going to change the
way we think about GIS software
forever.

fin

Thanks!
Do we have
Time for questions?