Innovation at the Waist

musings

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http://www.nlnetlabs.nl/

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Q'AF

Who am I

EVANGINEER

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Why am I here

Open

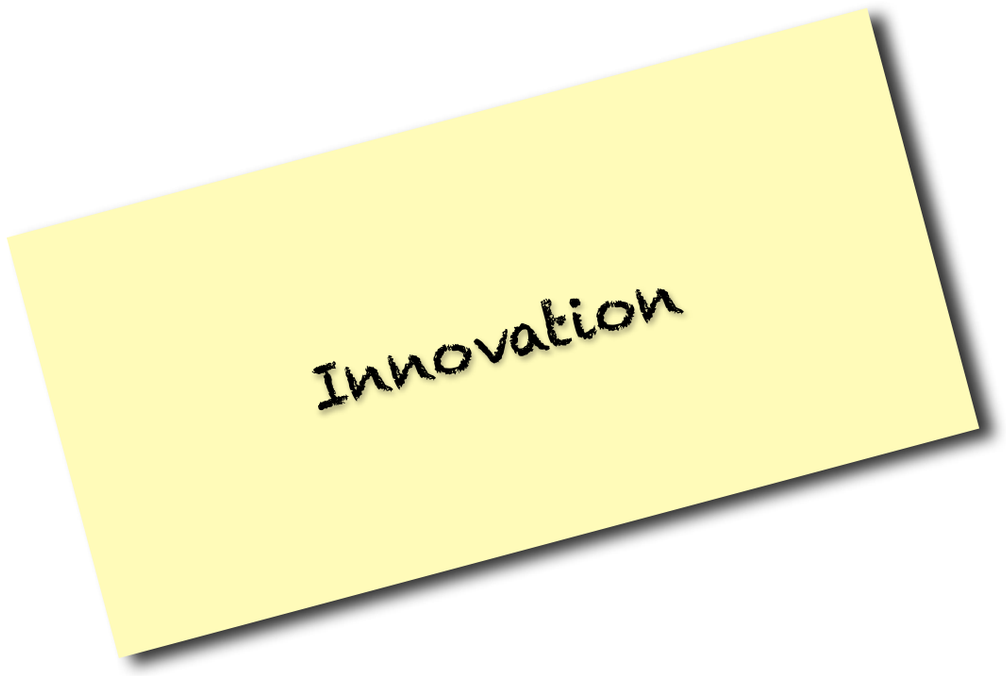
Trustworthy

Global

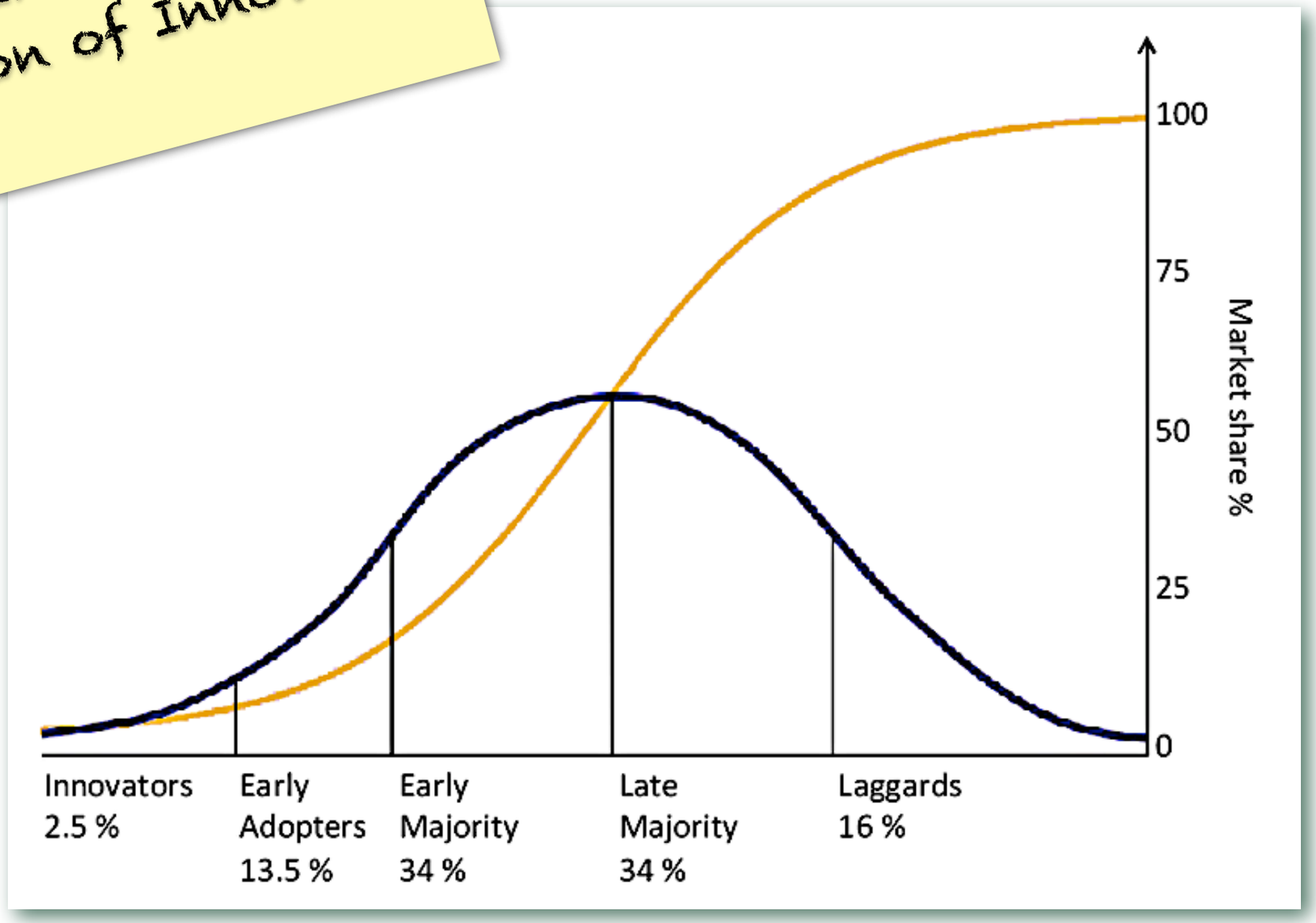
INNOVATION

We (technical internet community) introduced a number of technologies like IPv6 and DNSSEC that have a difficult time being deployed.

Is it possible to innovate at the waist?



Everett Rogers
Diffusion of Innovation



Source: http://en.wikipedia.org/wiki/Diffusion_of_innovations

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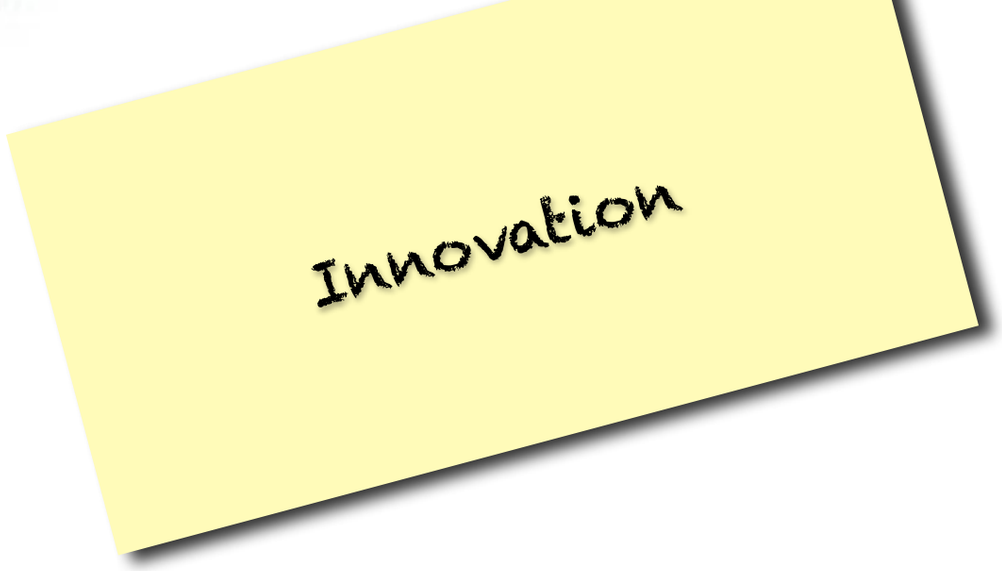


The Deployment Curve is about take-up of innovation.

Everest looks at what Decision Stages individuals go through.

At any point on the deployment curve you will have a mix of individuals at different decision stages

5 Decision Stages

Knowledge

Persuasion

Decision

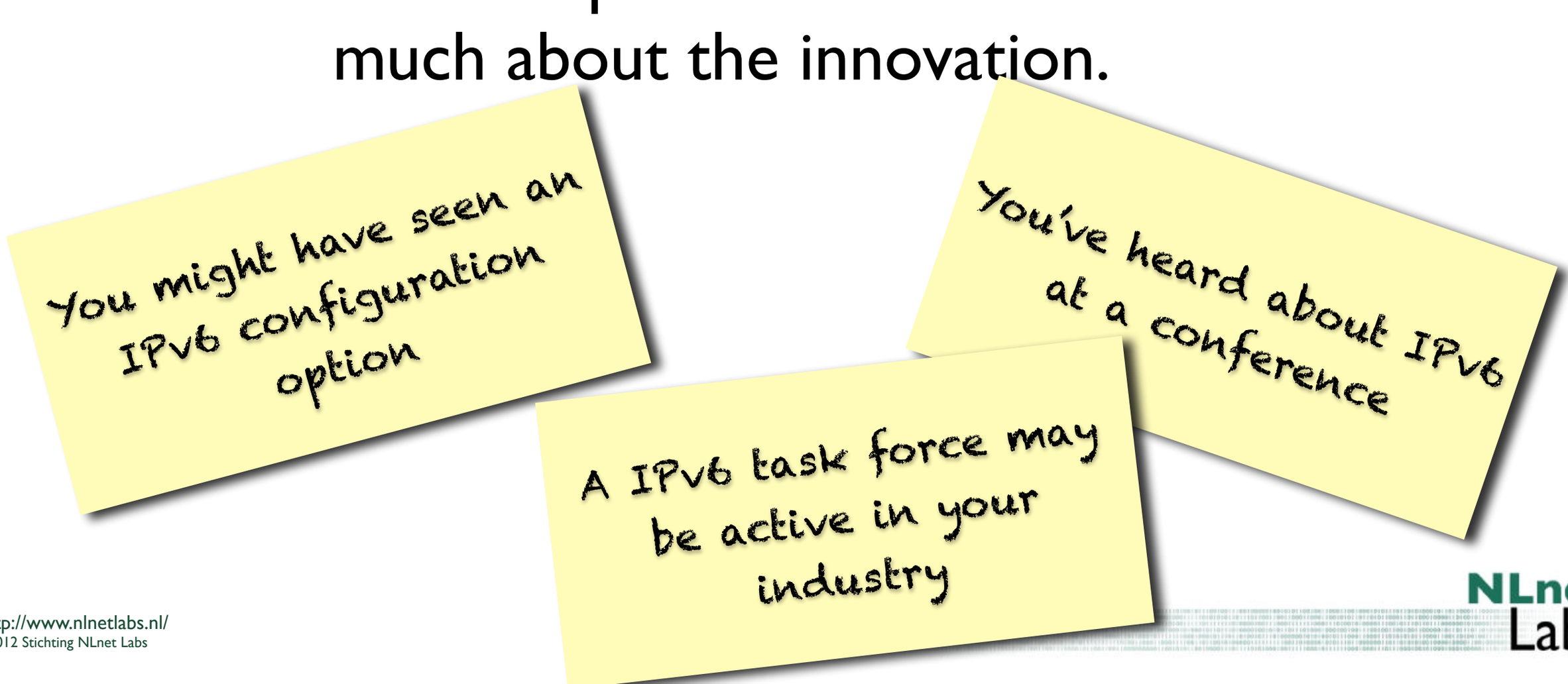
Implementation

Confirmation

5 Decision Stages

Knowledge

Individual is exposed but doesn't know much about the innovation.



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5 Decision Stages

Individual seeks more information

Persuasion

Read the IPv6 Wikipedia article

Take a course or workshop

Talk to colleagues

5 Decision Stages

Individual weighs risks and benefits and takes the decision to adapt or reject

Decision

Often: Engineer decides to persuade the Management

Management then is at stage 1

Once decision is made it will take new persuasion to reconsider

5 Decision Stages

Individual implements the innovation and may seek further information

This is where the engineers do a lot of work and find out they lack information or skills

Implementation

5 Decision Stages

Individual confirms the decision that implementation useful and deploy to full potential

Typically this is the stage where the pilot is moved to production.

Confirmation

New questions to ask

Knowledge

Persuasion

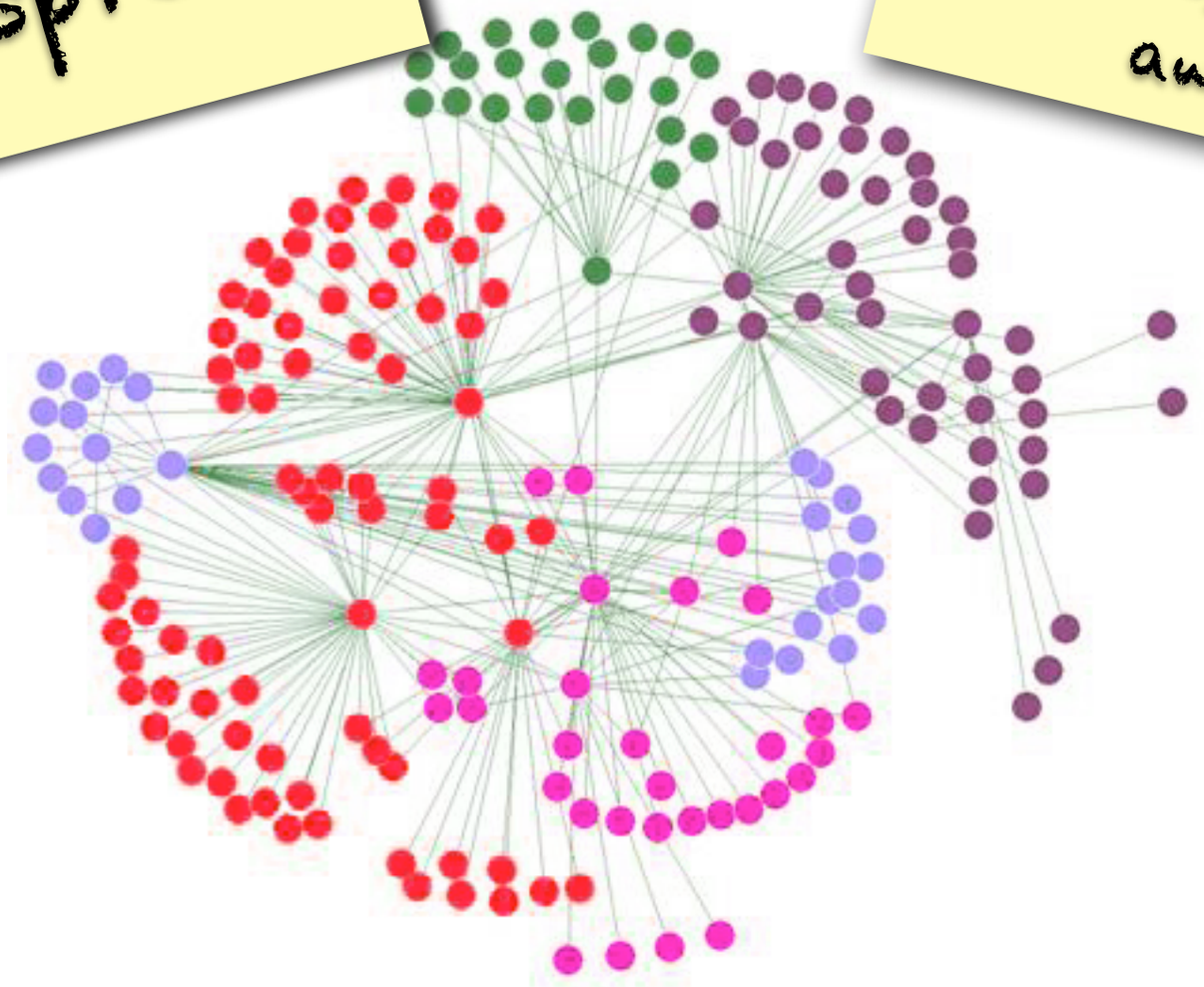
Decision

How does knowledge spread?

How are decisions made?

Social network drives spread

Spread works most effective when: Shared values, but lack of awareness



Source: http://en.wikipedia.org/wiki/File:Social_Red.jpg

Decision types: optional, collective, or authoritative

- Optional Innovation-Decision: This decision is made by an individual who is in some way distinguished from others in a social system.

On Internet scale the decision to deploy IPv6 is Optional

- Collective Innovation-Decision: This decision is made collectively by all individuals of a social system.

- Authority Innovation-Decision: This decision is made for the entire social system by few individuals in positions of influence or power.

We talked about Individuals making decisions about innovation

What are the properties of the innovation that inform the decisions of that individual?

Relative Advantage

Complexity/ Simplicity

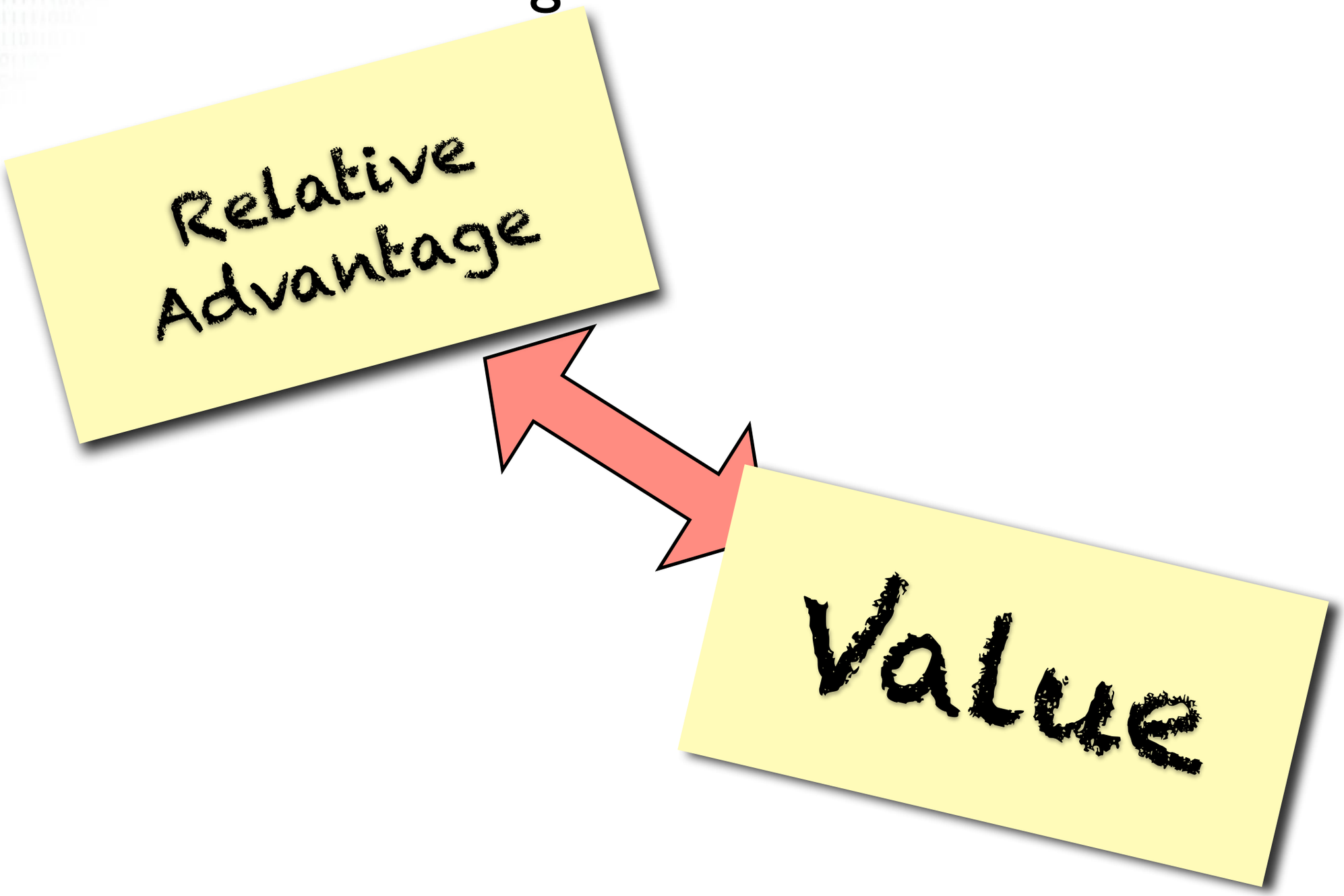
Trialability

Compatibility

Observability

- Is the innovation difficult to use, if so the individual that needs to make the decision is less likely to adopt it
  - Does the innovation bring relative improvement?
- Is the innovation compatible with what the individual already has deployed
- Can the individual try the innovation? Is it testable?
- Does the innovation have some cool? Can you talk about the innovation at the bar?

Back to relative advantage



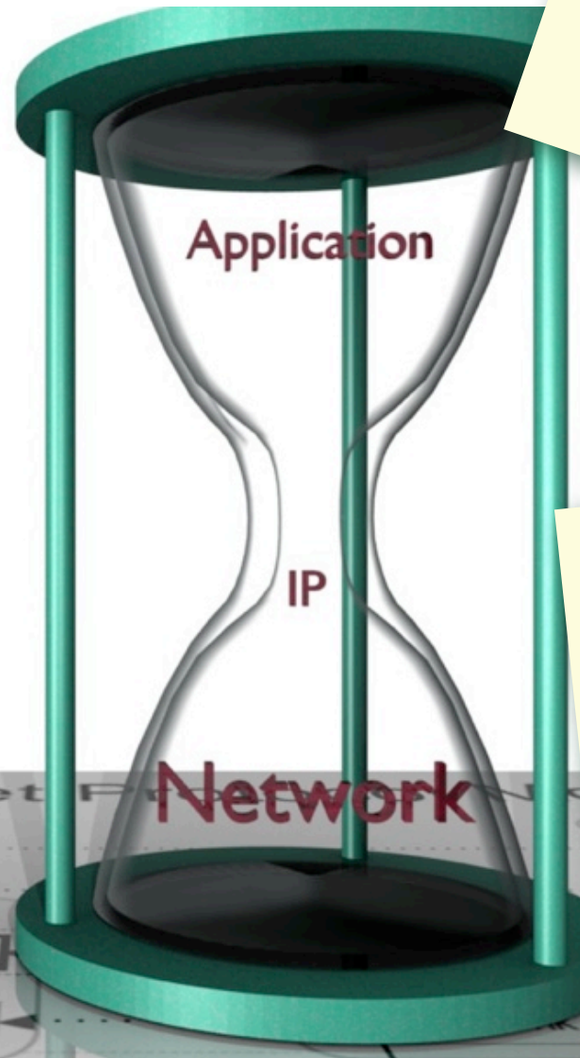
This is where value comes into the picture

Value of networks

n log(n)

Metcalfe's law

- Application Layer: Applications use IP for connectivity



The Internet Hourglass

- IP (IPv4!) is the common substrate

- The Network Access Layer: Components in the Network Access Layer deliver IP connectivity

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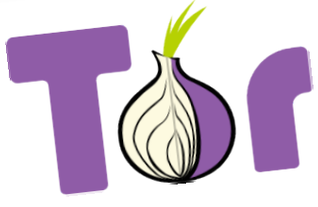
The IP API as the common open interface to the network



Permissionless Innovation

Mini note: HTTP is more and more the de-facto substrate

New applications are conceived and deployed almost daily

Proprietary

Open Source

No Imposed Business Model

Freeware

Privacyware

Payware

Adware

Imagination is the limit

Relative Advantage

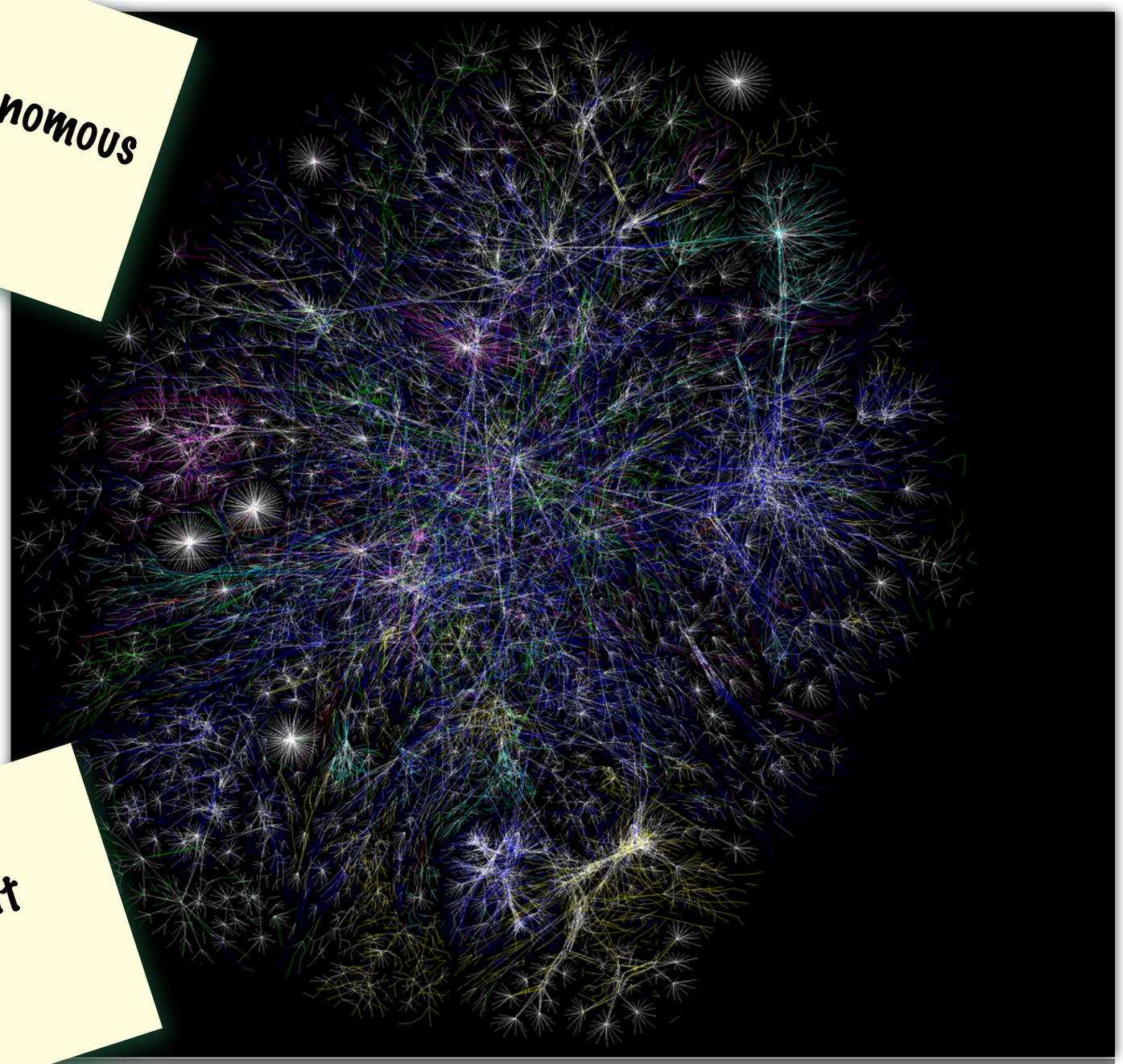
Complexity/ Simplicity

Trialability

Compatibility

Observability

- Independent Autonomous Networks



- Serving different markets

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Image source www.opte.org, creative commons license

The Price of Bandwidth, in bulk, per Mbps

A EUR80 fiber cross connect:	$0.01
Internet Exchange traffic:	$0.25*
Backbone traffic Western Europe:	$0.50
Transatlantic traffic, wholesale:	$1
Internet Transit, wholesale:	$2
Internet Transit, retail:	$15
Broadband Internet, consumer:	$50
National Ethernet service:	$180
3G mobile data, national:	$11,400
GSM voice call, national:	$483,840
3G mobile data, roaming low:	$834,000
3G mobile data, roaming high:	$3,127,500
GSM voice call, roaming:	$3,338,496
SMS Text Messages:	$210,000,000
SMS Text Messages, roaming:	$1,166,400,000

Western Europe, early-mid 2011 (based on 10Gbps or 300GB)

Table courtesy of Remco van Mook, Equinix

SDN

MPLS

SONET

IEEE 802.11

ADSL

VDSL

Docsis

Deliver IP to the edge and route with your peers

Innovating the fabric is an internal decision

Compatibility

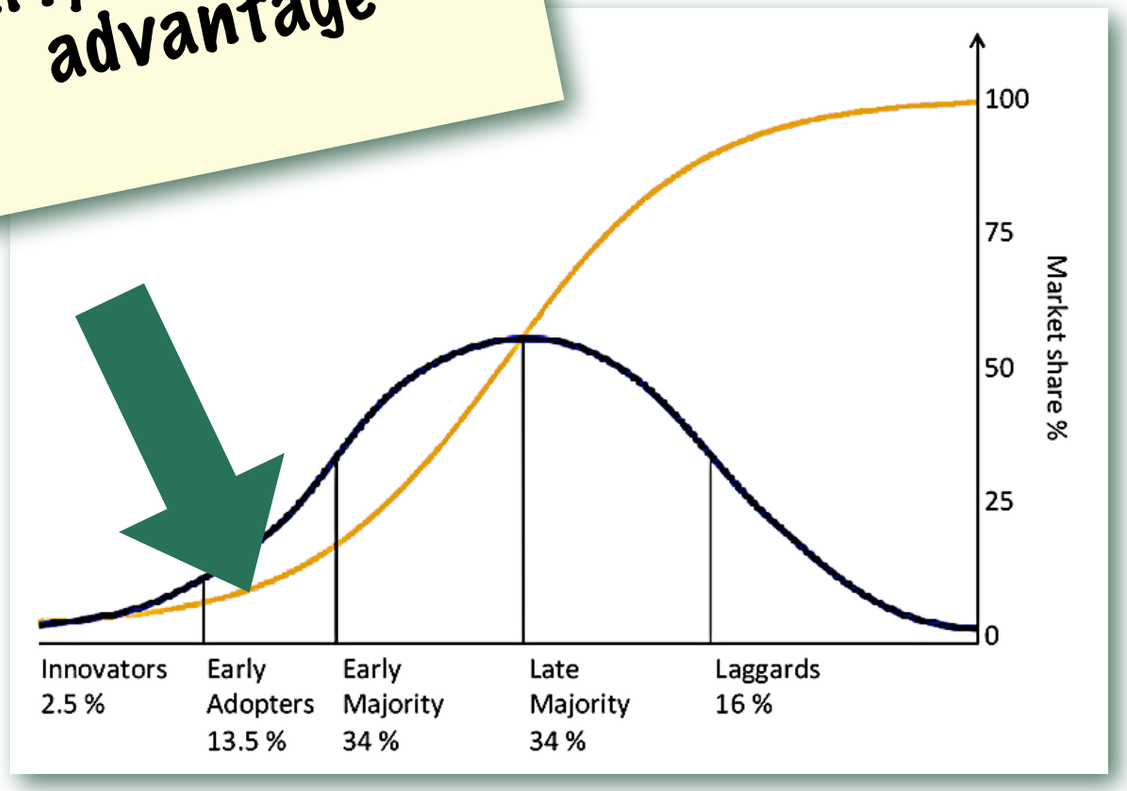
Trialability

Observability

Innovative gear pushes the packets cheaper

capex and (temprorarily increased opex) have known risks

Early deployment advantage



Early deployment advantage: Commodity price remains the same while delivery price drops.

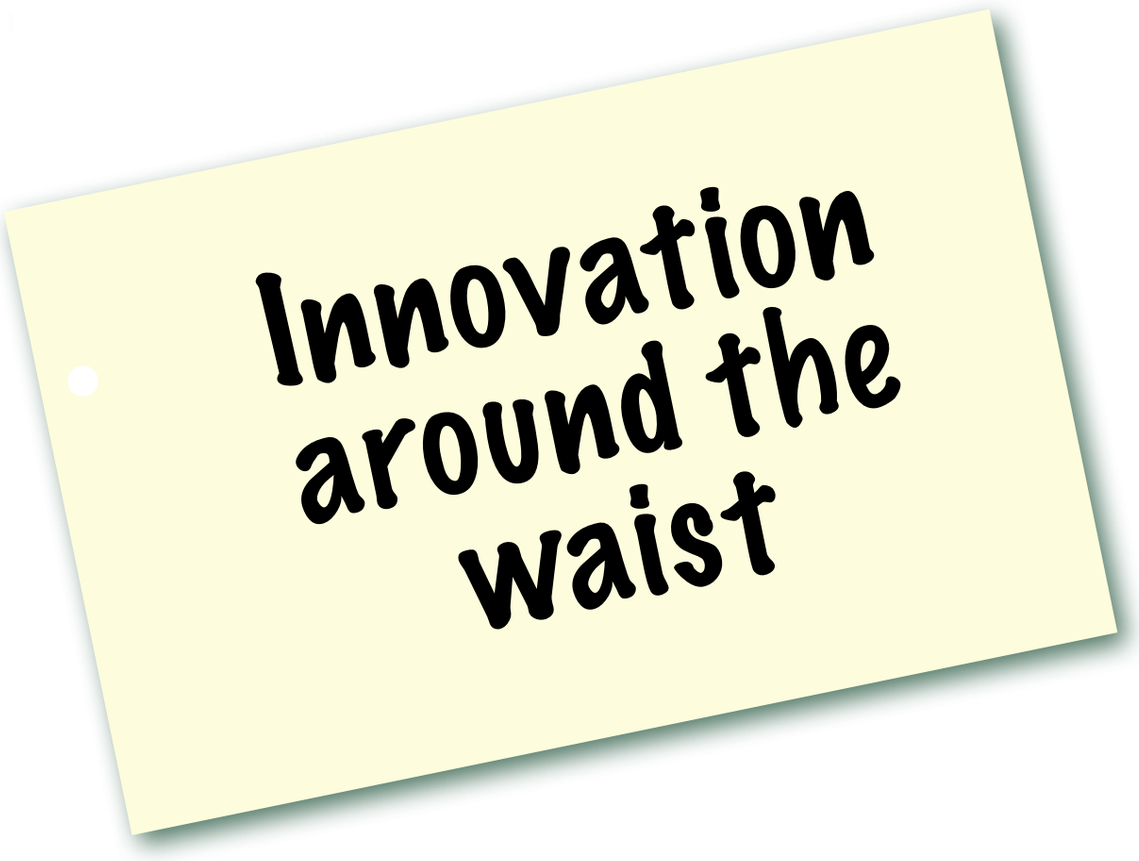
Late move disadvantage: Commodity price drops while delivery price remains the same

RAT HOLE

Earnings don't make it through the waist

Network Providers seek to monetize the network to fund their investments

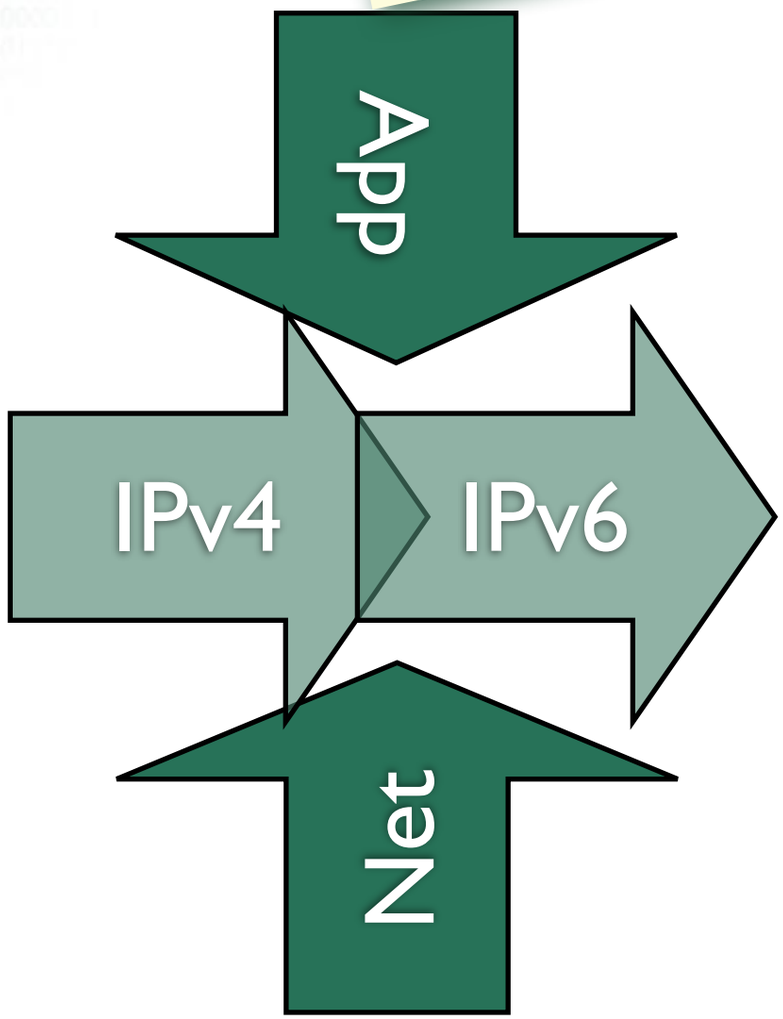
Most value creation in the top half is by different players than the investment on the bottom half



DNSSEC

Routing Security

- Both Application and Network Layer need to transition



From the individual innovators perspective

~~Relative~~ Advantage

~~Complexity~~/ Simplicity

~~Compatibility~~

~~Trialability~~

~~Observability~~

n log(n)

IPv4: n=2x10^9

IPv6: n=O(10^6)

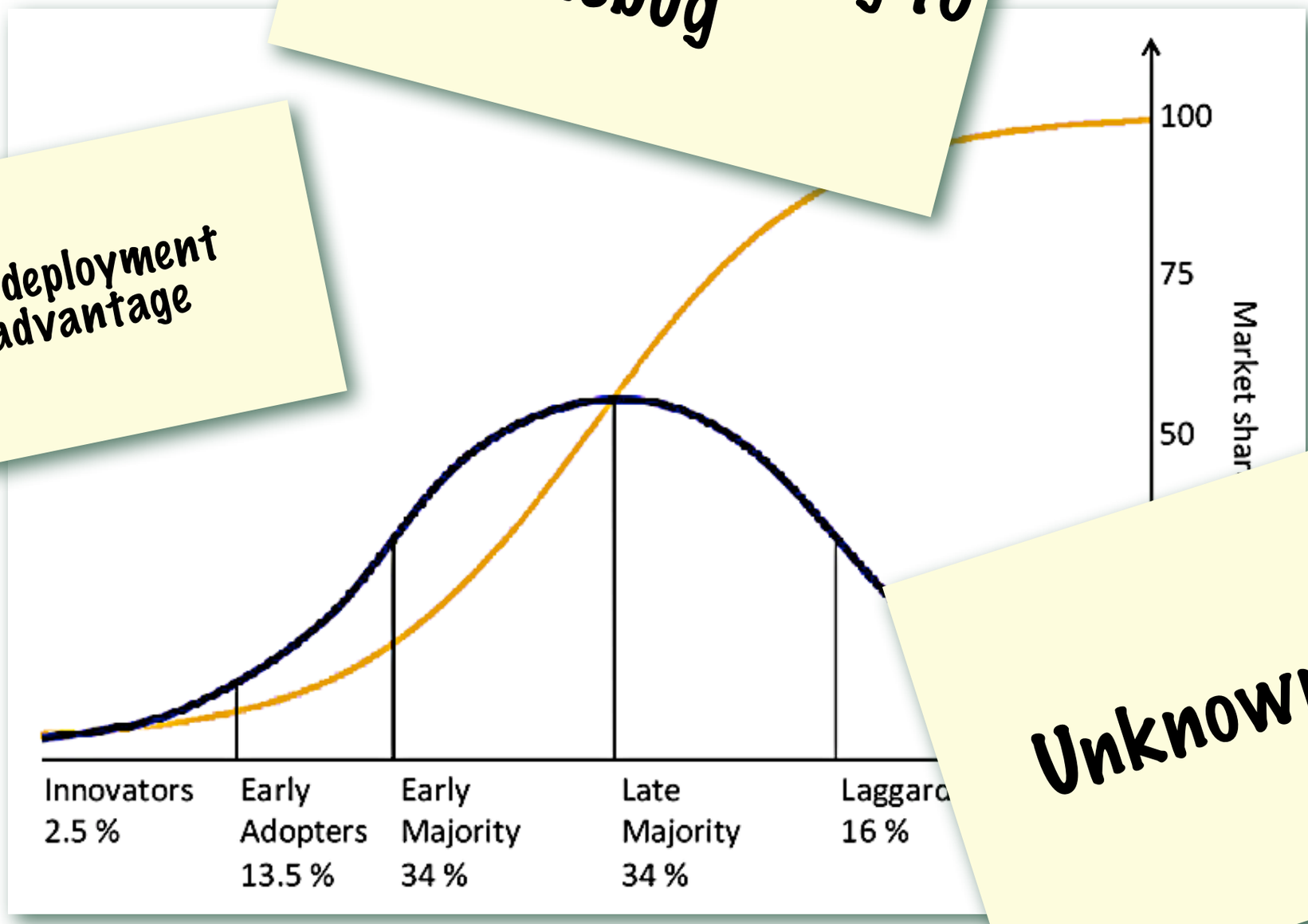
The new kid on the block should not spoil the fun for the others

Any reduction to the value of the network is unacceptable

These numbers are estimates for argument sake

Innovative gear makes you having to debug

Early deployment disadvantage



Unknown risks

Dark Picture


How to push the needle?
Deployment Panel
none
full
IPv6
Deployoforce
000
INDUSTRIES

In absence of the magic Deployoforce

What can be done to stimulate success of the innovation

Group

Credible large N in the future:

Identify attractors

Share the sense of direction/ vision

Reduce costs

Individual

Reduce complexity

Increase relative advantage

Maintain compatibility

Enable trialability

Make Observable

Some of the knobs that can be turned

Group

Credible large N in the future:

Identify attractors

Share the sense of direction/vision

Reduce costs

Regulation

Subsidy

taxation

Market Creation

Standardisation

Availability in Products

Open Source

Individual

Good Tools

Free Software

Subsidy

As ádd-on´

Reduce complexity

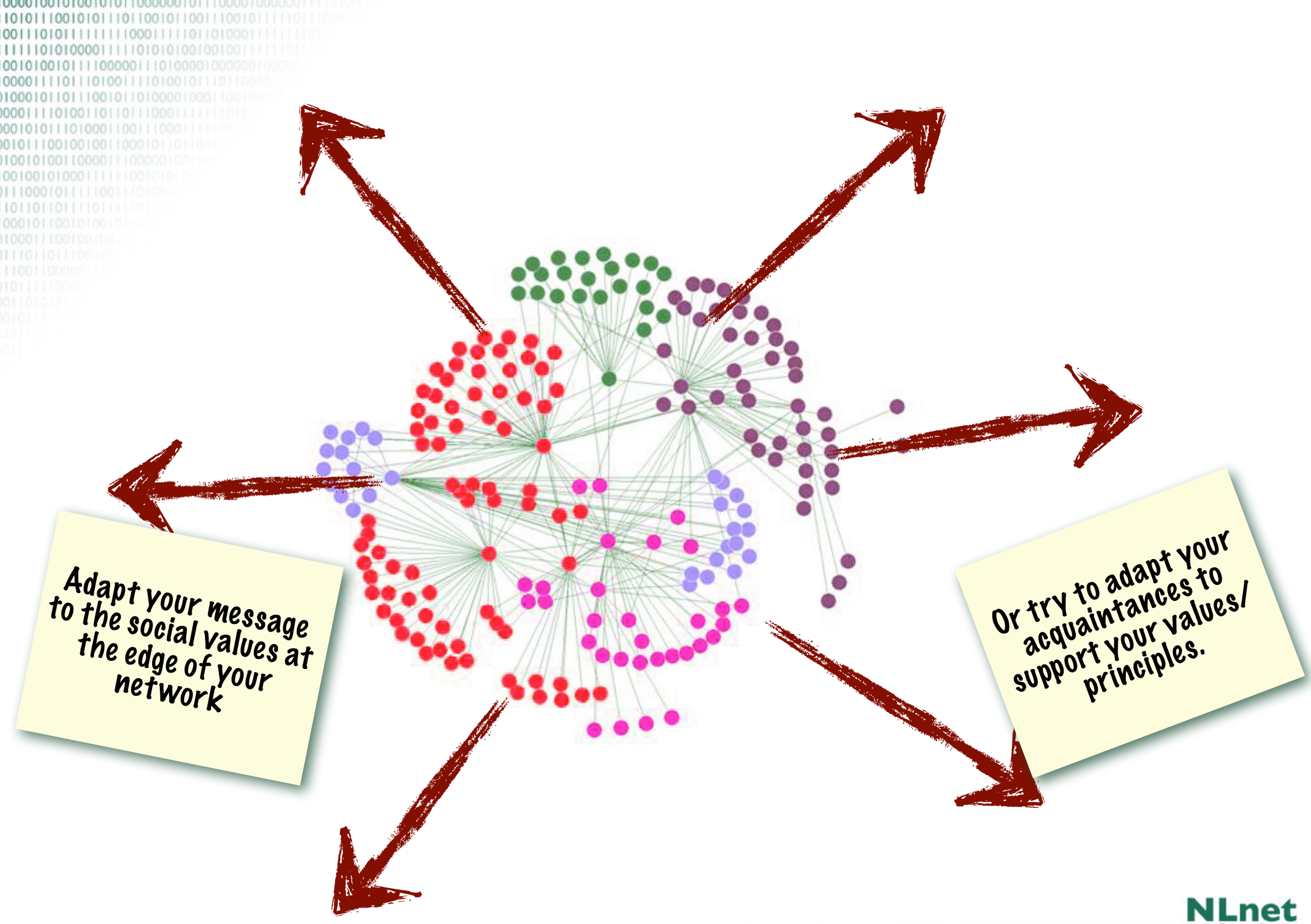
Increase relative advantage

Maintain compatibility

Enable trialability

Make Observable

source: http://en.wikipedia.org/wiki/File:Evensong_in_York_Minster.jpg picture by Allan Engelhardt



Adapt your message to the social values at the edge of your network

Or try to adapt your acquaintances to support your values/ principles.

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Why go through the effort in the first place?

6.000.000.000

(100 devices per user)

Open Global INNOVATION Trustworthy

We have to make the impossible possible

to keep the impossible possible

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