



afnic

afnic



Technology Backdrop Survey Report – October 2012

Survey organized by the AFNIC Scientific Council

Report by:

Alexandre Clame and Mélanie Lirante
(INIT)

<http://www.afnic.fr>

<http://www.init-marketing.fr>



Contents



1. Background and objectives of the survey
2. Methodology
3. Aspects of Internet access and use
4. The Backdrop construction
 1. Consensuses
 2. Divergences
5. Additional information: "Dominant forecasts" and "Simple majorities"
6. Conclusions and outlooks
7. Annexes

Background and objectives of the survey *afnic*

✓ Background:

✓ End 2008 – Early 2011:

- ✓ The AFNIC Scientific Council (SC) asked the question: "Is it possible to have a shared vision of technology trends in the medium to long term?"
- ✓ ICT users and professionals were invited to respond to an online survey
- ✓ The 1st edition of the survey's results was published in 2011:
<http://www.slideshare.net/AFNIC/resultats-toiledefondtechafnic-6786477>

✓ 2012 (May – June):

- ✓ The 2nd edition was overseen by the AFNIC SC in conjunction with INIT :
<http://www.afnic.fr/fr/l-afnic-en-bref/actualites/actualites-generales/5979/show/lancement-de-la-2eme-edition-de-l-enquete-toile-de-fond-technologique-afnic.html>

✓ Goals

✓ Construct a technological backdrop:

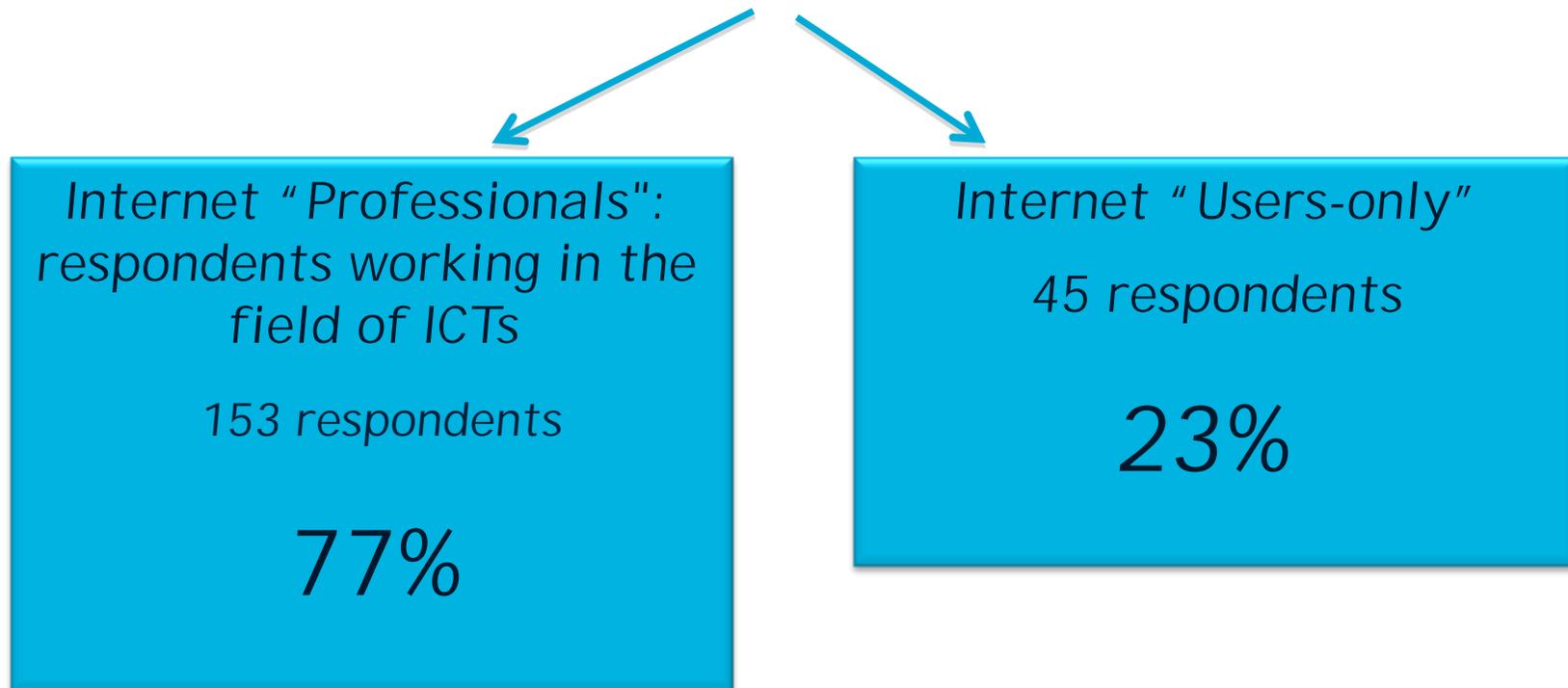
- ✓ The basis of the backdrop consists of consensuses.
- ✓ Divergent assertions (forming two "schools of thought") are used to integrate alternative scenarios into the backdrop

✓ Monitor changes in the backdrop by periodically renewing the survey (objectives are updated).

Respondents: numbers and profiles



198 respondents: 2 profiles



The themes of the questionnaire



THEME 1 / THE PURPOSE OF THE INTERNET

"USER" PROFILE: ALL THE RESPONDENTS

(198 respondents)

THEME 2 / THE ARCHITECTURE OF THE INTERNET

CROSS-CUTTING THEME

THEME 3 / THE INTERNET DOMAIN NAME SYSTEM (DNS)

"PROFESSIONAL" PROFILES ONLY

(153 respondents)

IDENTIFICATION

"USER" PROFILE: ALL THE RESPONDENTS (198 respondents)

N.B. The Internet "Professionals" answered the parts of the survey which only targeted Internet "Users" (eg THEME 1), but as simple users.



Contents



1. Background and objectives of the survey
2. Methodology
3. Aspects of Internet access and use
4. The Backdrop construction
 1. Consensuses
 2. Divergences
5. Additional information: "Dominant forecasts" and "Simple majorities"
6. Conclusions and outlooks
7. Annexes

Methodology 1/2



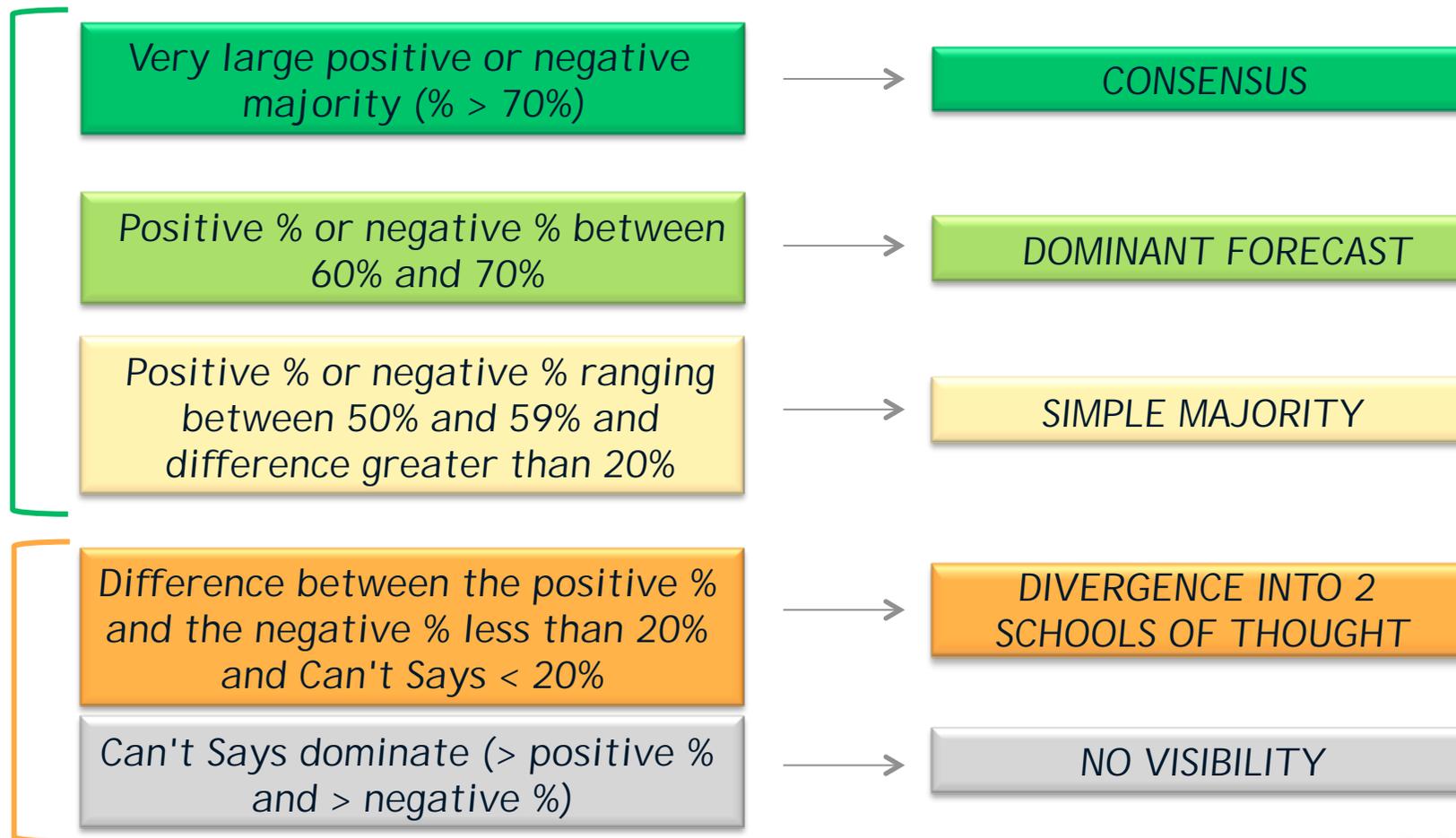
- ✓ The questions asked require answers on the following scale:



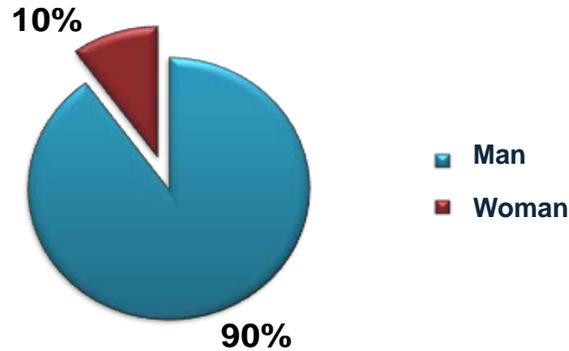
- ✓ The call for participation was issued by AFNIC to contacts by electronic means (e-mail, Twitter, etc.)
- ✓ The respondents were invited to transfer the invitation to their acquaintances.

Methodology 2/2

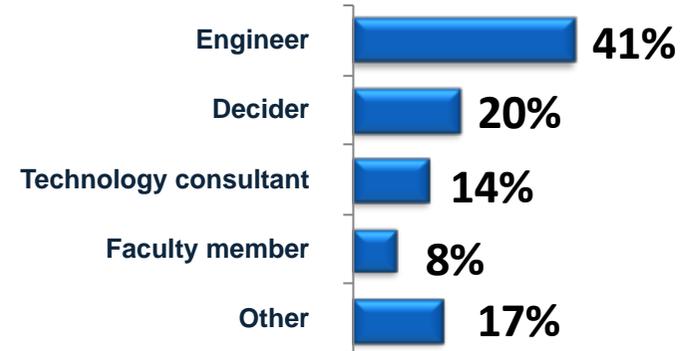
- ✓ The thresholds taken into account to analyze the results on semantic issues (Strongly agree ... Tend to disagree):



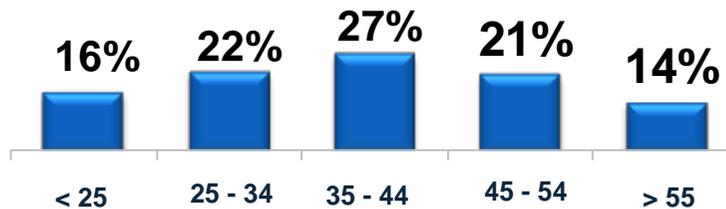
SEX



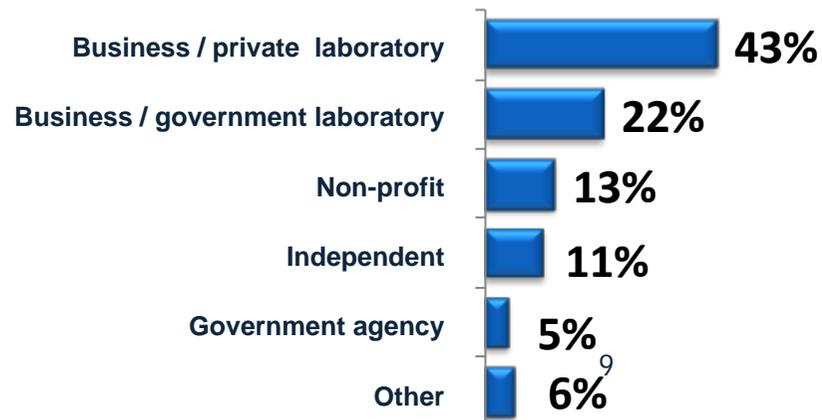
POSITION HELD



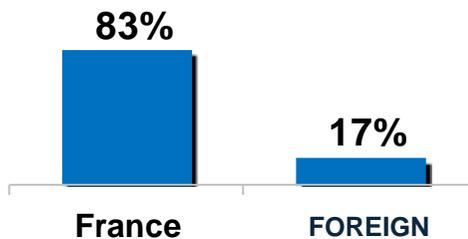
AGE



TYPE OF ORGANIZATION



COUNTRY



AFNIC MEMBER





Contents

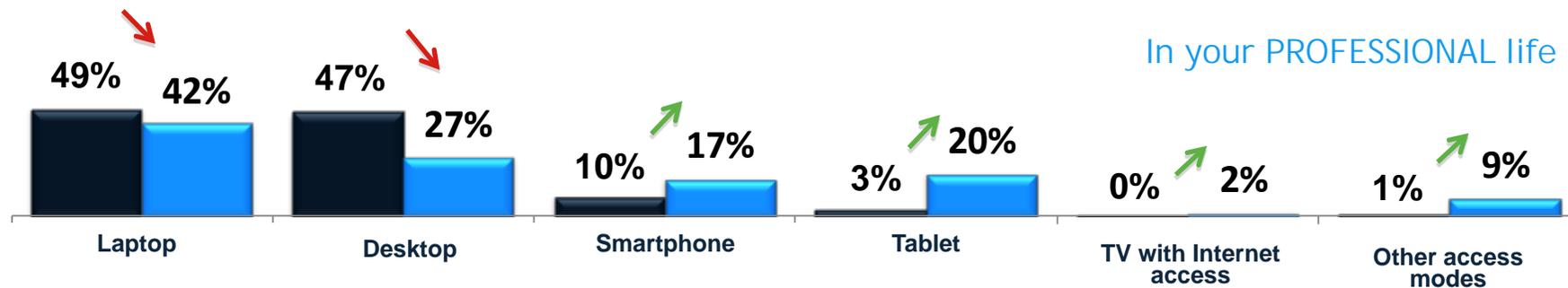


1. Background and objectives of the survey
2. Methodology
3. Aspects of Internet access and use
4. The Backdrop construction
 1. Consensuses
 2. Divergences
5. Additional information: "Dominant forecasts" and "Simple majorities"
6. Conclusions and outlooks
7. Annexes

At present, when you access the Internet, you probably use different types of hardware.

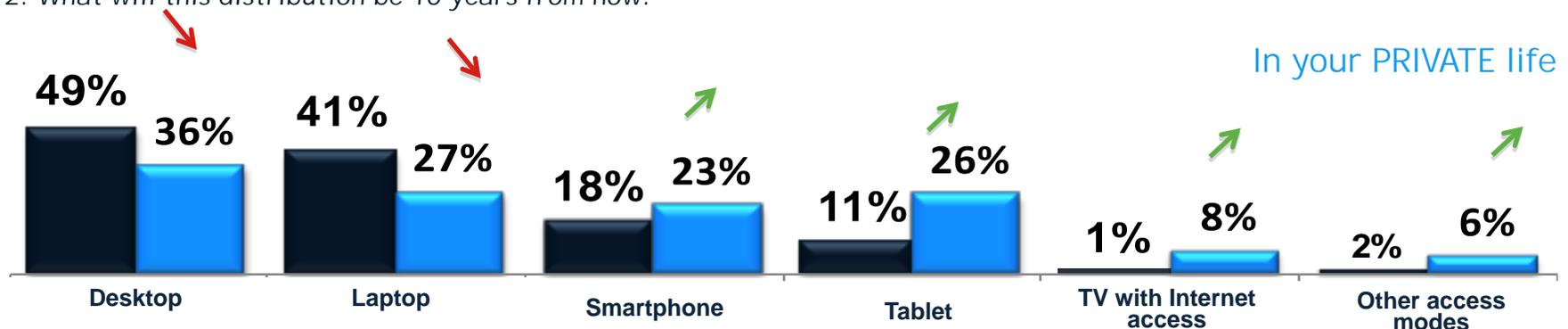
1. Please indicate how you allocate your time on the Internet using these different access methods:

2. What will this distribution be 10 years from now:



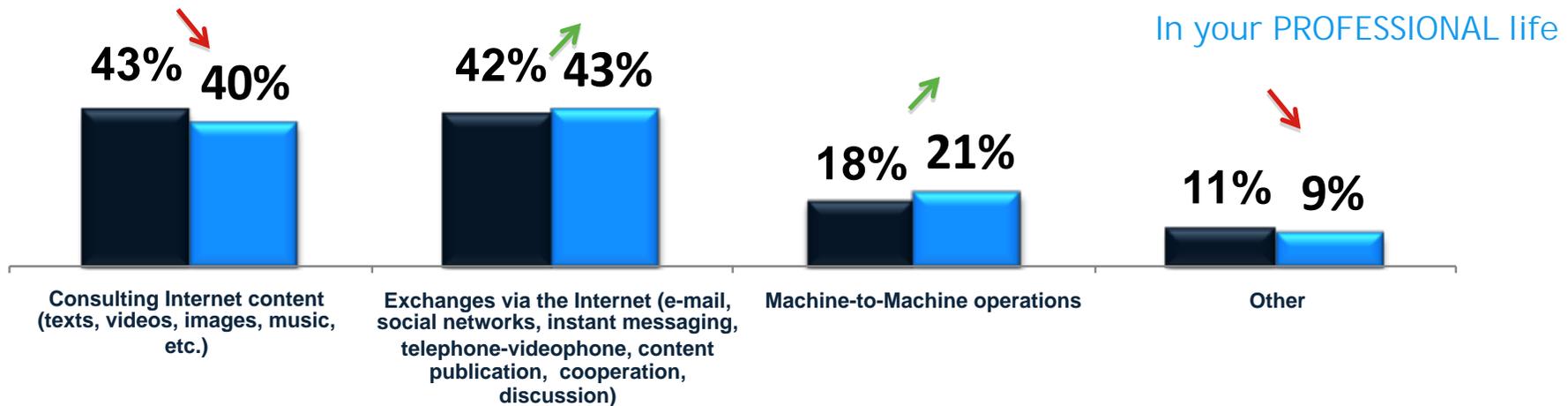
1. Please indicate how you allocate your time on the Internet using these different access methods:

2. What will this distribution be 10 years from now:

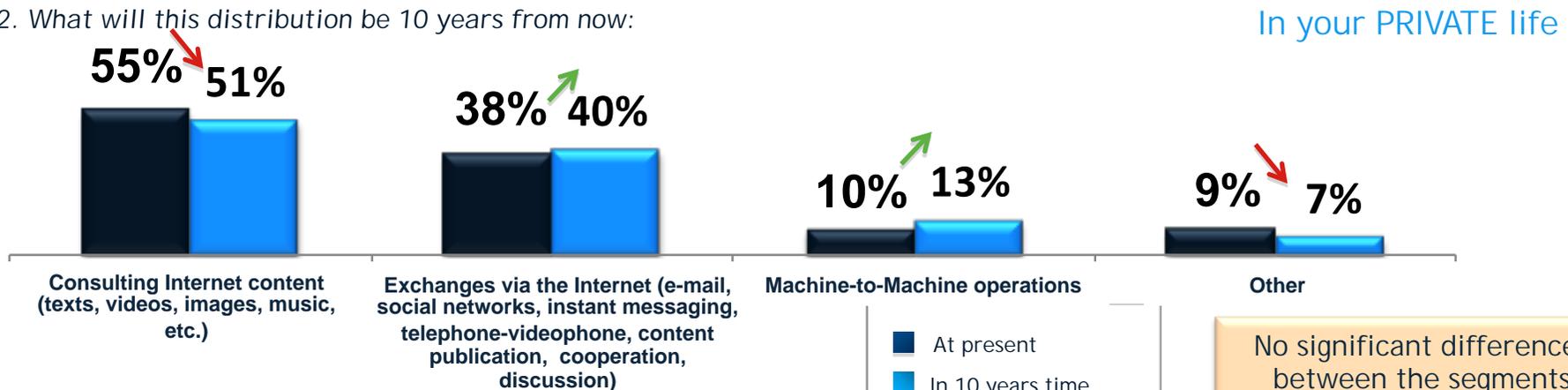


At present, when you access the Internet, you probably do so for different types of uses and contents.

1. Can you tell us how you allocate your time on the Internet in relation to these different types of uses and contents:
2. What will this distribution be 10 years from now:



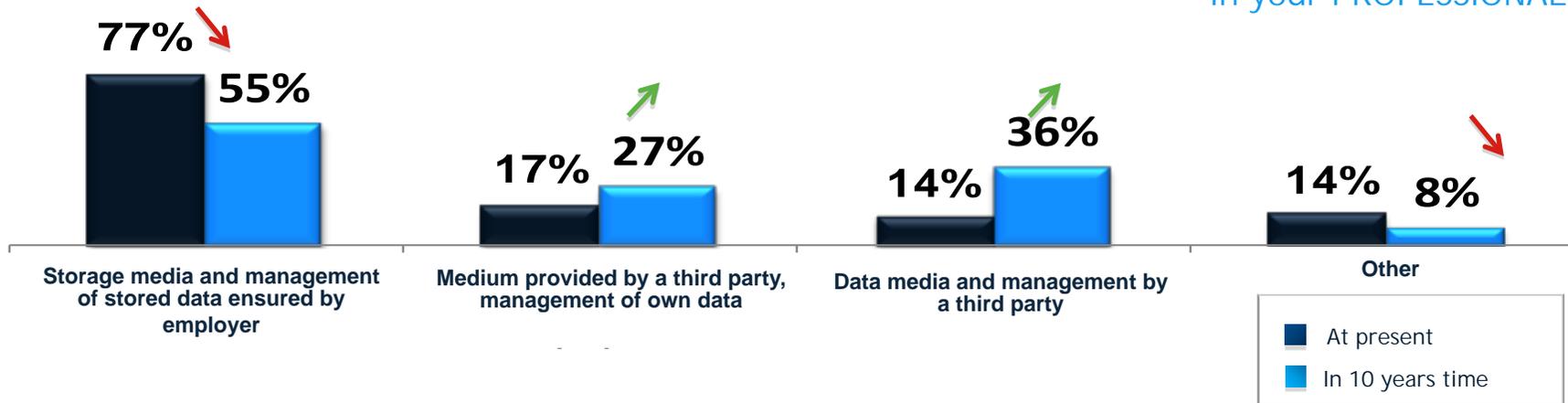
1. Can you tell us how you allocate your time on the Internet in relation to these different types of uses and contents:
2. What will this distribution be 10 years from now:



Currently, when you store data, you probably use different media.

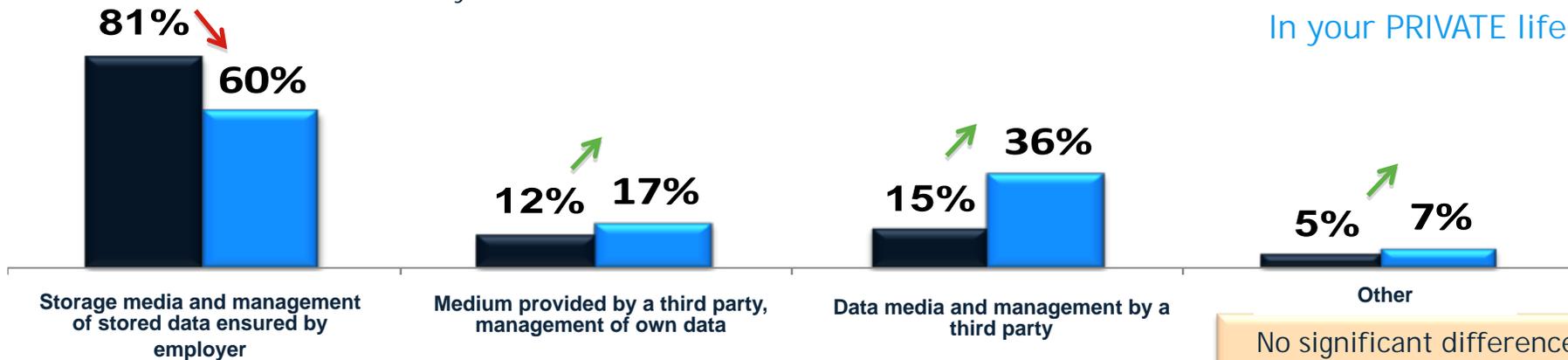
1. Can you tell us how your data storage is distributed in relation to these different media:
2. What will this distribution be 10 years from now:

In your PROFESSIONAL life



1. Can you tell us how your data storage is distributed in relation to these different media:
2. What will this distribution be 10 years from now:

In your PRIVATE life



No significant differences between the segments



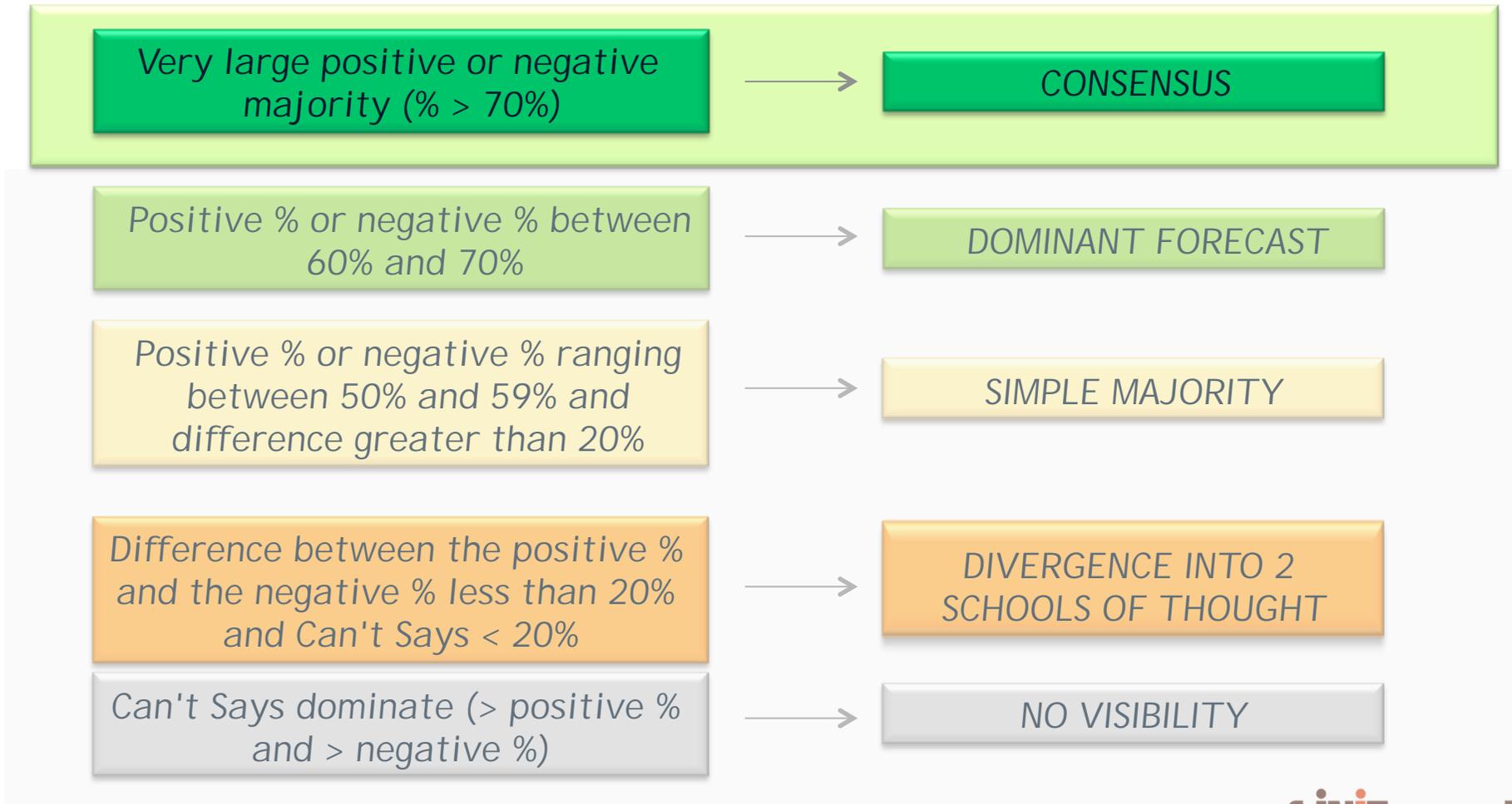
Contents



1. Background and objectives of the survey
2. Methodology
3. Aspects of Internet access and use
4. The Backdrop construction
 1. Consensuses
 2. Divergences
5. Additional information: "Dominant forecasts" and "Simple majorities"
6. Conclusions and outlooks
7. Annexes

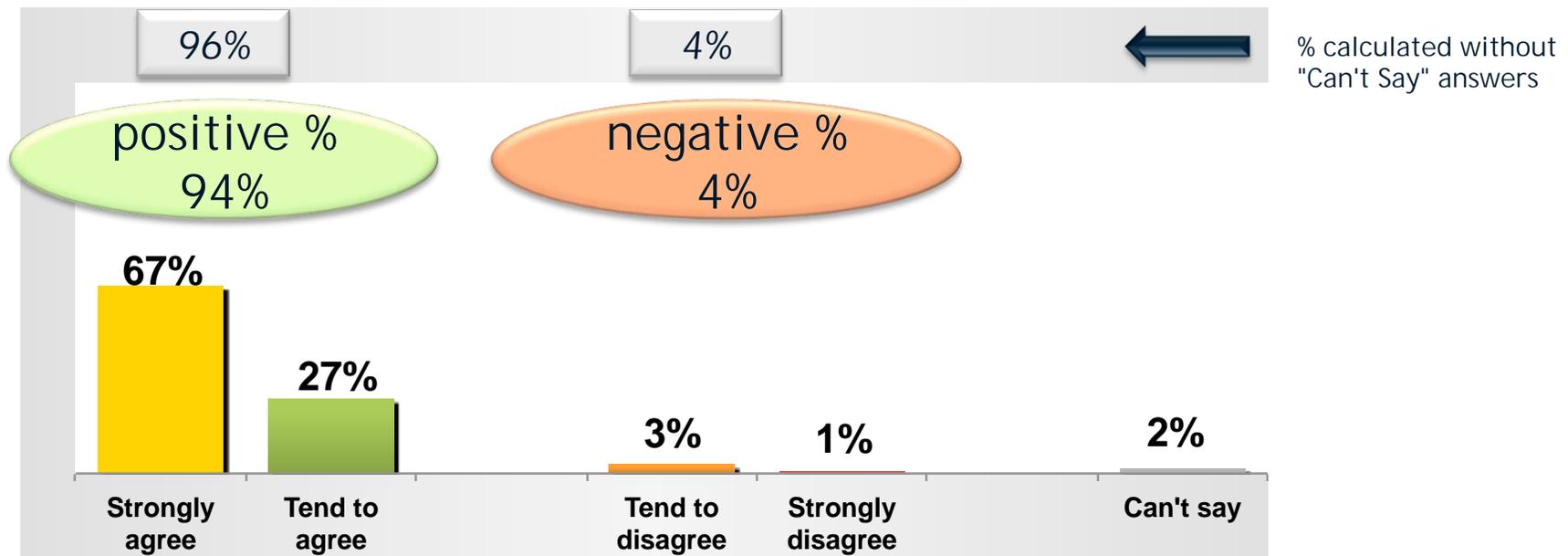
Methodology

- ✓ The thresholds taken into account to analyze the results on semantic issues (Strongly agree ... Tend to disagree):



To what extent do you agree that:

Q44. In 10 years' time, the Internet will still be the dominant electronic communications network



Basis: 153 respondents

If you disagree

O_Q45 - FILTER: if you disagree (tend to disagree or strongly disagree) with the statement that "In 10 years' time, the Internet will still be the dominant electronic communications network"

WHY?

In French

Vu la tendance actuel des gouvernements, les réseaux tendront vers une explosion de réseaux

N'arriverions nous pas à une saturation de ce moyen, et à un moment où il faudrait innover, apporter un nouveau concept de communication.

On voit l'émergence de réseaux internet parallèle pour certains pays qui s'isole du réseau principal, la neutralité du net va aussi réduire la confiance des utilisateurs dans le réseau, la sécurité des entreprises ne sera plus possible dans un monde de DPI à tout va.

In English

Just like the phone network of 10 years ago is NOT the dominant comms. network any more.

in 10 years "the" Internet will be different in terms of technology, so 'will still be' may refer to the name, not necessarily to the technology

If you disagree

O_Q46 - FILTER: if you disagree (tend to disagree or strongly disagree) with the statement that "In 10 years' time, the Internet will still be the dominant electronic communications network"

What will replace it?

In French

Autre chose probablement ;), les hackers s'amuse déjà avec les dvb-s, on aura un internet par Orange&co, et internet ^^.

Un réseau parallèle inter entreprise et inter personne pourrait se développer plus rapidement qu'on le pense. Les entreprises ont déjà commencé cela, dès qu'ils en ont les moyens ou que les données sont sensibles, tout passe par des liaisons point à point entre les entreprises. Certains clients abandonnent les accès vpn car il devient trop facile d'intercepter les communications SSL avec du DPI, c'est d'ailleurs souvent suite à une démonstration d'un équipementier que nous avons eu des demandes de modifications radicales concernant les accès extérieurs et les communications inter entreprises.

In English

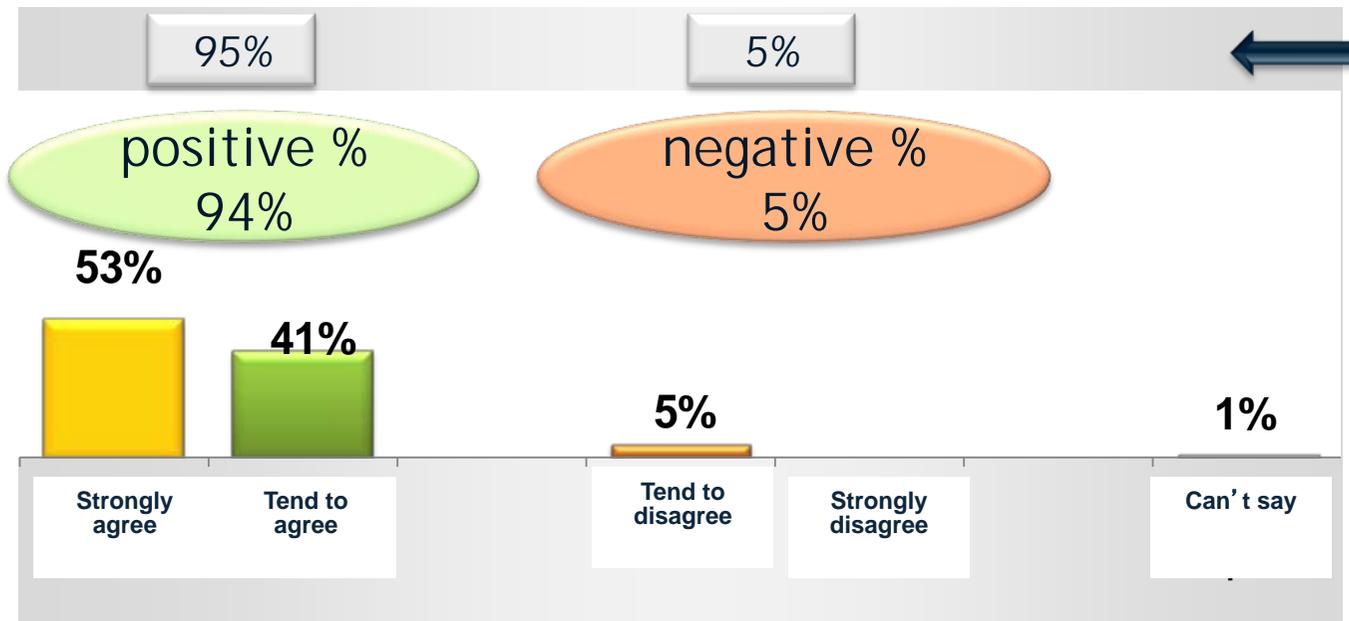
it will evolve - or be replaced by walled gardens (facebook and the likes)

A new network - based on the need of people for free communication.

More secure protocols

To what extent do you agree that:

Q47 - In 10 years' time, the infrastructure of the Internet will continue to evolve to handle the traffic for all applications and services



← % calculated without "Can't Say" answers

Basis: 153 respondents

If you disagree

O_Q47 - FILTER: if you disagree (tend to disagree or strongly disagree) with the statement that "In 10 years' time, the infrastructure of the Internet will continue to evolve to handle the traffic for all applications and services"

WHY?

In French

L'argent. L'Internet évoluera pour répondre aux besoins des applications dominantes (cf. filtrage).

Les petits acteurs évoluent, les gros - assez peu. Globalement, l'évolution aura de plus en plus du mal à suivre l'augmentation des besoins.

Nouveau modèle mondial émergent qui va vouloir être contrôlé par une autorité à un moment où à un autre pour que l'argent prenne le dessus sur la connaissance

Certains services (ex: médecine à distance) demandent une fiabilité plus haute que ce que propose l'Internet du Best Effort, hors Internet fonctionne grâce à ce principe.

Parce que ce n'est déjà pas le cas, et qu'avec des stratégies commerciales anciennes au lieu d'avoir des tarifs orientés sur les coûts et rien d'autre les opérateurs divers refusent déjà de répondre pleinement aux attentes des usagers.

In English

There will be peripheral changes but the core structure of IP, TCP, BGP, DNS is fixed.

If you disagree

O_Q48 - FILTER: if you disagree (tend to disagree or strongly disagree) with the statement that "In 10 years' time, the infrastructure of the Internet will continue to evolve to handle the traffic for all applications and services"

What alternatives might develop?

In French

Développement des infrastructures locales de plus en plus dépendant des investissements publics.

Des infrastructures parallèles

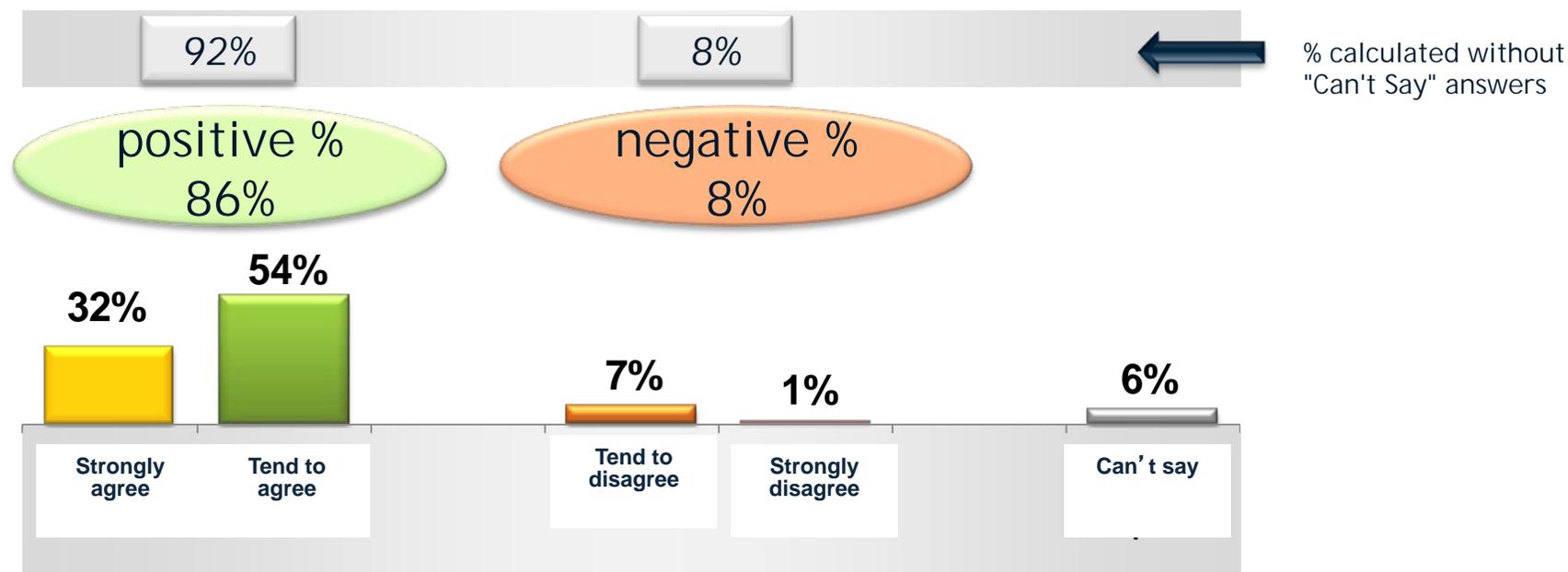
un Internet anonyme

Le retour à des réseau privé et ligne dédié est inévitable pour certain type de service critique. Internet n'est pas adapté à tout type de contenu.

Au niveau réseau & transport, mais aussi fournisseur final, favoriser des tarifs uniquement orientés sur les coûts réels. Favoriser une rude concurrence. Favoriser la position des acteurs petits et moyens, par exemple des acteurs régionaux. Et l'on en revient au problème de la neutralité du réseau dès qu'il est estampillé «internet», qui devrait être un principe souverain et inscrit dans les lois et règlements.

To what extent do you agree that:

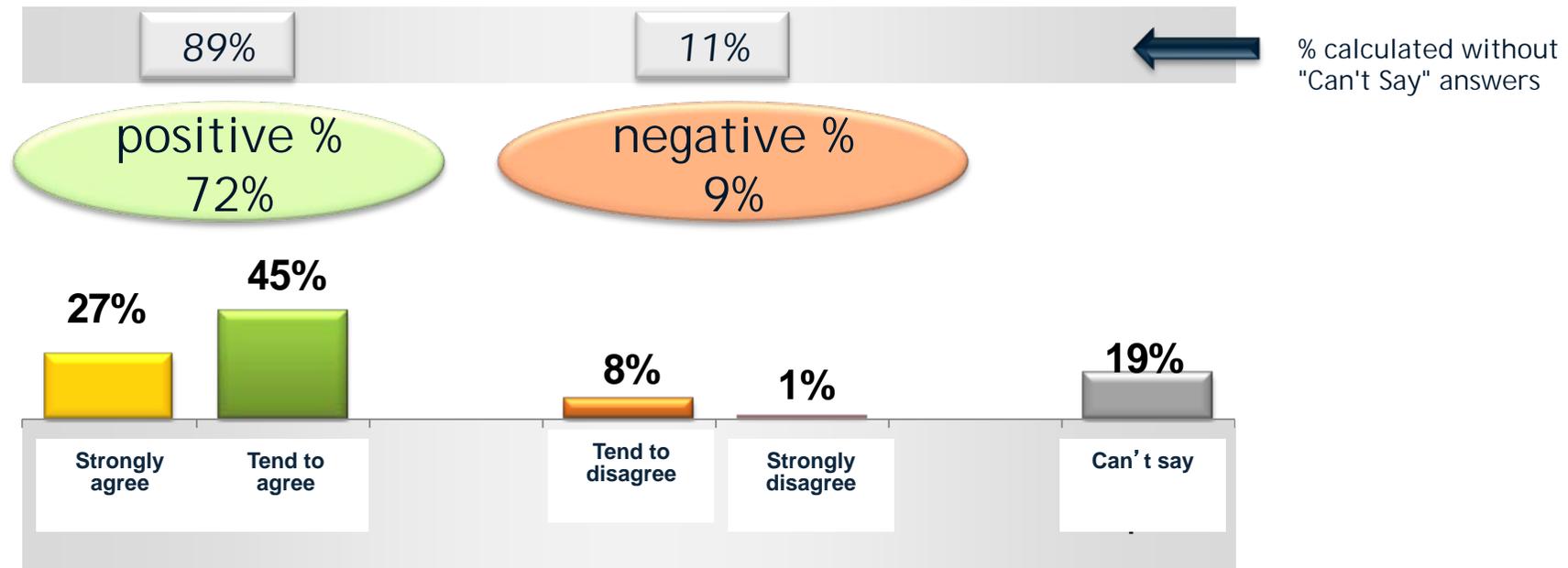
Q65 - The DNS will remain the dominant Internet naming and resolution system



Basis: 153 respondents

To what extent do you agree that:

Q39 - The Internet of Things will have emerged one way or another



Basis: 153 respondents

O_Q40 - FILTER: If you agree (strongly agree or tend to agree) with the statement that: "The Internet of Things will have emerged one way or another"

If you agree

How?

In French	In English
Objets "intelligents", principalement électroménager connecté.	Controlling cars, stuff in your house, robots, micro-robots
Les appareils vont être de plus en plus connectés. Pour être piloté (le rêve du café qui se lance tout seul), mais aussi mettre à disposition des informations (consommation électrique, température, etc.). Que ce soit sur des équipements directement IP ou sur des réseaux alternatifs plus simples, mais avec passerelle.	My car, tv, refrigerator and thermostat already have an IP and communicate.
Développement progressif, intégrant une part de planification (in situ et à distance) par un usager, une part d'autonomie de l'objet, et une part d'évènementiel où l'objet peut demander un choix à distance à un acteur externe (autre objet, machine ou usager). Le développement et l'ergonomie de ces services dépendent du développement de l'internet mobile.	I expect more chipped items (fridges) and RFID-tagged items to exist, and more apps to interact with them.
Probablement dans la gestion de la consommation d'électricité et de l'eau. A contrario, je ne pense pas que la domotique va significativement progresser dans les 10 prochaines années.	One - or another ;-) Huge impact on privacy and complexity, overlay networks

O_Q39 - FILTER: If you disagree (strongly disagree or tend to disagree) with the statement that: "The Internet of Things will have emerged one way or another"

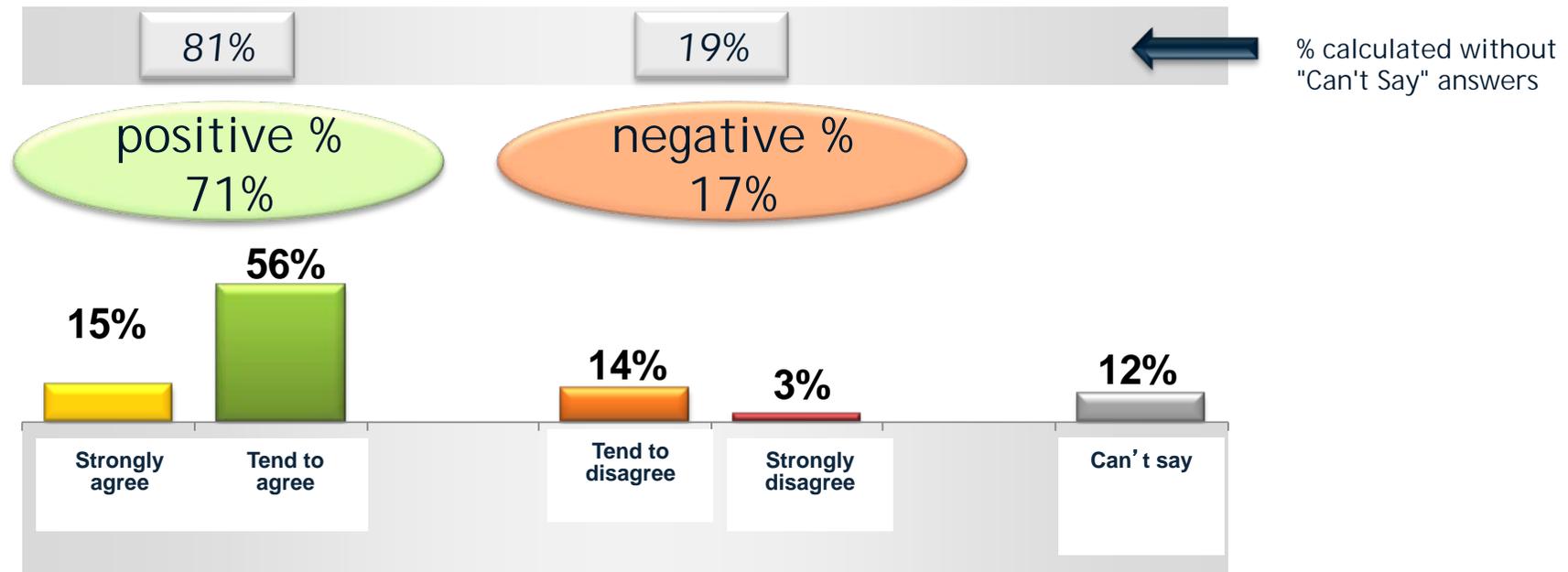
If you disagree

WHY?

In French	In English
<p>« Internet des objets » est un terme marketing trop flou. Il est utilisé aussi bien pour de vrais objets connectés (actifs) que pour des choses qui n'ont rien à voir (ONS).</p>	<p>The Internet of Things is just of an interpretation of Internet's usage. It not appears from one day to another, it's an evolution of their components, adding improvements and user's experiences which is make constantly since the beginning of the Internet.</p>
<p>L'Internet des objets, c'est toujours "dans 10-15 ans". C'était déjà le cas il y a 10 ans, ca sera toujours pareil dans 10 ans. C'est comme l'intelligence artificielle ou la "fusion a froid".</p>	
<p>Il n'y a pas encore de /killer feature/ pour un frigidaire connecté au réseau, et il commence à y avoir prise de conscience des risques niveau vie privée.</p>	

To what extent do you agree that:

Q72 - The use of personal data from user DNS queries will be generalized by DNS resolver operators (ISPs and alternative providers)

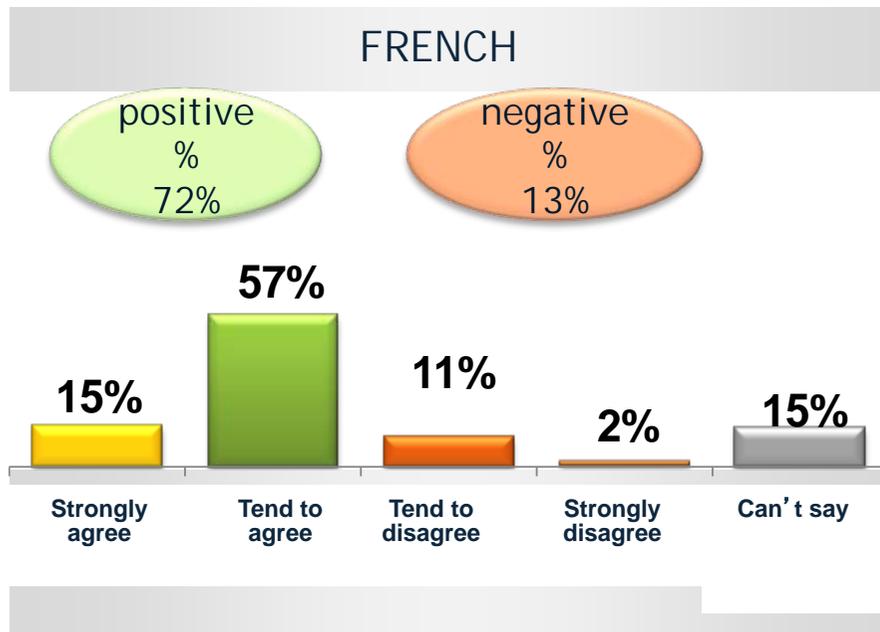


Basis: 153 respondents

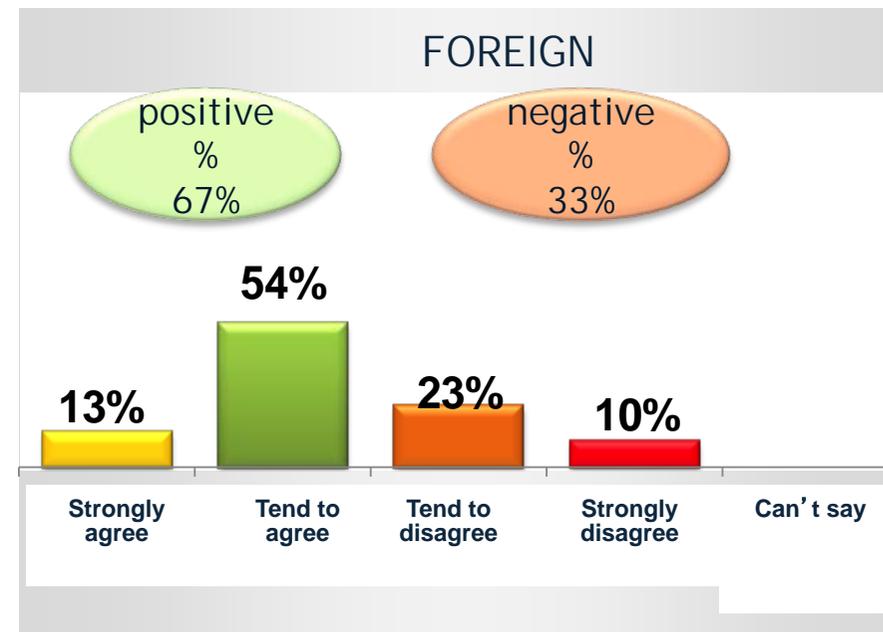
To what extent do you agree that:

DIFFERENCES PER SEGMENT

Q72 - The use of personal data from user DNS queries will be generalized by DNS resolver operators (ISPs and alternative providers)



Basis: 123 respondents



Basis: 30 respondents

There is a 20-point difference in the level of disagreement between French and foreign respondents.

O_Q73 - FILTER: If you disagree (strongly disagree or tend to disagree) with the statement that:
"... the use of personal data from user DNS queries will be generalized by DNS resolver operators (ISPs and alternative providers)"

If you disagree

WHY?

In French

Il y a une conscience des problèmes ainsi que la connaissance des solutions associées. Aujourd'hui si les solutions ne sont pas en place, c'est pour des raisons économiques. Lorsque le problème deviendra inquiétant, les solutions seront mises en place.

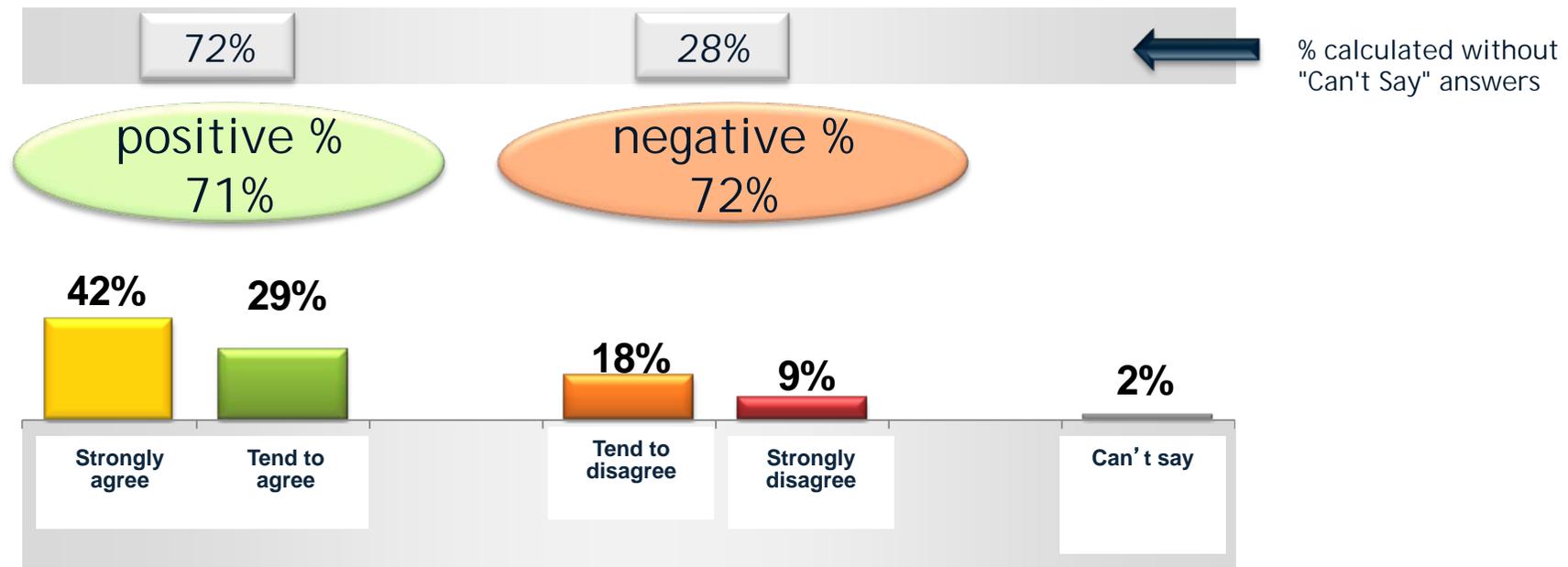
La commercialisation des logs créera de l'insécurité pour les utilisateurs et facilitera le fingerprinting des cibles d'attaques. Des hordes de zombies pourront alors tranquillement mettre à sac n'importe quel resolver, DNSSECisé ou pas.

L'analyse des requêtes DNS semble peu intéressante face à d'autres systèmes d'analyse plus précis (tels Google Analytics, ou encore suivi des visiteurs via des cookies traceurs), même si ces derniers devaient rencontrer des limitations juridiques peu ou non appliquées (comme les récentes lois européennes sur l'utilisation des cookies, pour la plupart inapplicables).

L'atteinte à la vie privée est trop grosse, et facile à expliquer au tout venant.

To what extent do you agree that:

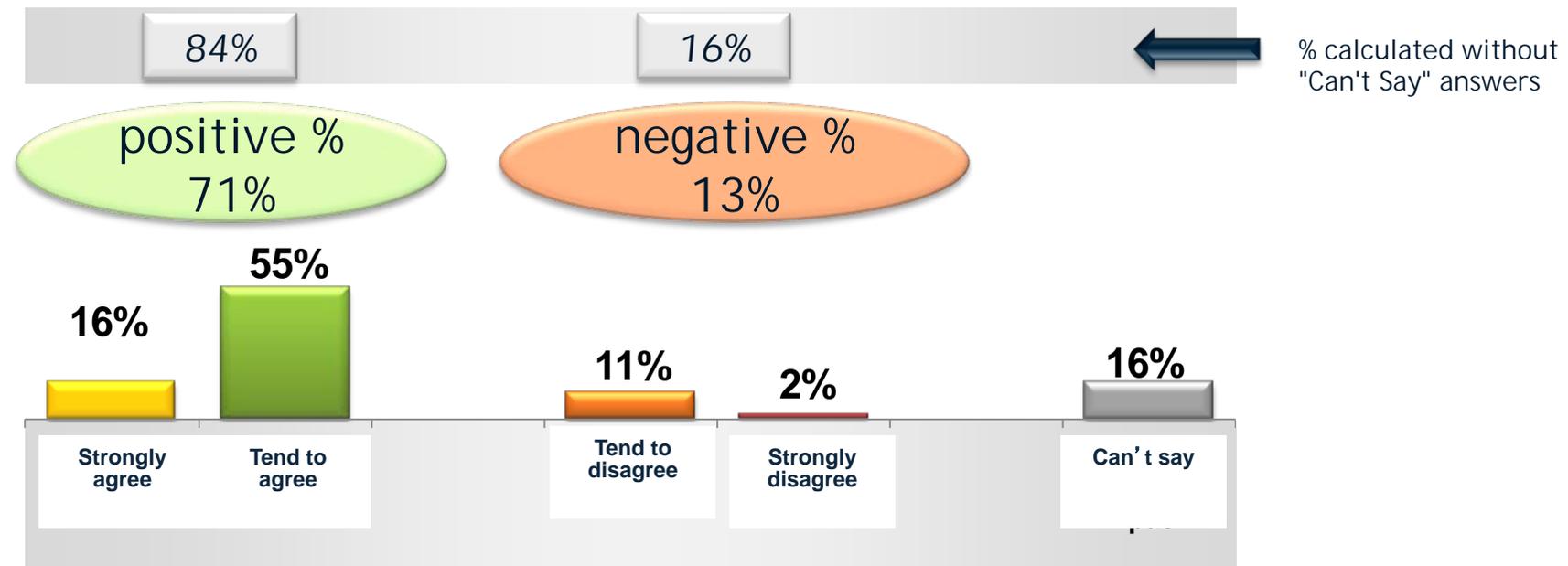
Q30 - The geographical location of your data will have a major impact on your sense of security



Basis: 198 respondents

To what extent do you agree that:

Q75 - In 10 years' time, the geographical or topological position in the network will significantly affect (in more than 1 case out of 10) the answers to DNS resolution queries



Basis: 153 respondents

If you disagree

O_Q75 - FILTER: If you disagree (strongly disagree or tend to disagree) with the statement that "In 10 years' time, the geographical or topological position in the network will significantly affect (in more than 1 case out of 10) the answers to DNS resolution queries"

WHY?

In French

Ce serait préférable que non, sinon ça voudra dire que les lobby ont gagnés :s

Alternatives comme l'anycast dans les grands CDN

Multiplication des CDN.

Dnssec

On va peut être plutôt se mettre à anycaster les frontaux des services, ce serait beaucoup plus logique et efficace de reporter l'intelligence dans les couches hautes (applicatives) que de compliquer les serveurs DNS pour un use-case encore marginal

In English

The political and legal structures around the DNS are firmly in favour of a coherent name space.

Summary of consensuses



	Criteria	Positive %	Negative %	Can't say	
1	Q44. In 10 years' time, the Internet will still be the dominant electronic communications network	94%	4%	2%	CONSENSUS
2	Q47 - In 10 years' time, the infrastructure of the Internet will continue to evolve to handle the traffic for all applications and services	94%	5%	1%	CONSENSUS
3	Q65 - The DNS will remain the dominant Internet naming and resolution system	86%	8%	6%	CONSENSUS
4	Q39 - The Internet of Things will have emerged one way or another	72%	9%	19%	CONSENSUS
5	Q72 - The use of personal data from user DNS queries will be generalized by DNS resolver operators (ISPs and alternative providers)	71%	17%	12%	CONSENSUS
6	Q30 - The geographical location of your data will have a major impact on your sense of security	71%	27%	2%	CONSENSUS
7	Q75 - In 10 years' time, the geographical or topological position in the network will significantly affect (in more than 1 case out of 10) the answers to DNS resolution queries	71%	13%	16%	CONSENSUS

Very large positive or negative majority (% > 70%)



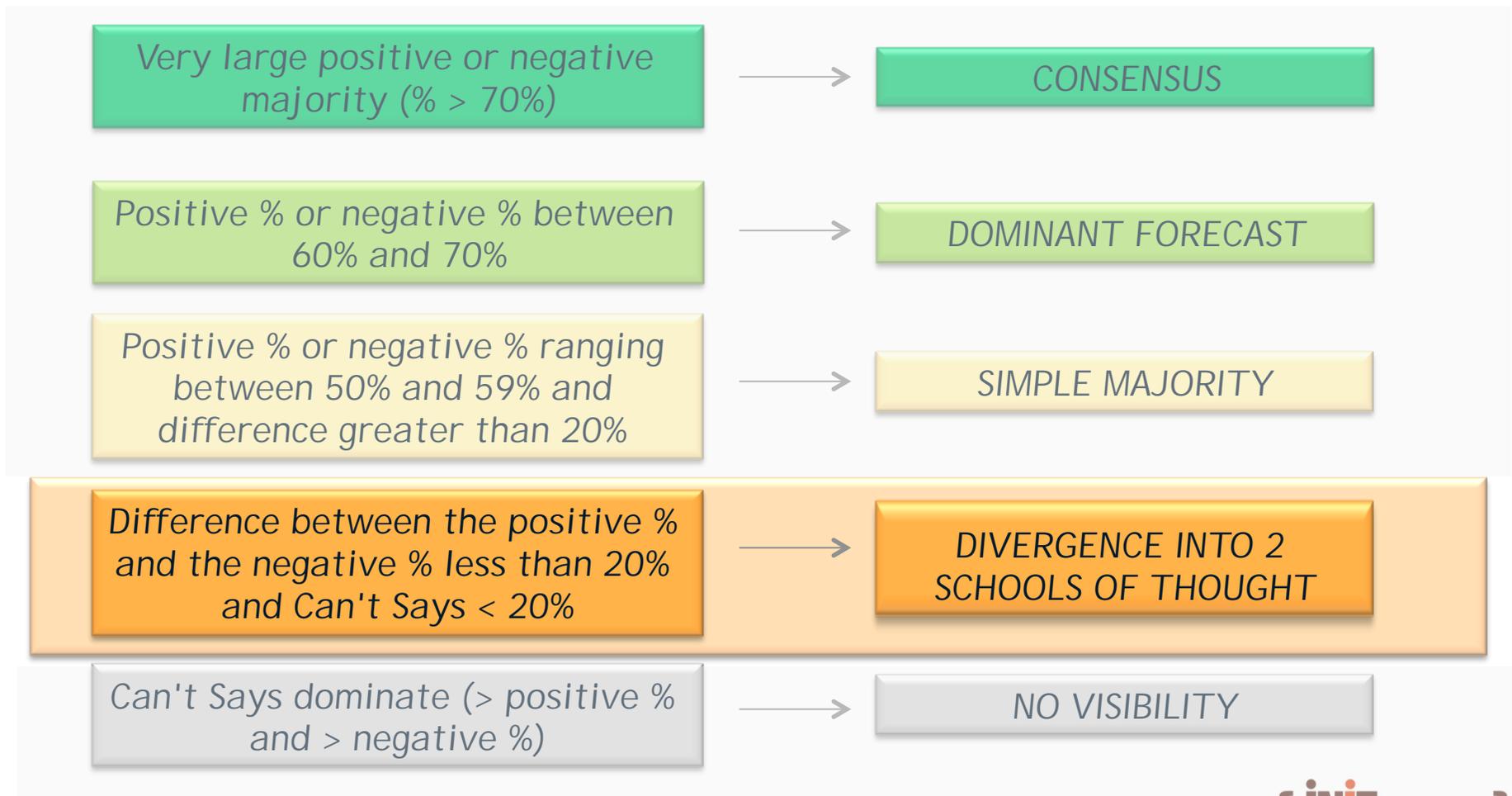
Contents



1. Background and objectives of the survey
2. Methodology
3. Aspects of Internet access and use
4. The Backdrop construction
 1. Consensuses
 2. Divergences
5. Additional information: "Dominant forecasts" and "Simple majorities"
6. Conclusions and outlooks
7. Annexes

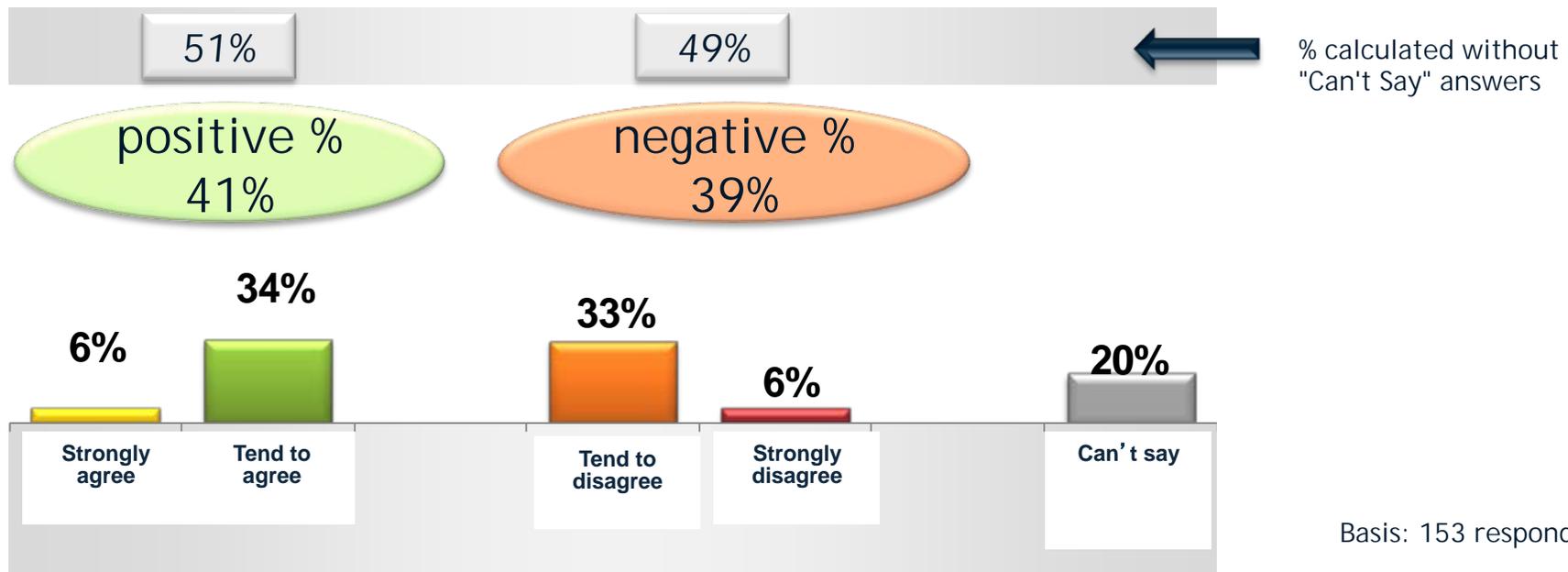
Methodology

- ✓ The thresholds taken into account to analyze the results on semantic issues (Strongly agree ... Tend to disagree):



To what extent do you agree that:

Q71 - In the case of DNS requests assigned to a third party (ISPs or suppliers of alternative solvers), the use of alternative solvers will exceed the use of one's own ISP resolver

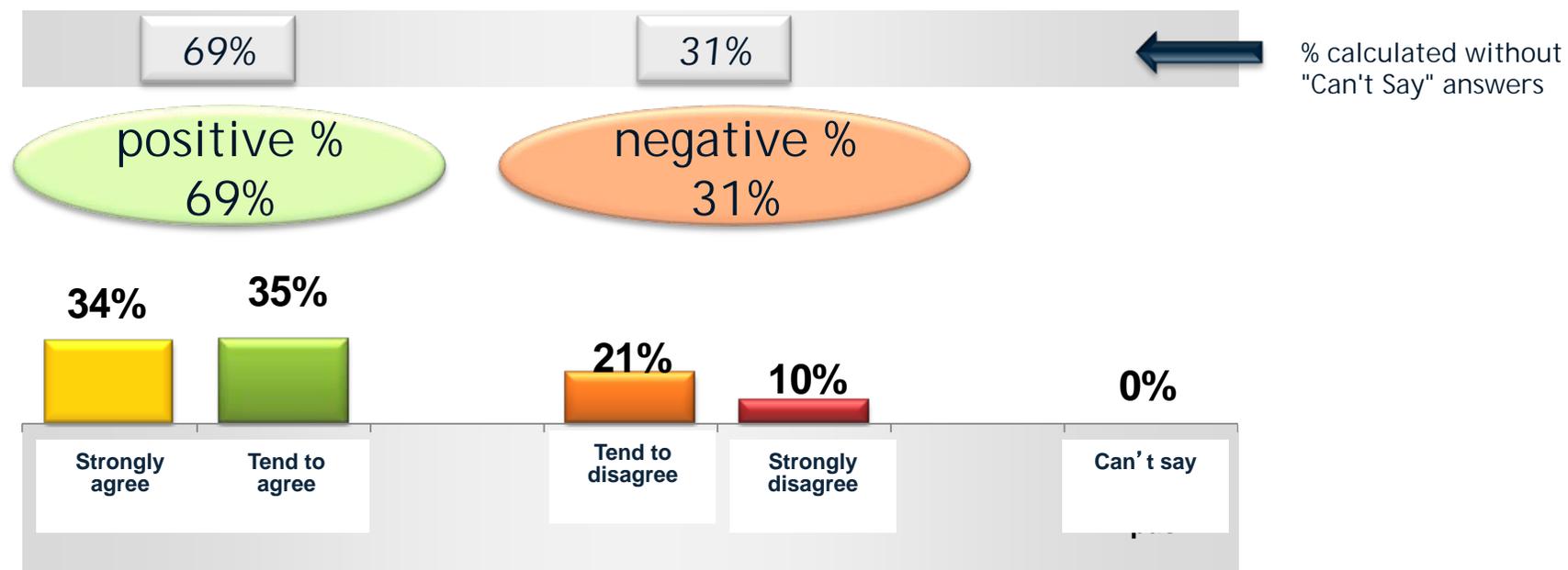


Major point of divergence: DNS queries assigned to a third party and the use of alternative solvers will exceed the use of one's own ISP resolver.

To what extent do you agree that:

FILTER: if you agree or tend to agree (on Q71)

Q71A - Do you think this will allow a better guarantee of the integrity of responses (e.g. avoid "Liar DNS")?

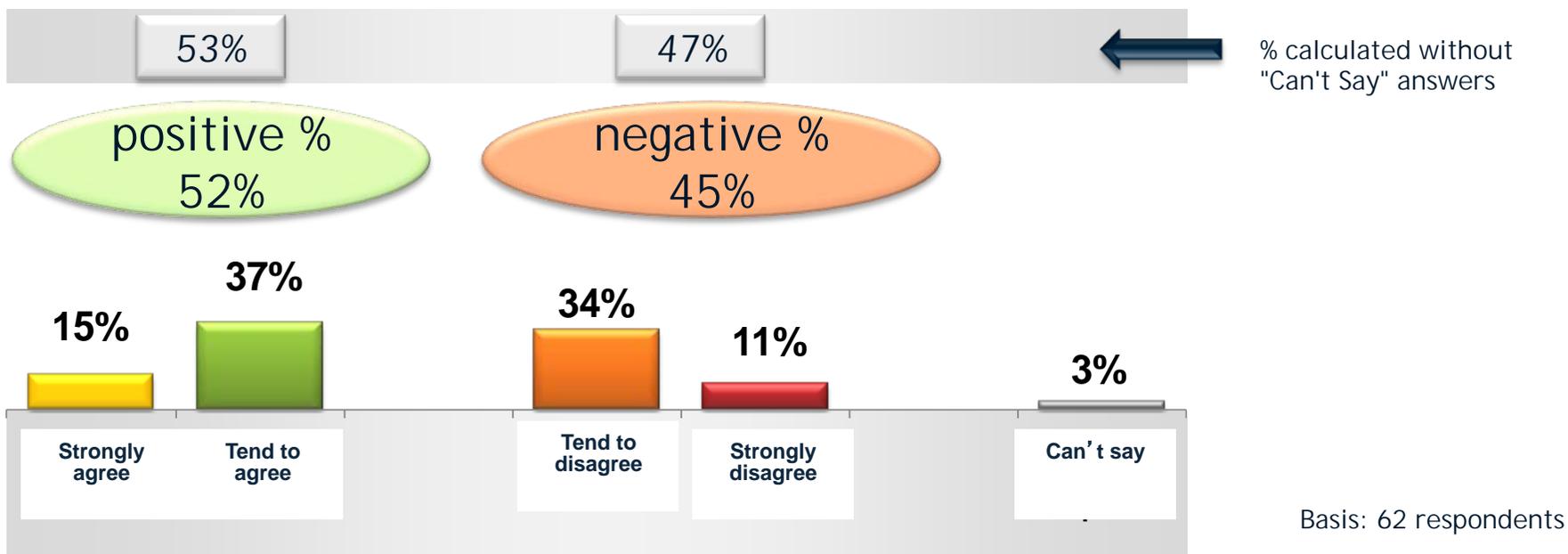


Basis: 62 respondents

To what extent do you agree that:

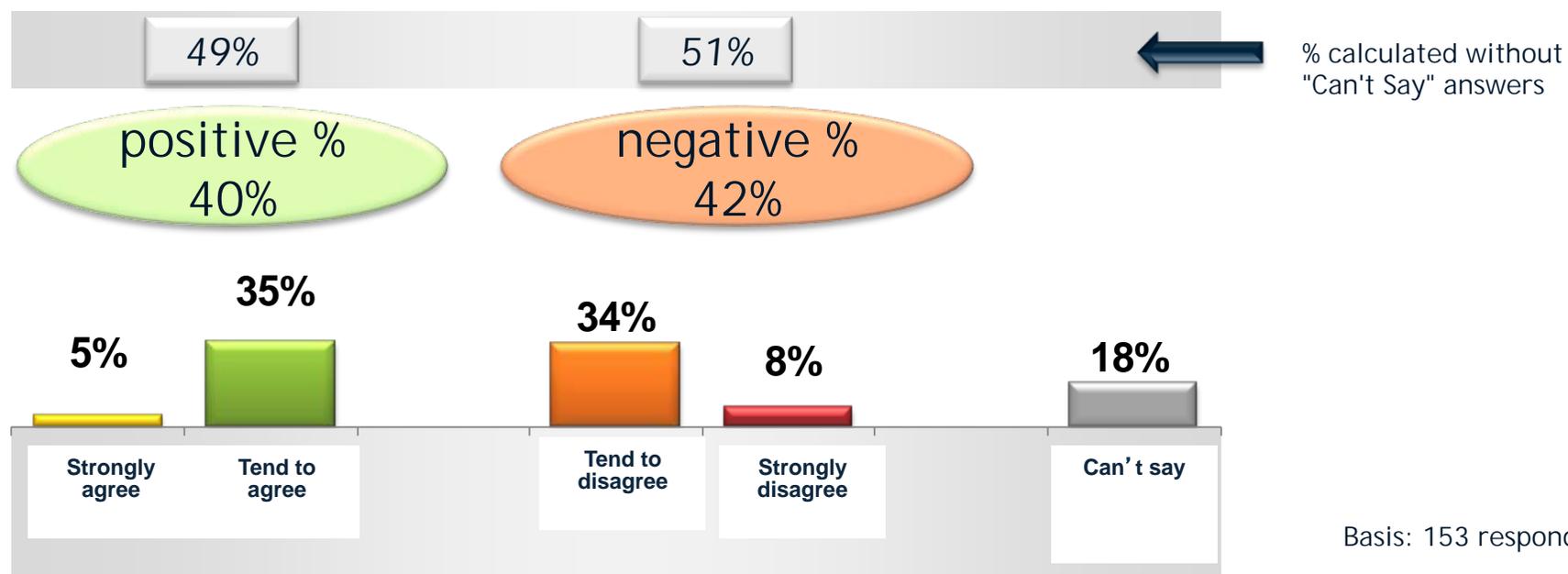
FILTER: if you agree or tend to agree (on Q71)

Q71B - Do you think this will allow better performance in name resolution (lead-time, availability)?



To what extent do you agree that:

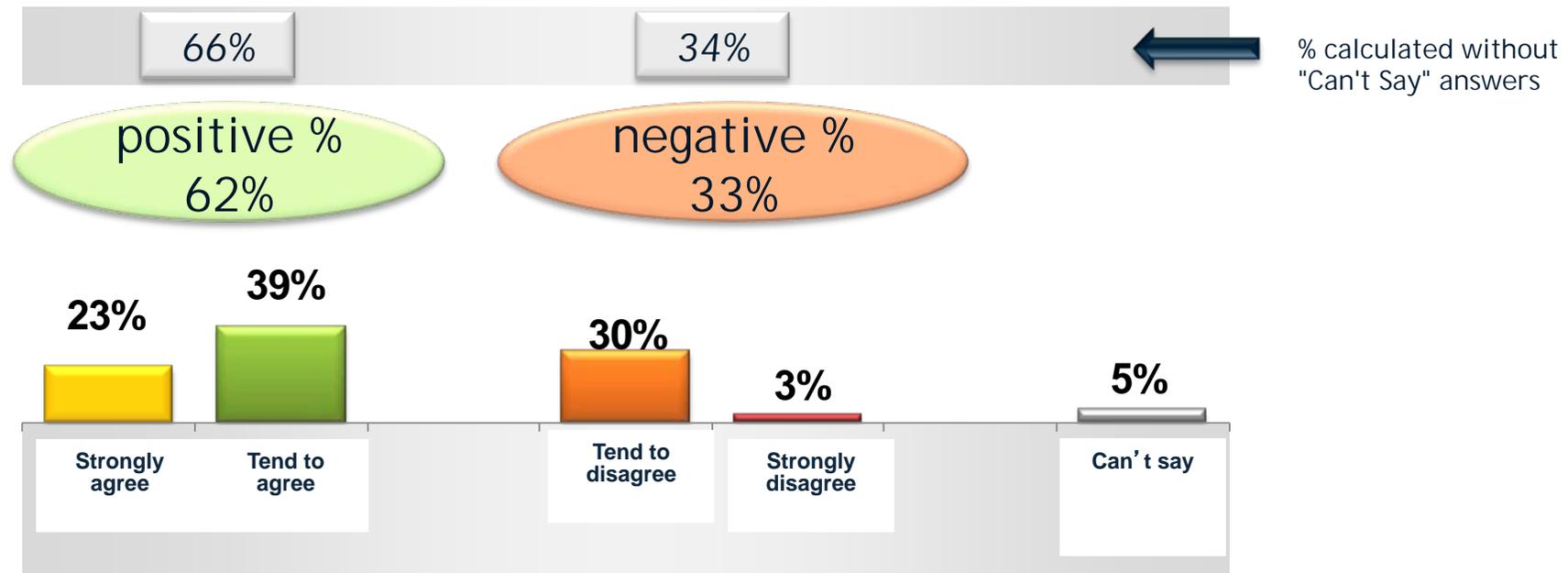
Q70 - Local DNS resolvers (caches installed on user machines) will play a significant role (25% or more) compared with ISP resolvers or "open" resolvers of the Google DNS type



To what extent do you agree that:

FILTER: if you agree or tend to agree (on Q70)

Q70A - Do you think this will allow a better guarantee of the integrity of responses (e.g. avoid "Liar DNS")?

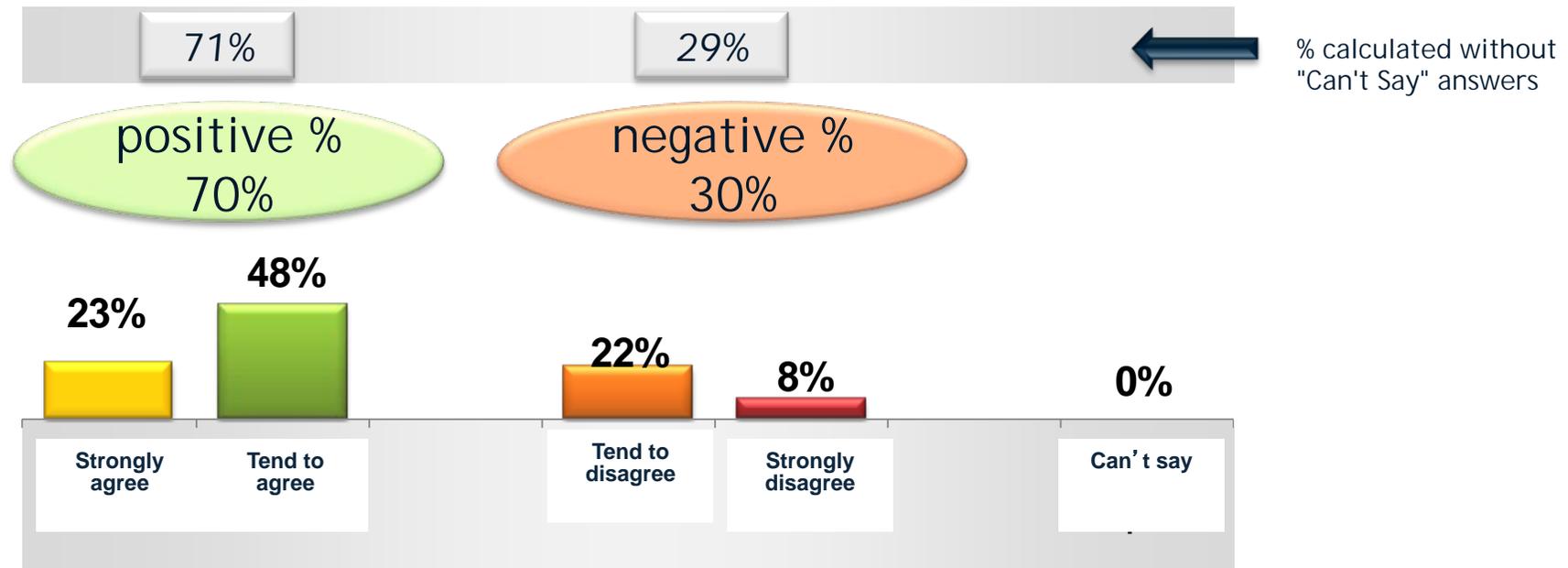


Basis: 61 respondents

To what extent do you agree that:

FILTER: if you agree or tend to agree (on Q70)

Q70B - Do you think this will allow better performance in name resolution (lead-time, availability)?



Basis: 61 respondents

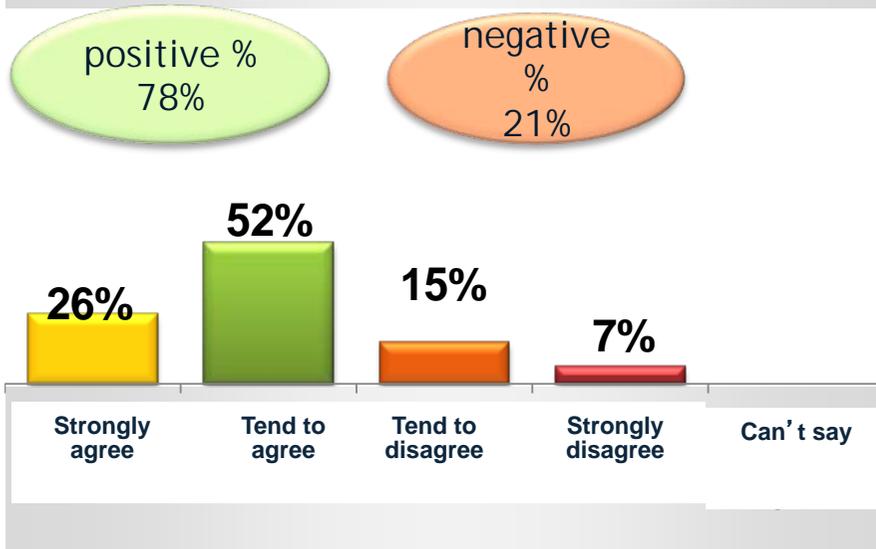
To what extent do you agree that:

FILTER: if you agree or tend to agree (on Q70)

Q70B - Do you think this will allow better performance in name resolution (lead-time, availability)?

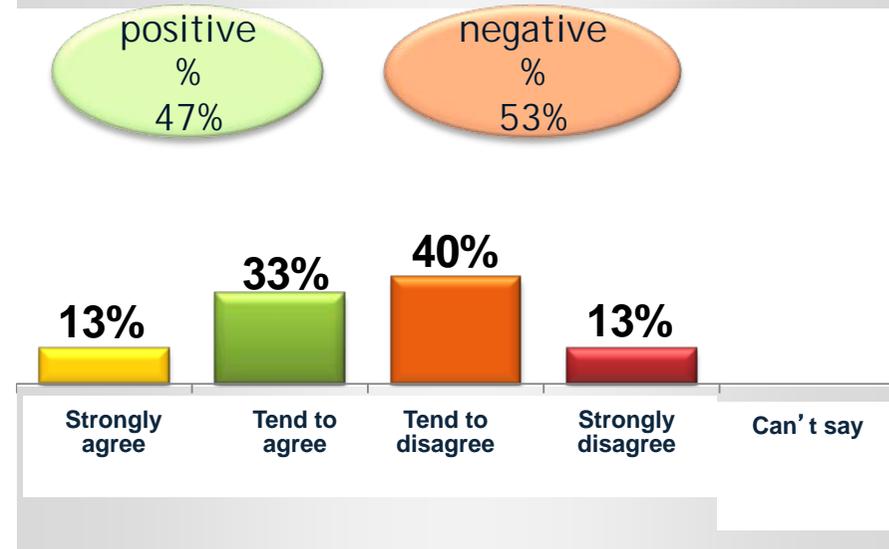
DIFFERENCES PER SEGMENT

FRENCH



Basis: 46 respondents

FOREIGN

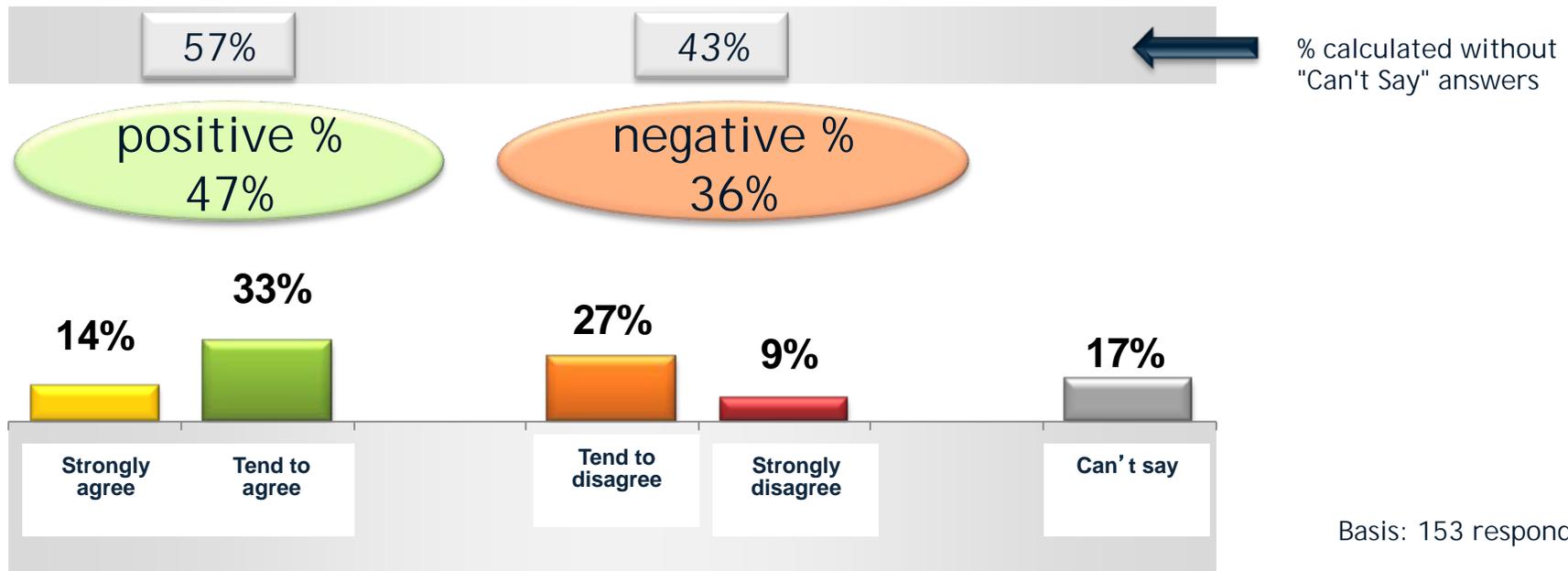


Basis: 15 respondents
(caution: weak basis)

There is a real divergence of points of view between French and foreign respondents. French respondents have reached a consensus while foreign respondents diverge on this question.

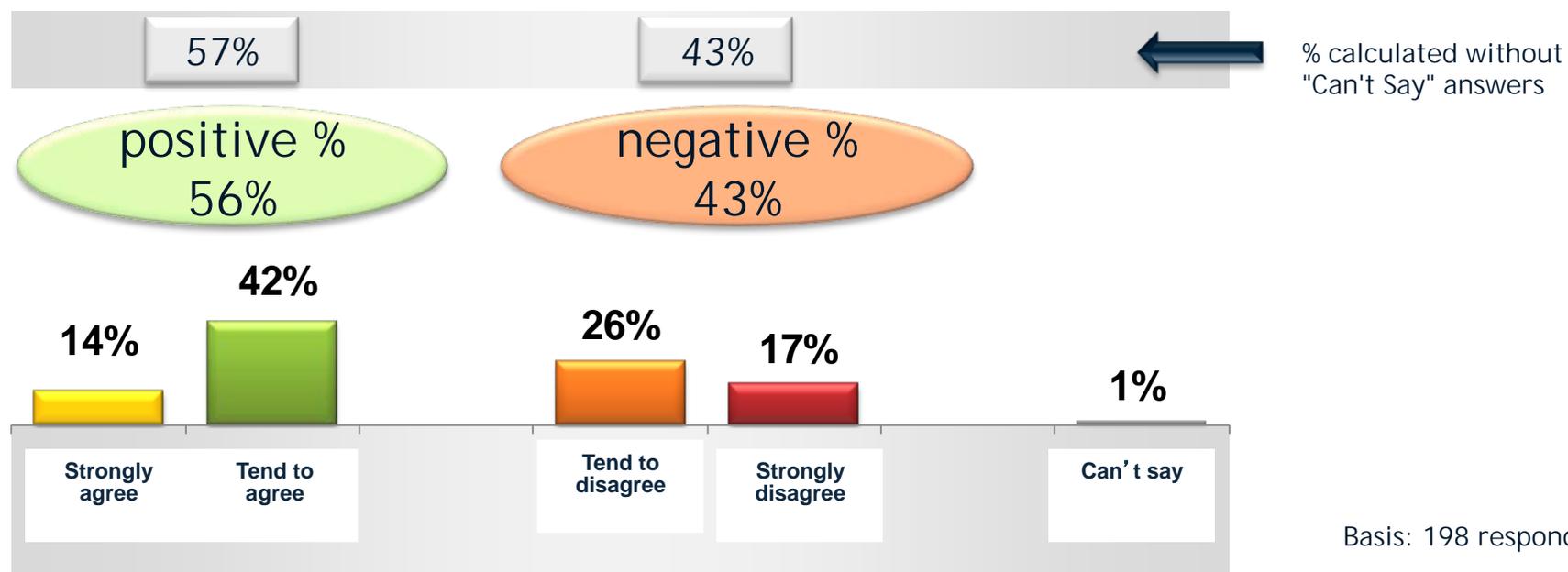
To what extent do you agree that:

Q33 - The deployment of IPv6 will gradually result in the disappearance of Network Address Translation boxes



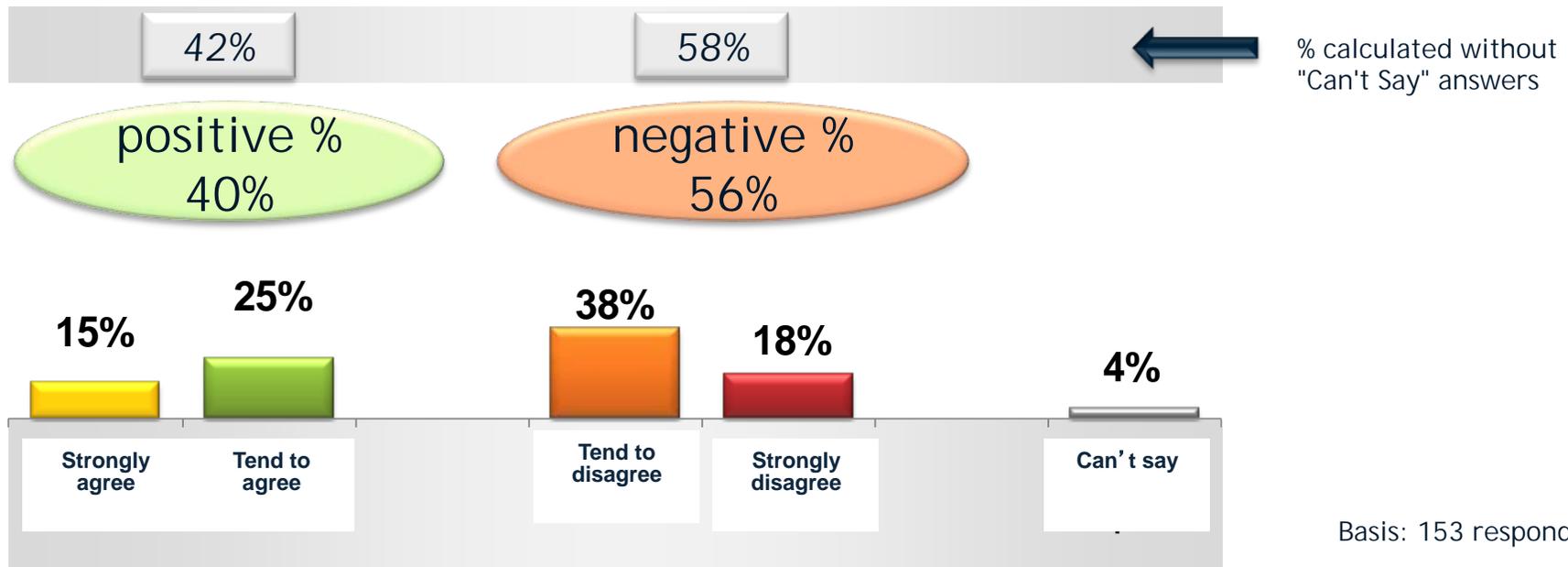
To what extent do you agree that:

Q21 - Office suites (provided as services on the Internet) will eventually completely replace traditional office suites (software installed locally on the user's machine)



To what extent do you agree that:

Q59 - The different types of access to wireless Internet (3G, wifi hotspots, etc.) will be neutral in the sense that these access systems let through all the traffic exchanged without judging its nature



O_Q59 - FILTER: if you disagree (tend to disagree or strongly disagree) with the statement that "The different types of wired Internet access (DSL, fiber, etc.) will be neutral in the sense that these access systems let through all the traffic exchanged without judging its nature" or "The different types of access to wireless Internet (3G, wifi hotspots, etc.) will be neutral in the sense that these access systems let through all the traffic exchanged without judging its nature"

If you agree

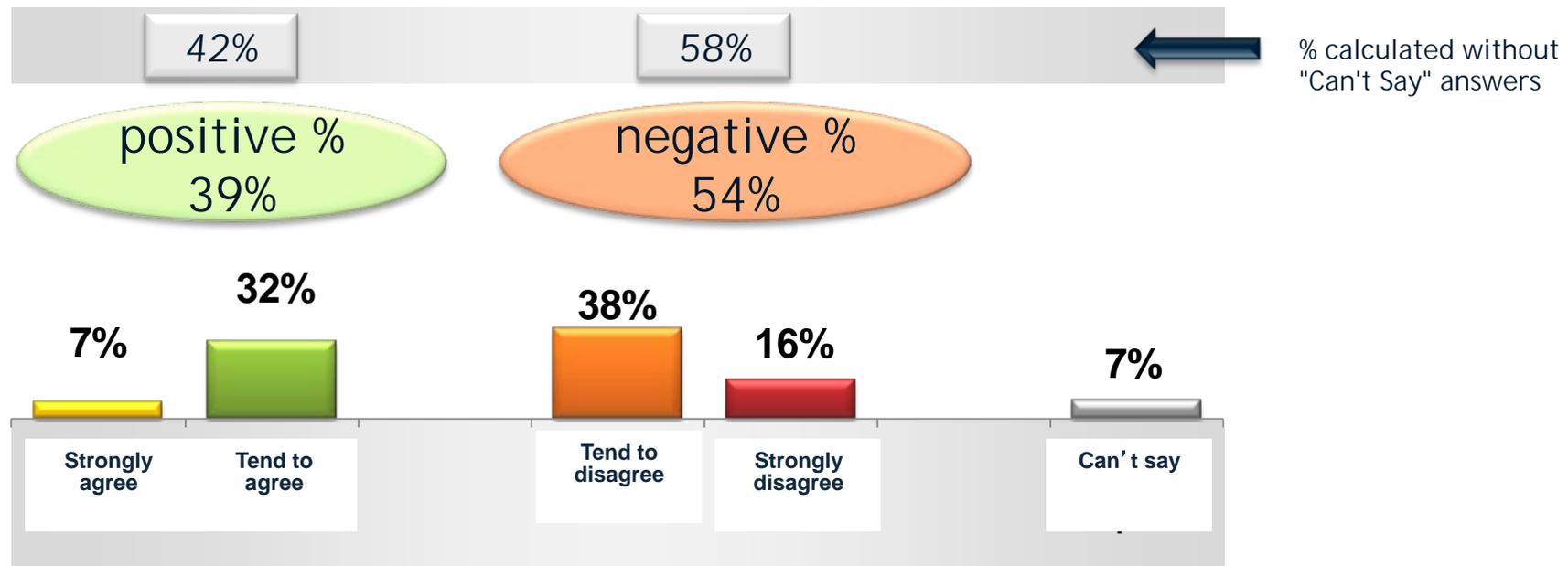
WHY?

In French
Le besoin de nos gouvernements de faire respecter les droits d'auteur feront que les protocoles vont être de plus en plus surveillés.
Les évolutions récentes du secteur des télécoms, ainsi que les positions des différents acteurs impliqués (FAI, institutionnels et fournisseurs de services en ligne) laissent présager d'un "Internet" de moins en moins neutre, et de la pérennité de systèmes de plus en plus fermés (walled-gardens).
La neutralité de Free Mobile n'a pas incité les autres entreprises a suivre son exemple.
Evolution des offres, ou nous nous apercevons que la neutralité des réseaux est mise à mal. Que le consommateur devra adopter spécifique à un usage donné, et non global comme c'est le cas aujourd'hui.
Blocage déjà existant, en raison des aspects de piratage, ou d'utilisation de services non- autorisés par les fournisseurs d'accès (par exemple, téléphonie IP sur téléphone mobiles/smartphones)
Là où le business du filaire est de fournir un tuyaux de bits, le business du sans fil (3g/4g en particulier) sont plus complexes et entre en compétition avec des services de voix et video offerts via le même support. De plus, la connectivité des antennes reste encore limitée en terme de bande passante, on recommence à voir des quotas ce qui aurait dû disparaître.
Les opérateurs vont tenter de forcer la mise en oeuvre de QoS sur les connexions mobiles pour financer leurs investissements d'infrastructure et également récupérer une part de la valeur générée par les acteurs over-the-top (Youtube, spotify etc.)

In English
Wireless is a more scarce resource than wired. For 58 I hope that the net will be neutral but I am not sure if it will be
Layer 9 and above need too much money. It's a social playing field.
There are too many commercial interests at play to make survival of content independent likely.
It's commercially interesting to carrier to allow/prefer certain types of traffic.
Old voice (or video) monopolies will not die; walled gardens will have tremendous power
Too many economic drivers towards differential pricing, and the network infrastructure is not secure enough to prevent this.
The net neutrality will be very difficult to defend.

To what extent do you agree that:

Q60 - Cloud computing will fundamentally change Internet protocols and services



Basis: 153 respondents

O_Q61 FILTER: If you agree (strongly agree or tend to agree) with the statement that "Cloud computing will fundamentally change Internet protocols and services"

If you disagree

In what ways?

In French
De nouveaux protocoles vont être nécessaires pour sécuriser au maximum les échanges
Stockage et puissance de calcul
Les protocoles de sécurité
Stockage ou calcul, tout ce qui peut être délocalisé sur le cloud
Le stockage des informations va être décentralisé.
Uniquement service
Les majeures, d'entreprises connues et "fiables". Tels que iCloud, Google Drive, Amazon AWS.
Internet des objets
Stockage, administration en ligne...

In English
A shift from a focus on giving a device enough power for all possible uses (for maximum flexibility and lifetime) to a model that allows intensive jobs (processing, storage) and media to be offloaded to flexible cloud resources.
Local memory will disappear
requirement for better security and resilience
We'll take for example Google Chrome. URL's visited at home, are in the history at work. Same for passwords, all because they end up in Google Cloud
More reliable, more ubiquitous

O_Q62 FILTER: If you agree (strongly agree or tend to agree) with the statement that "Cloud computing will fundamentally change Internet protocols and services"

If you agree

How?

In French

Par définition parce que les données ne seront plus "sous la main", mais à distance. Les besoins de réactivité des services à distance altéreront les protocoles (perversion pour obtenir "le petit plus de puissance que l'autre n'a pas". Google le fait déjà à l'heure actuelle. cf. spdy et Chrome.

Extensions pour les échanges de gros volumes.

Par tout les moyens possible et imaginable ;) -> nuage de ribidium
^^

Le rapport qualité-prix entre le stockage local et "Cloudé" va se fortement se réduire.

Décorélation du service des systèmes qui le propulse

En délocalisant les applications de la machine vers le cloud.

Innovation de le stockage, le tout-dans-le-cloud.

Mise à disposition de puissances de calculs et ed stockage indispensables au traitement temps-réel des données générées par les objets

In English

It will be attractive to users because there will be enough bandwidth available to make it viable, and it will give them devices that perform better with fewer tradeoffs (battery life, form factor, performance, UI, etc).

Devices technology will change

More private clouds for company, law protecting your data

O_Q63 - FILTER: If you disagree (strongly disagree or tend to disagree) with the statement that "Cloud computing will fundamentally change Internet protocols and services"

If you disagree

WHY?

In French

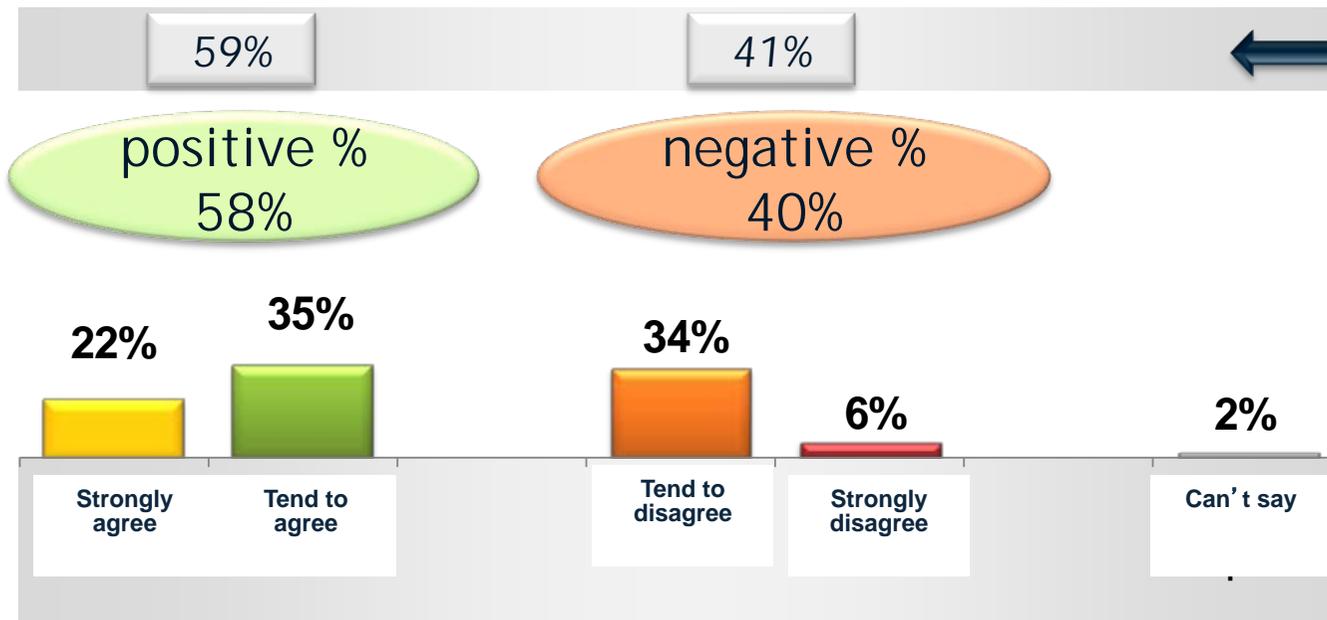
le cloud tel que vendu actuellement n'a rien à voir avec Internet, c'est du simple service situé en périphérie du réseau. S'il peut créer plus d'usage asymétriques et donc nuire à l'équilibre naturel des réseaux, ce n'est qu'une problème de dimensionnement et pas un problème protocolaire qu'il faudra résoudre.
Le cloud est au final un gros serveur élastique avec une gestion qui devrait se faire dans les couches supérieures. Cependant, le cloud pourrait changer fortement les structures de coûts des entreprises.
Le moteur est la performance croissante des réseaux, processeurs.
Les protocoles et services ont plutôt bien résisté. D'autre part, la tendance actuelle est plutôt de tout faire passer en http (ou https) pour contourner les filtrages et je ne vois pas pourquoi cela changera.
Pas "fondamentalement" mais ils vont évoluer vers quelque chose de plus globalisé (technologies de datacenter vers le cœur d'Internet)
le cloud est un buzzword qui correspond à trop de technologies différentes
Je vois le Cloud que comme une nouvelle façon de consommer un service, non pas de le faire fonctionner.
Limitations dues à- la confidentialité, - les performances,- les coûts de certains services- le blocage psychologique de l'utilisateur particulier maître de son propre environnement

In English

Cloud computing fundamentally relies on existing Internet protocols and services. Cloud computing has already had the effect of making server space very cheap. Beyond that I don't see any specific impetus for changes in services or protocols to suit the needs of cloud computing. Those needs seem sufficiently close to those of non-cloud computing that we merely need to fix the ways that internets are currently broken in order to suit them both.
Cloud computing is mostly marketing speak for 'runs on other people's hardware. That's unlikely to be a major force once the hype wears out.
It isn't anything new, just become economical viable the last few years to do cloud.
CC is based on Internet technology, and even it'll cause some changes they are not fundamental
Clouds are all about money saving, but people will be able to afford hosting their own data better and cheaper in the future.

To what extent do you agree that:

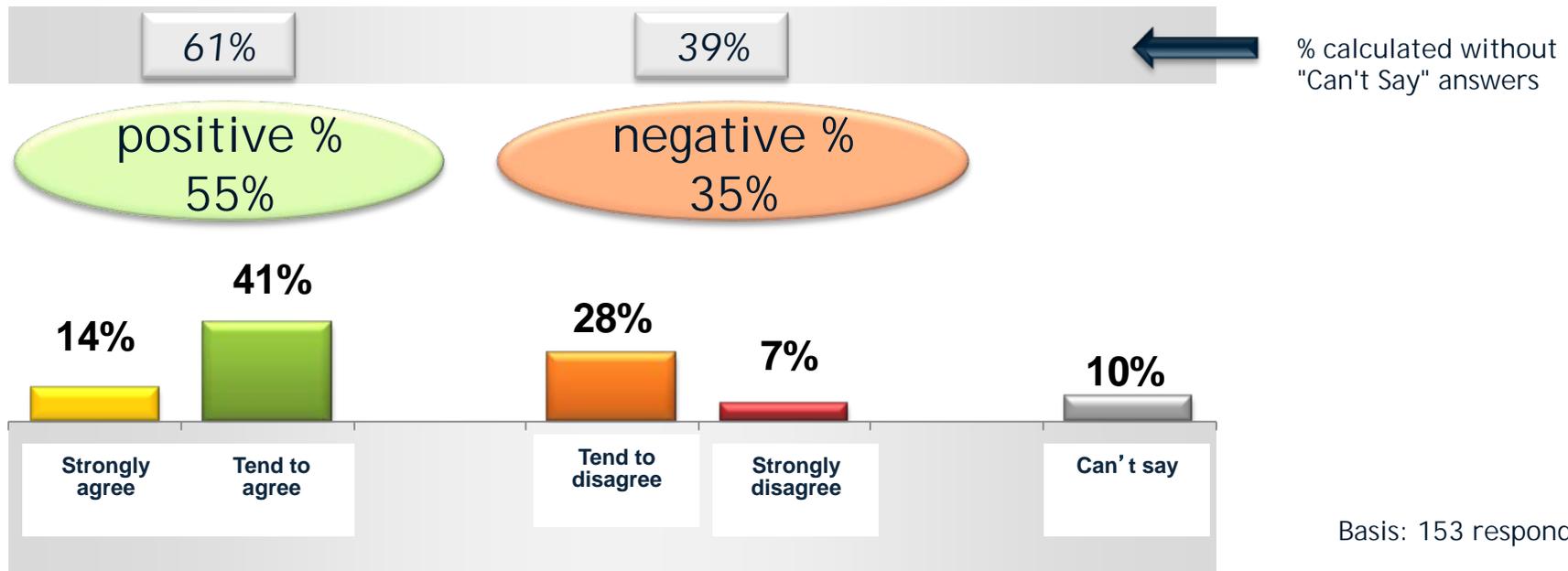
Q51 - For you, the weak points of the Internet infrastructure that could cause a major crash are:
Physical: underground / underwater cables, electricity, air conditioning, etc.



Basis: 153 respondents

To what extent do you agree that:

Q52 - For you, the weak points of the Internet infrastructure that could cause a major crash are: At the network level (typically, BGP routing)



Summary of the divergences into 2 schools of thought



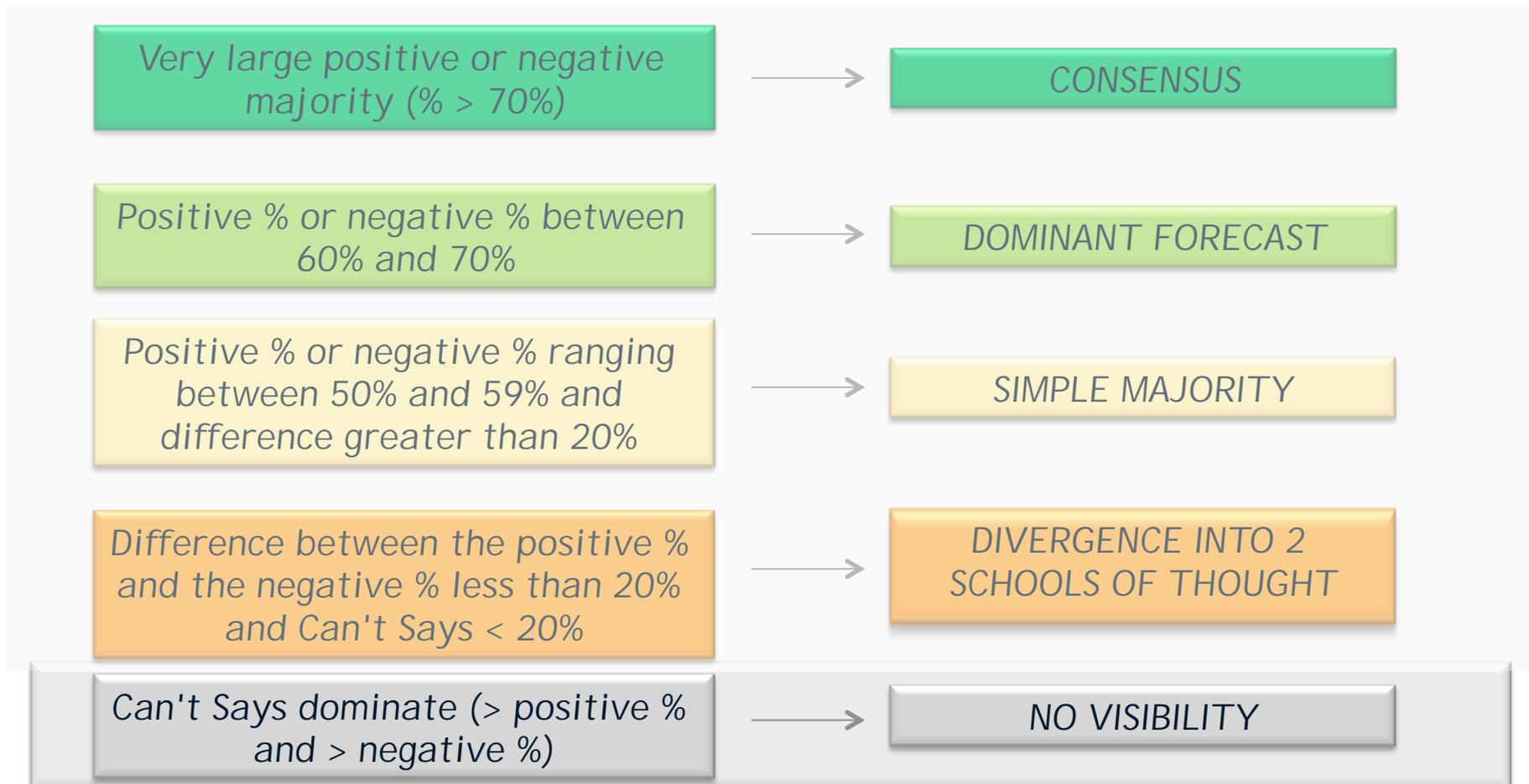
	Criteria	Positive %	Negative %	Can't say	Positive / negative % difference	
1	Q71 - In the case of DNS requests assigned to a third party (ISPs or suppliers of alternative solvers), the use of alternative solvers will exceed the use of one's own ISP resolver	41%	39%	20%	1%	2 SCHOOLS OF THOUGHT
1(2)	Q71A - Do you think this will allow a better guarantee of the integrity of responses (e.g. avoid "Liar DNS")?	69%	31%	0%	39%	DOMINANT FORECAST
1(3)	Q71B - Do you think this will allow better performance in name resolution (lead-time, availability)?	52%	45%	3%	6%	2 SCHOOLS OF THOUGHT
2	Q70 - Local DNS resolvers (caches installed on user machines) will play a significant role (25% or more) compared with ISP resolvers or "open" resolvers of the Google DNS type	40%	42%	18%	-2%	2 SCHOOLS OF THOUGHT
2(2)	Q70A - Do you think this will allow a better guarantee of the integrity of responses (e.g. avoid "Liar DNS")?	62%	33%	5%	30%	DOMINANT FORECAST
2(3)	Q70B - Do you think this will allow better performance in name resolution (lead-time, availability)?	70%	30%	0%	41%	CONSENSUS
3	Q33 - The deployment of IPv6 will gradually result in the disappearance of Network Address Translation boxes	47%	36%	17%	11%	2 SCHOOLS OF THOUGHT
4	Q21 - Office suites (provided as services on the Internet) will eventually completely replace traditional office suites (software installed locally on the user's machine)	56%	43%	1%	13%	2 SCHOOLS OF THOUGHT
5	Q59 - The different types of access to wireless Internet (3G, wifi hotspots, etc.) will be neutral in the sense that these access systems let through all the traffic exchanged without judging its nature	40%	56%	4%	-16%	2 SCHOOLS OF THOUGHT
6	Q60 - Cloud computing will fundamentally change Internet protocols and services	39%	54%	7%	-16%	2 SCHOOLS OF THOUGHT
7	Q51 - For you, the weak points of the Internet infrastructure that could cause a major crash are: Physical: underground / underwater cables, electricity, air conditioning, etc.	58%	40%	2%	18%	2 SCHOOLS OF THOUGHT
8	Q52 - For you, the weak points of the Internet infrastructure that could cause a major crash are: At the network level (typically, BGP routing)	55%	35%	10%	20%	2 SCHOOLS OF THOUGHT

Difference between the positive % and the negative % less than 20%

Methodology



- ✓ The thresholds taken into account to analyze the results on semantic issues (Strongly agree ... Tend to disagree):



Divergences: absence of visibility



Can't Says dominate (> positive %
and > negative %)



NO VISIBILITY

- ✓ The analysis of divergences due to absence of visibility:
 - ✓ For the 1st edition, we presented a type of analysis that we called "No visibility: PdV".
 - ✓ The % of "Can't Say" responses was very high and prevented any visibility on some issues [Can't Says dominate (> positive % and > negative %)]
 - ✓ In the 2nd edition, this phenomenon was not observed.



Contents

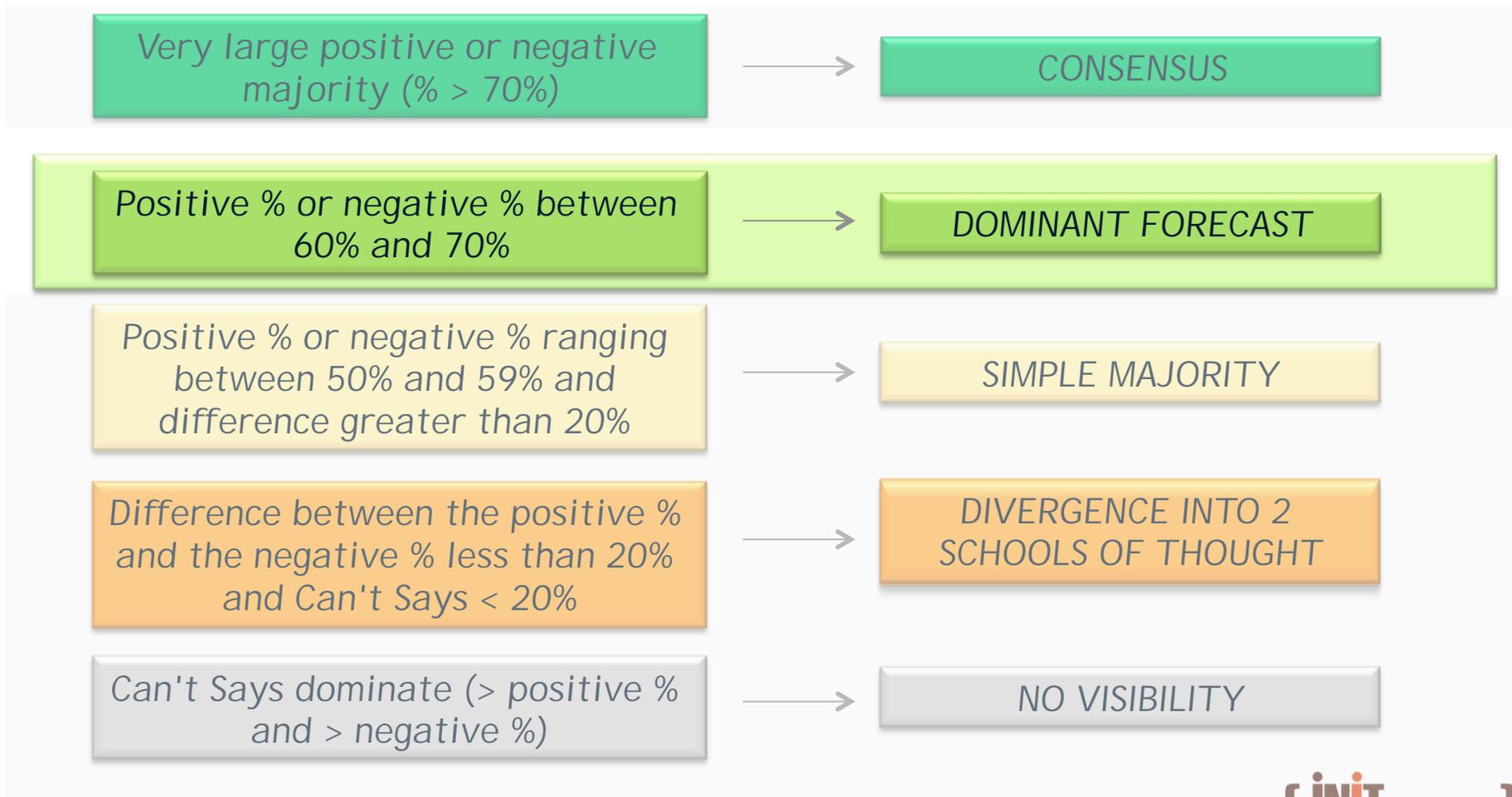


1. Background and objectives of the survey
2. Methodology
3. Aspects of Internet access and use
4. The Backdrop
 1. Issues on which respondents agree
 2. Issues on which respondents disagree
5. Additional information: "Dominant forecasts" and "Simple majorities"
6. Conclusions and outlooks
7. Annexes

Methodology

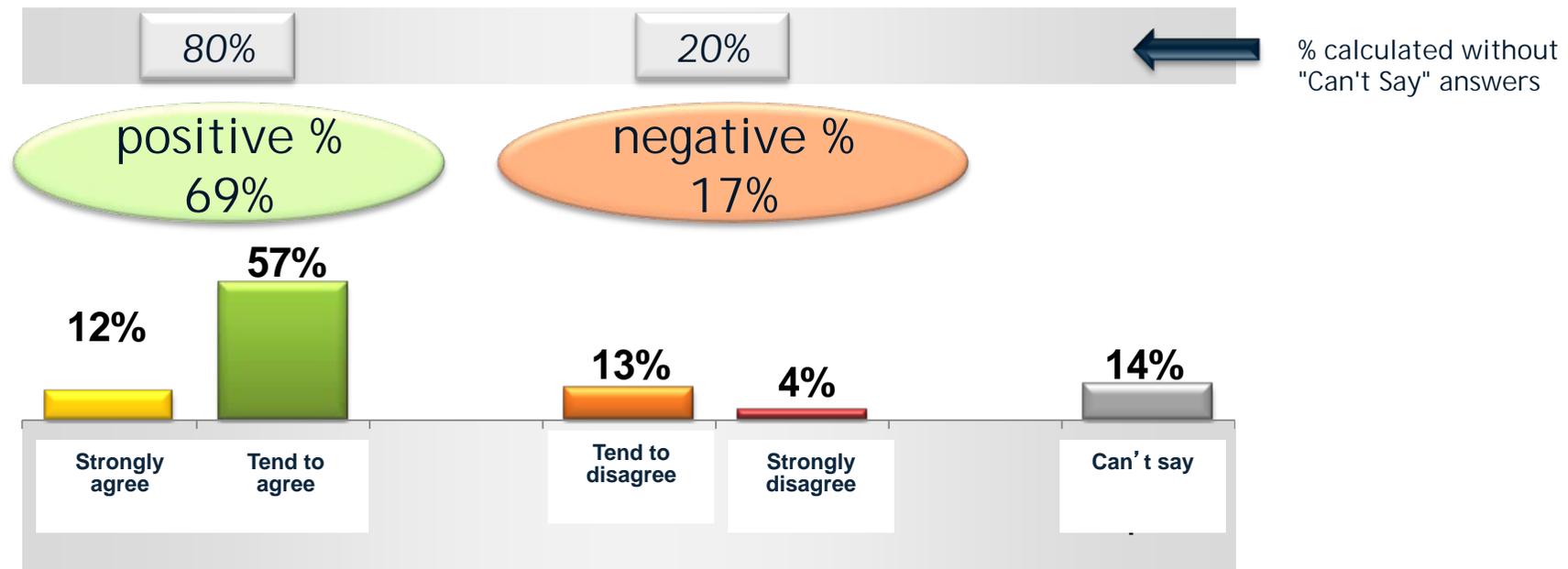


- ✓ The thresholds taken into account to analyze the results on semantic issues (Strongly agree ... Tend to disagree):



To what extent do you agree that:

Q36 - The routing protocols and algorithms used in today's Internet will withstand the growth of the Internet



Basis: 153 respondents

O_Q36 - FILTER: If you disagree (strongly disagree or tend to disagree) with the statement that: "The routing protocols and algorithms used in today's Internet will withstand the growth of the Internet"

If you disagree

WHY?

In French

Problématique et enjeux nouveaux qui ne sont pas pris en charge ou réglés aujourd'hui qu'avec des rustines :- sécurité : confidentialité, authentification, disponibilité, mécanisme de contrôle d'accès dédié à la gestion/usage des canaux de communications- démultiplication du nombre de réseau par le passage en IPv6- problématique de gestion d'accès à la ressource: impossibilité d'accès aux informations de la couche applicative sur les réseaux, (ce qui est normal) mais enjeu de la gestion de l'usage d'Internet.- problématique de gestion de la congestion dans le transport (utilisation massive UDP ou TCP, attente de la montée de protocole semblable à DCCP)

Les problèmes de sécurité ne sont pas totalement réglés.

L'évolution du trafic et des usages/applications généreront de nouveaux besoins, évidemment.

Généralement pas de prise en compte de la latence, ou de la bande passante disponible.

Les usages vont évoluer, les protocoles vont devoir s'adapter (intégrer la mobilité au plus bas niveau par exemple)

La mise en place de réseaux déconnectés peuvent modifier la manière dont les backbones seront utilisés

Scalability. Security. Surveillance. Governance (ITU, UN, US, EU, China...). Copyright wars.

In English

They are getting increasingly brittle and ossified. The flexibility that they do have has been the only reason that the internet has grown as it has done so far, but the demands eventually will outstrip that flexibility.

Future networks will require link-state-agnostic routing, as many of these networks will operate over less-reliable links such as radio, PLOS or Free Space Optical.

Mobility will put pressure on the Locator/ID split

They already restrict the growth of the Internet, putting a brake on the availability of addresses (even in IPv6!) and the ability to multi-home.

Security is big issue

O_Q37 - FILTER: If you disagree (strongly disagree or tend to disagree) with the statement that: "The routing protocols and algorithms used in today's Internet will withstand the growth of the Internet", which of them will substantially modified and / or replaced?

And if they are replaced, by what will they be replaced?

If you disagree

In French

Les protocoles existent déjà, le point concerne l'adaptation réseau, la translation IPv4/IPv6, la mise à niveau des terminaux pour soutenir l'utilisation des protocoles et algorithmes IPv6

BGP, pour rendre le routage dépendant de notions de sensibilité à la latence (niveau paquets).

Encore des adaptations à ip6 ; surement d'autres optimisations basées sur la priorité et la capacité de rétention et donc d'autres protocoles après la mise en place des routeurs optiques

- en transport : les protocoles de transport classique (TCP/UDP) pourra être remplacé par des protocoles disposant de fonctionnalités avancées sur la sécurité, la congestion (DCCP)- en réseau : le mécanisme de datagramme devrait vivre de longue années enc

In English

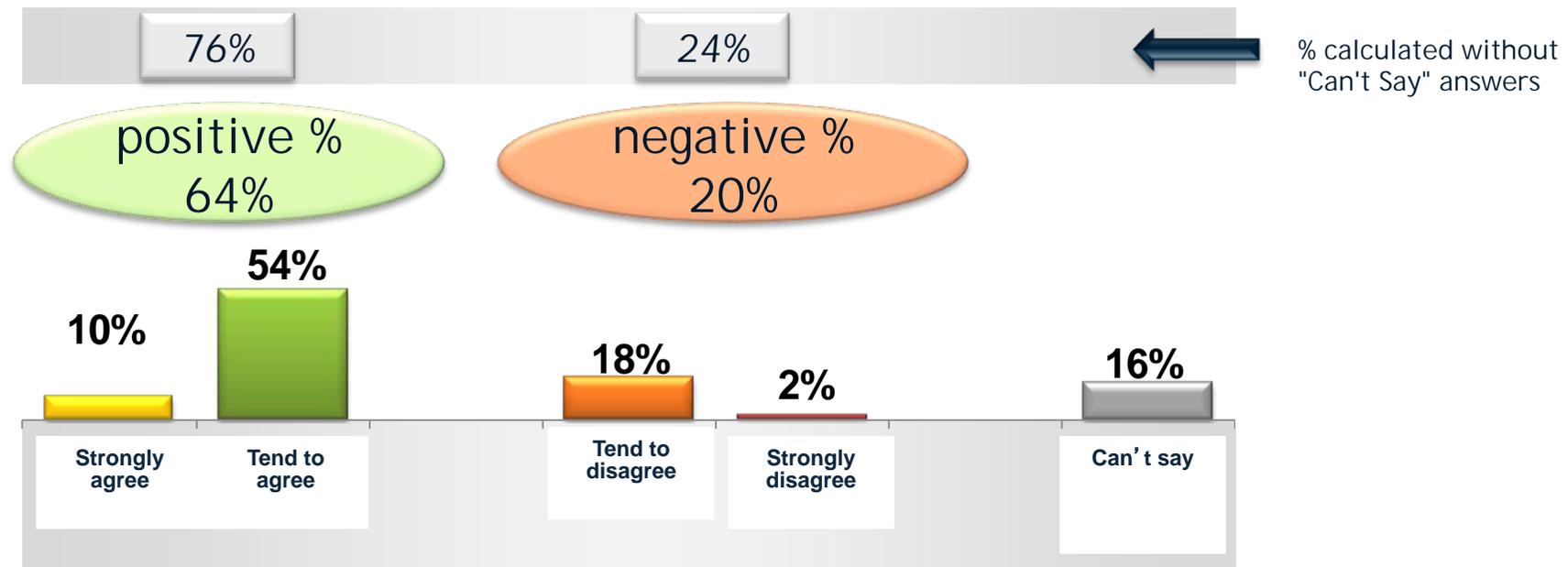
TCP will need to evolve to manage higher bandwidth rates, multiple links, different classes of traffic (eg bulk vs real-time), BGP needs to evolve to improve security and scale, multiple protocols need to evolve to improve support for mobility (Mobile IP is not a good solution). I think that ILNP has promise as a means to manage routing table scale, mobility, and flexibility

I can't see much sign of clean-slate internet research feeding into practical networking, other than piecemeal application-specific overlays.

BGP can not survive as it is :("it" will be "replaced" with TOR, mash networking, and other overlay technologies, while users "route around obstacles" but on their usage needs by the "new Telcos" = ISPs,

To what extent do you agree that:

Q73 - In 10 years' time, the DNS will be more secure than it is today

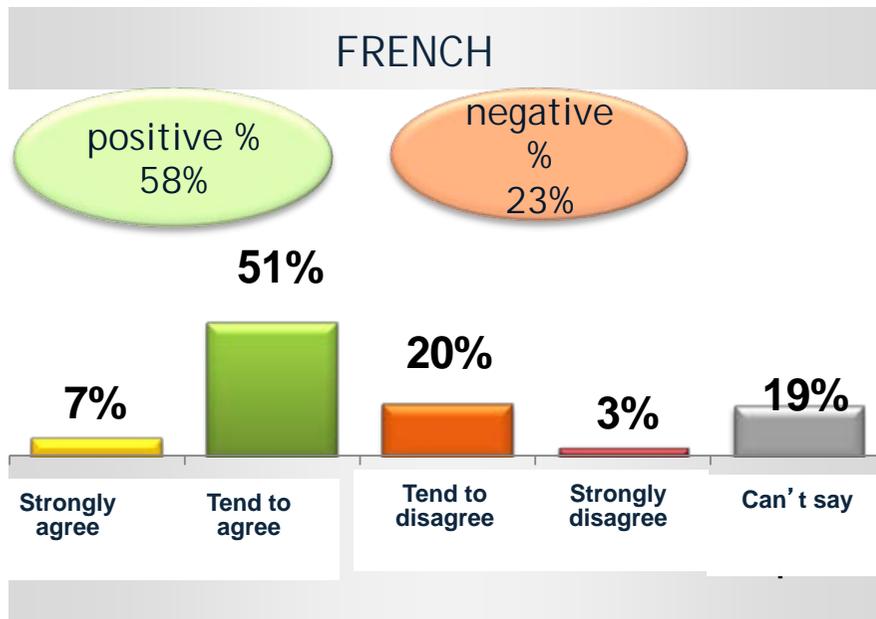


Basis: 153 respondents

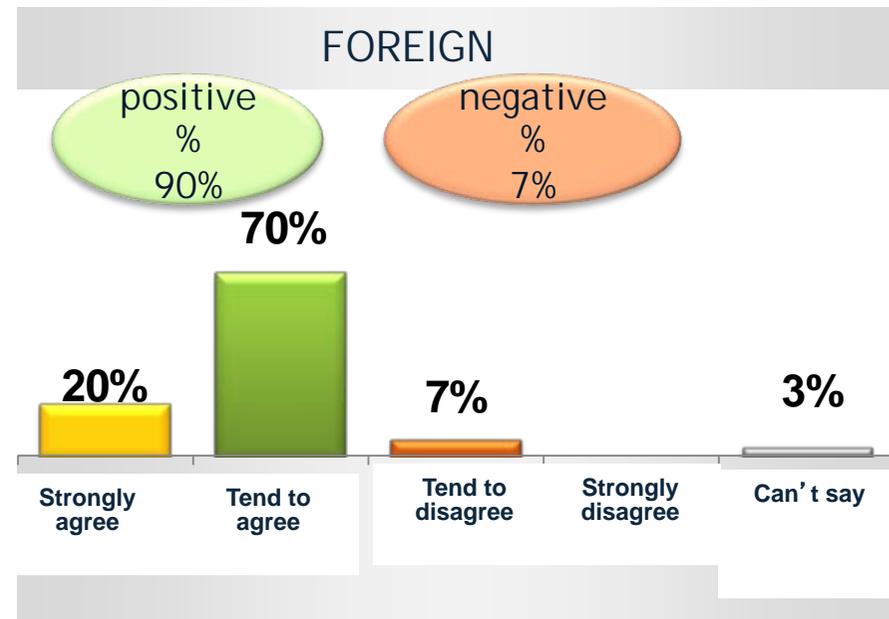
To what extent do you agree that:

DIFFERENCES PER SEGMENT

Q73 - In 10 years' time, the DNS will be more secure than it is today



Basis: 123 respondents



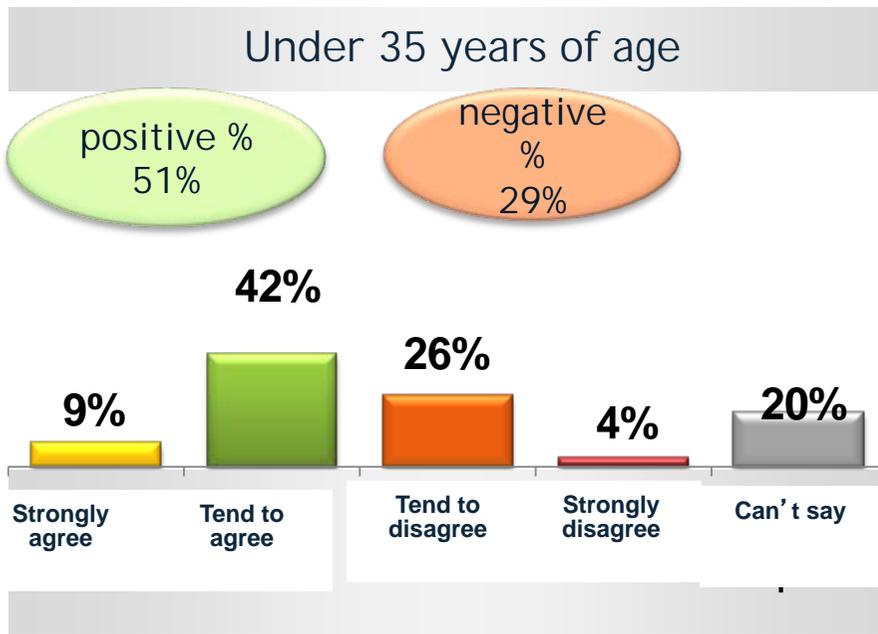
Basis: 30 respondents

It can be seen that the dominant global forecast is a simple majority among French respondents, but there is a broad consensus among foreign respondents.

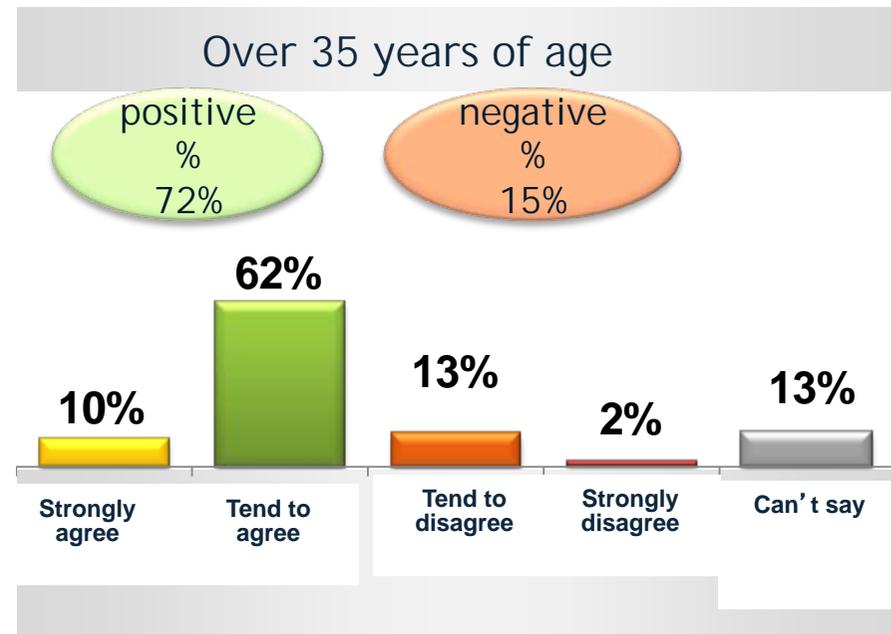
To what extent do you agree that:

DIFFERENCES PER SEGMENT

Q73 - In 10 years' time, the DNS will be more secure than it is today



Basis: 57 respondents



Basis: 96 respondents

Respondents under 35 years of age are more uncertain about the security of the DNS.

O_Q73 - FILTER: If you disagree (strongly disagree or tend to disagree) with the statement that: "In 10 years' time, the DNS will be more secure than it is today"

If you disagree

WHY?

In French

L'adoption massive de dnssec coûtera plus d'argent qu'il n'en rapportera ce qui riste de ralentir fortement sa progression.

Généralisation de DNSSEC, prise de conscience qu'un domaine "semblant légitime" ne suffit pas pour avoir confiance.

Personne ne voudra prendre en charge sa véritable sécurisation tandis que de nombreux "mafieux" chercheront toujours à le "détourner".

In English

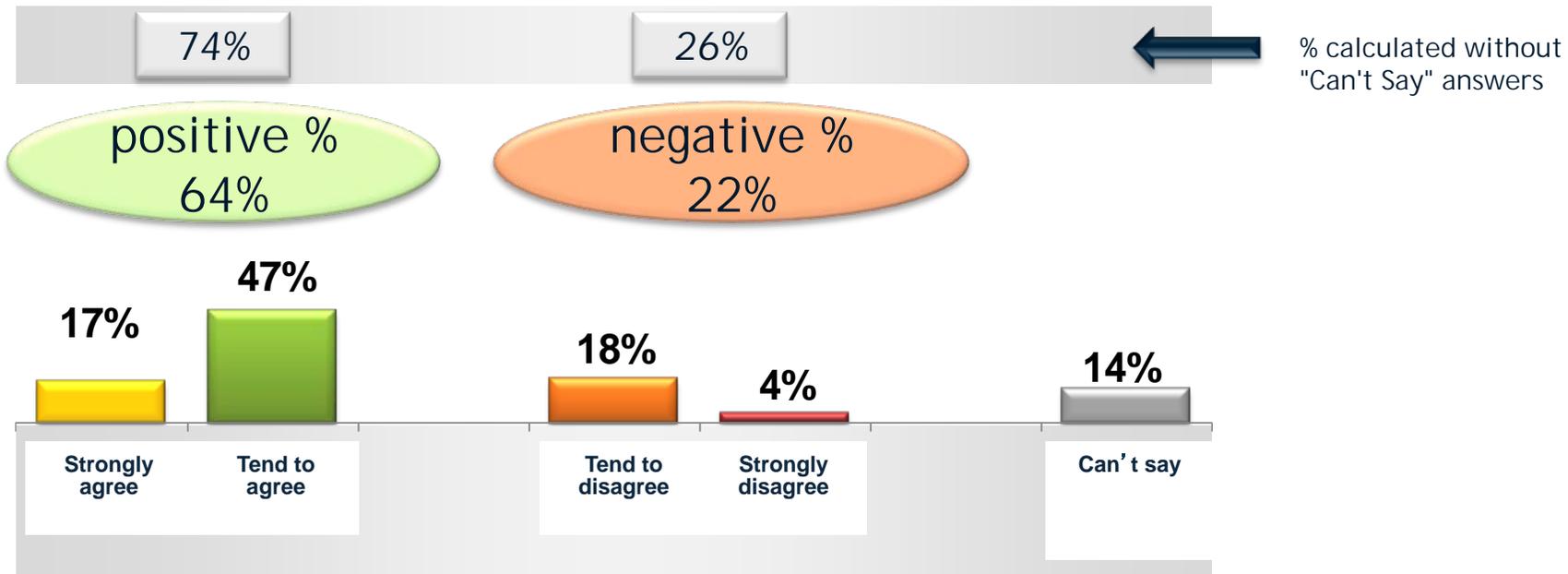
Without the widespread implementation of DNSSEC or some similar technology, DNS exploits will continue to spread. These exploits can affect a great many hosts and are very potentially lucrative to identity thieves and other criminal sorts. I predict that without large-scale adoption of DNSSEC the DNS will break down catastrophically well within ten years. I further predict that the beginning of large-scale adoption of DNSSEC will lead to widespread blacklisting of non-DNSSEC resolvers, which should tend to cause an acceleration of DNSSEC adoption, and none too soon at that.

It will be 'more secure', but the threat will evolve more rapidly. DNSSEC will get some deployment, but it's hard to get right. In the mean time, I expect DNS cache poisoning techniques to evolve and increase overall risk.

Blocking and interference will make the DNS less reliable; plenty of new TLDs will provide a false sense of security

To what extent do you agree that:

Q74 - In 10 years' time, the Internet name space will be globally governed by a single root (the DNS root)



Basis: 153 respondents

O_Q74 - FILTER: If you disagree (strongly disagree or tend to disagree) with the statement that "In 10 years' time, the Internet name space will be globally governed by a single root (the DNS root)"

If you disagree

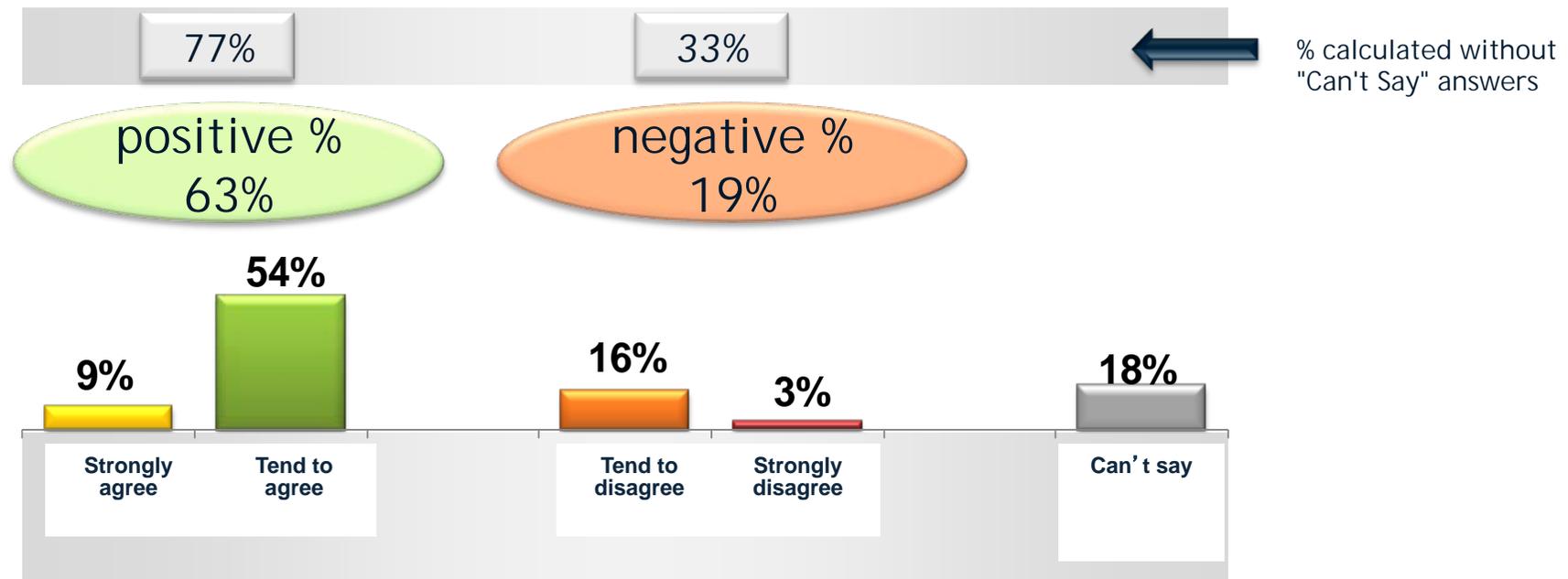
WHY?

In French
La montée des censures (ARJEL, SOPA) et résolveurs menteurs fera que de plus en plus de gens utiliseront des systèmes « alternatifs » donc il y aura fragmentation de l'espace de nommage.
Internet devenant un enjeu stratégique, une racine unique représente trop de risques géopolitiques. En outre, chaque pays voudra censurer tout ou partie d'Internet.
Je vois mal les autres grandes puissance continuer à laisser ça entre les seules mains américaines.
Les décisions non démocratiques de l'ICANN ainsi que les censures de noms de domaines par le gouvernement US mettent en danger l'unicité de la racine DNS et favorisent la création de méthodes alternatives.
Le troll portant sur la légitimité de l'ICANN revient de plus en plus souvent. Je pense plus probable que certains ISP mettent en place leurs alternatives basés sur un principe de droit de distribution / accords commerciaux locaux. D'une certaine façon, ce genre de comportement aurait le mérite de pousser à la mise en place de resolvers locaux, de l'autre le namespace unifié est déjà mort à cause de la censure.
Devant la suprématie des USA sur la racine, il est probable qu'un pays ou un groupe de pays (se rendant compte de leur dépendance à l'internet) décide de créer une alternative viable à la racine actuelle

In English
It could be an evolution. We keep say that an alternate root is not good, but, if done properly it may be good.
There already exist several incompatible internet namespaces. I predict that someone will eventually find a way to reliably bridge between namespaces while avoiding most collisions. The advantages of arbitrary naming are small but seductive, and probably will outweigh the advantages of a unified DNS root namespace- barring only the imposition of strong central control from a governing body or coalition thereof.
New naming systems will arrive and new roots for those naming systems will become more relevant.
This is already not entirely the case and the political desirability of local control will only increase the pressure for this.
There will be pressure to have TLDs related to morally-objectable subjects. If the root is still controlled by an organization that can be strongly influenced by one government, the TLD won't be allowed.
Currently it is not global, it should be international

To what extent do you agree that:

Q49 - In 10 years' time, security mechanisms for routing on the Internet (e.g. RPKI) will be adopted and implemented worldwide

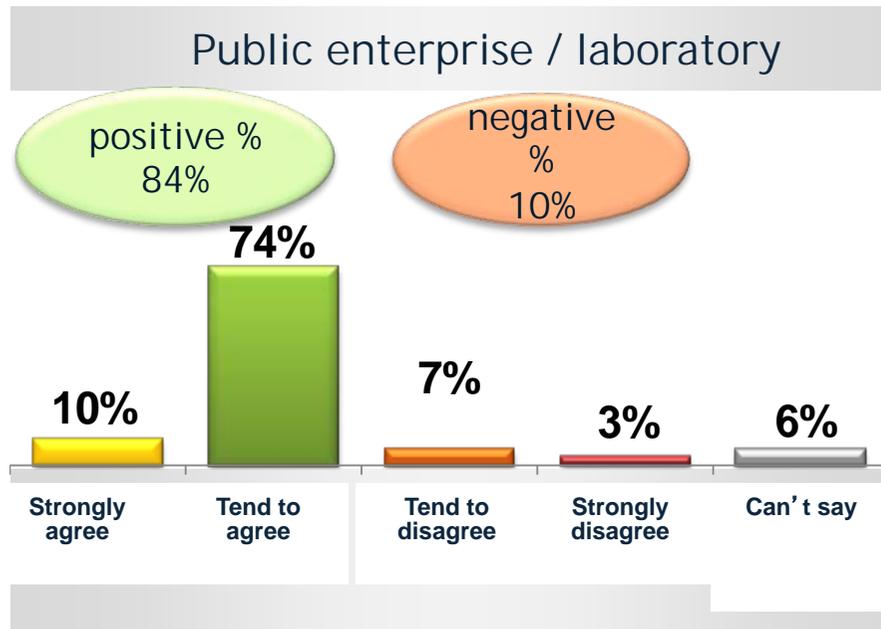


Basis: 153 respondents

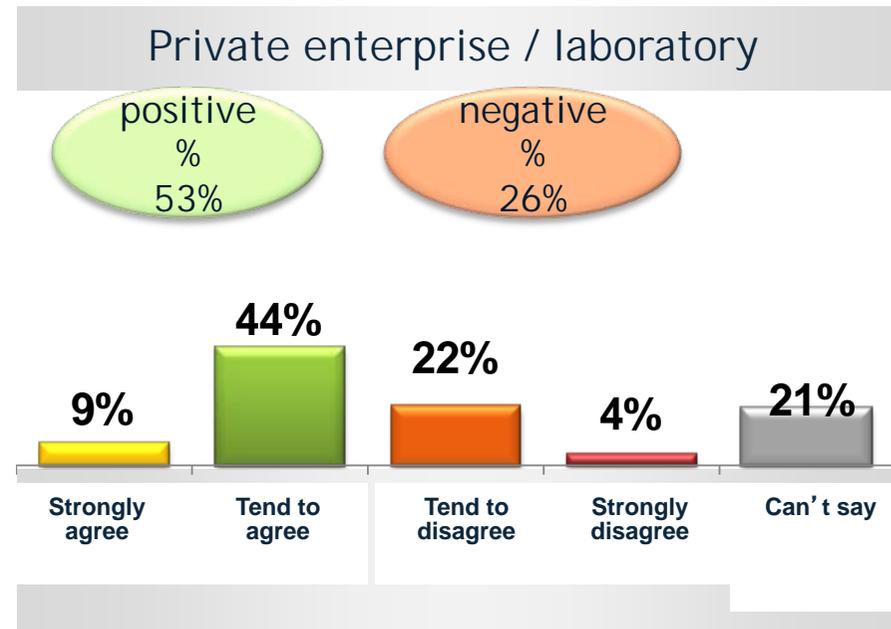
To what extent do you agree that:

DIFFERENCES PER SEGMENT

Q49 - In 10 years' time, security mechanisms for routing on the Internet (e.g. RPKI) will be adopted and implemented worldwide



Basis: 31 respondents



Basis: 70 respondents

For public institutions, there is clearly a consensus. For private companies, it is a simple majority.

O_Q49 - FILTER: If you disagree (strongly disagree or tend to disagree) with the statement that "In 10 years' time, security mechanisms for routing on the Internet (e.g. RPKI) will be adopted and implemented worldwide"

If you disagree

WHY?

In French

Surement trop couteux à mettre en place par rapport au gain. Si l'on regarde l'historique de DNSSec, tout est prêt depuis plus de dix ans. Les implémentations commencent à se faire, mais pour le "grand public" (OVH, Gandi). Aujourd'hui aucune implémentation du protocole n'est réalisée sur des grosses installations. Je pense donc qu'une implémentation du type de RPKI va avoir la même inertie.

Absence d'information grand public sur un sujet potentiellement sensible. Et "mondialement" en 10 ans? cela paraît optimiste.

La sécurité est toujours le même problème, tant qu'on a pas eu de problème, on ne s'en soucie pas vraiment. Le cout de maintenir le système de sécurité (particulièrement RPKI) est probablement trop élevé par rapport au risque.

La mise en place sera plus longue pour un déploiement global

La sécurité ne semble pas intéresser les utilisateurs finaux, et donc peu les professionnels qui leur proposent leurs services.

Ça viendra lentement, parce que ça ne correspond pas aujourd'hui à un problème massif avec des enjeux majeurs pour les utilisateurs.

Les nouveaux protocoles mettent en général plus de 10ans avant d'être massivement adoptés surtout si le but n'est pas lucratif (ex : ipv6)

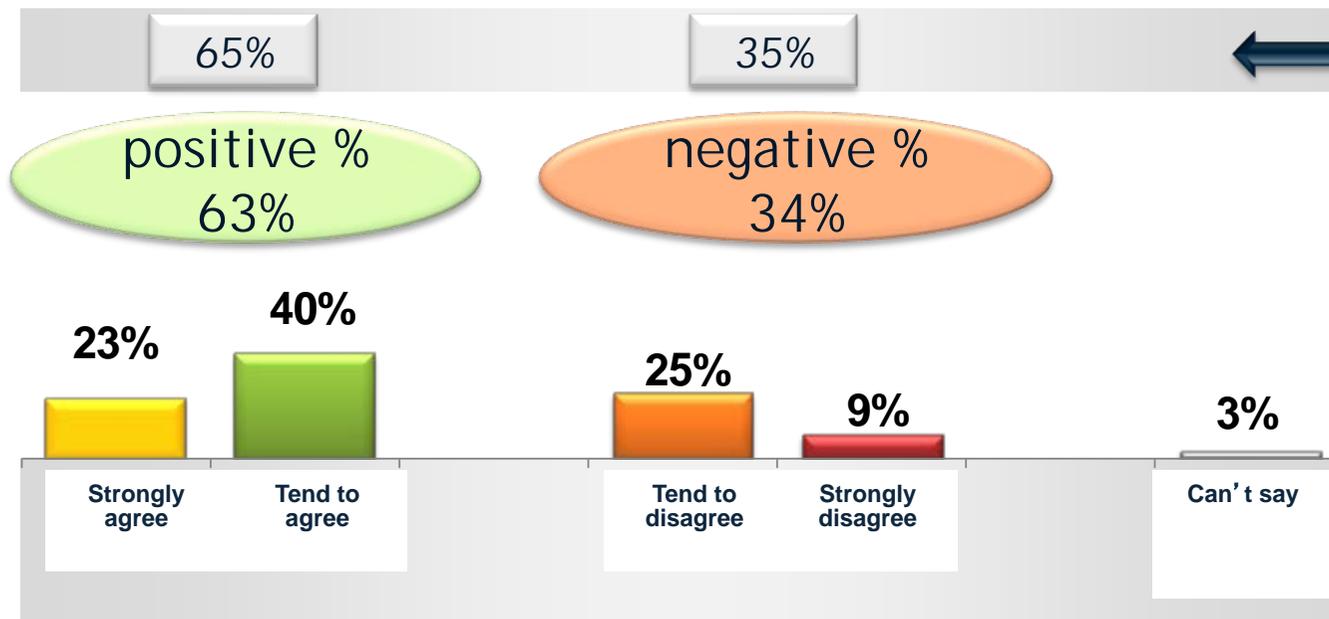
In English

The need for anonymous routing is strong

Security is hard to do correctly and not (still) a maajor priority most places.

To what extent do you agree that:

Q53 - For you, the weak points of the Internet infrastructure that could cause a major crash are: At the level of infrastructure services such as the DNS

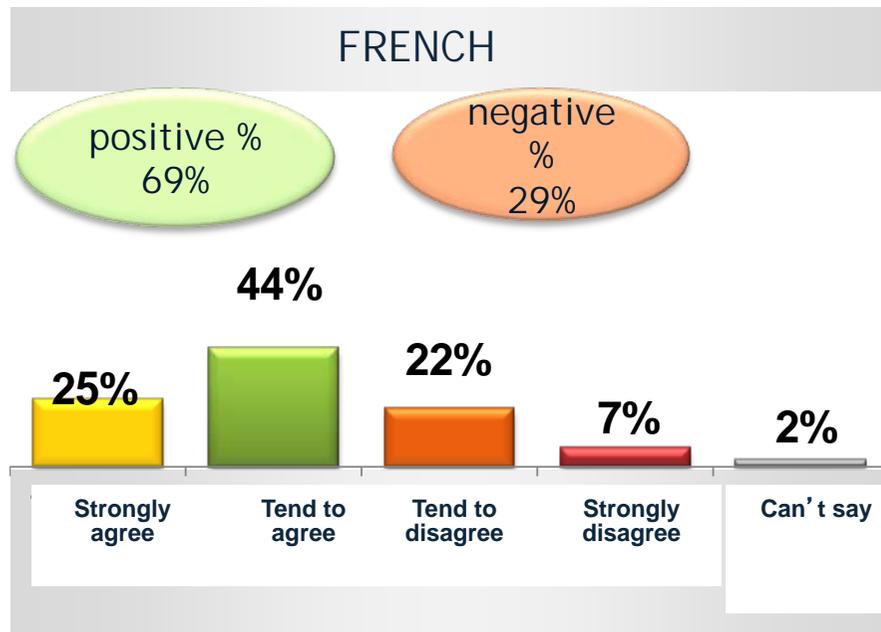


Basis: 153 respondents

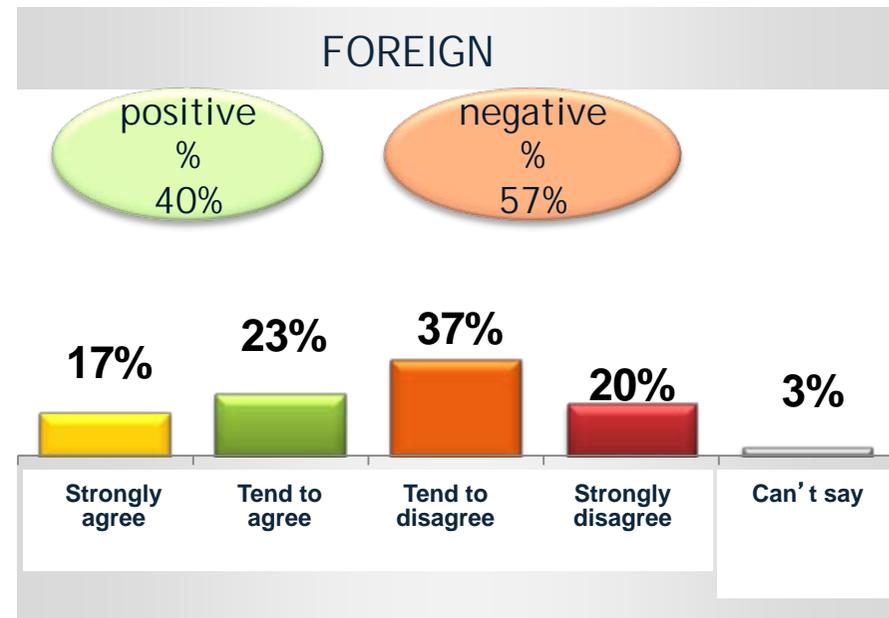
To what extent do you agree that:

DIFFERENCES PER SEGMENT

Q53 - For you, the weak points of the Internet infrastructure that could cause a major crash are: At the level of infrastructure services such as the DNS



Basis: 123 respondents

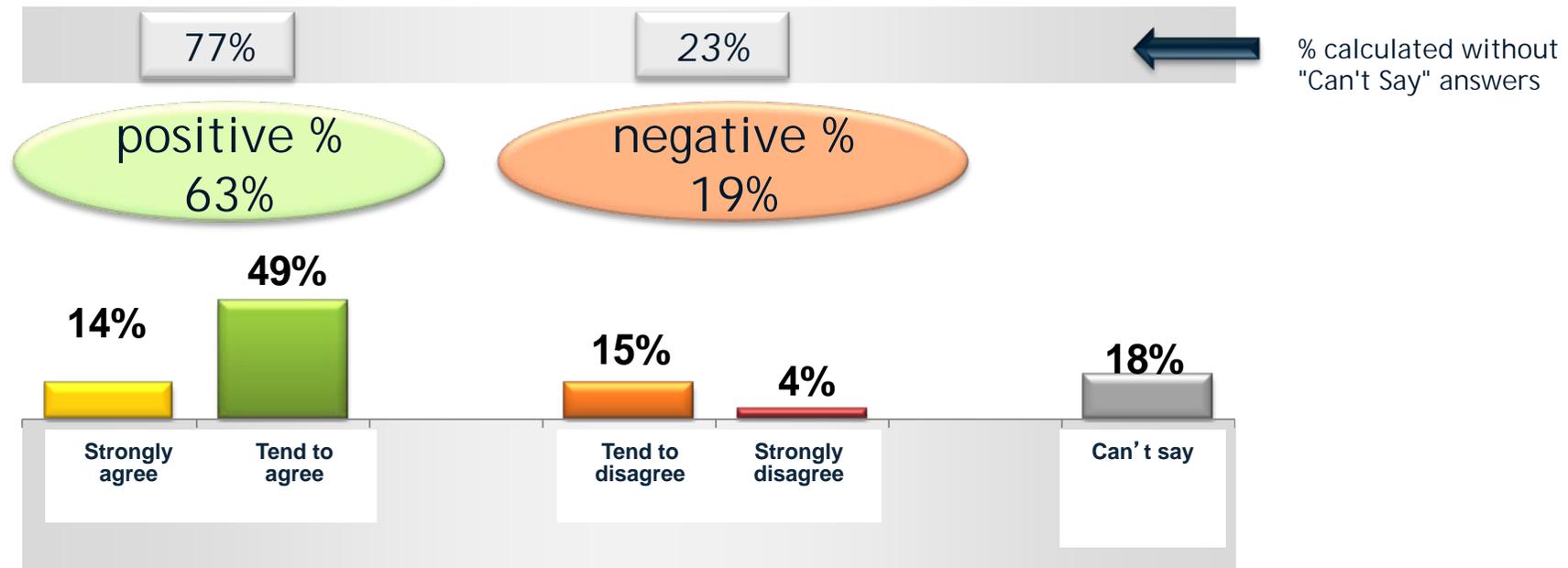


Basis: 30 respondents

It can be seen that the dominant global forecast also appears to be the dominant forecast among French respondents, but there is a divergence into 2 schools of thought among foreign respondents.

To what extent do you agree that:

Q34 - NATs will continue to be used for other things regardless of the level of IPv6 deployment

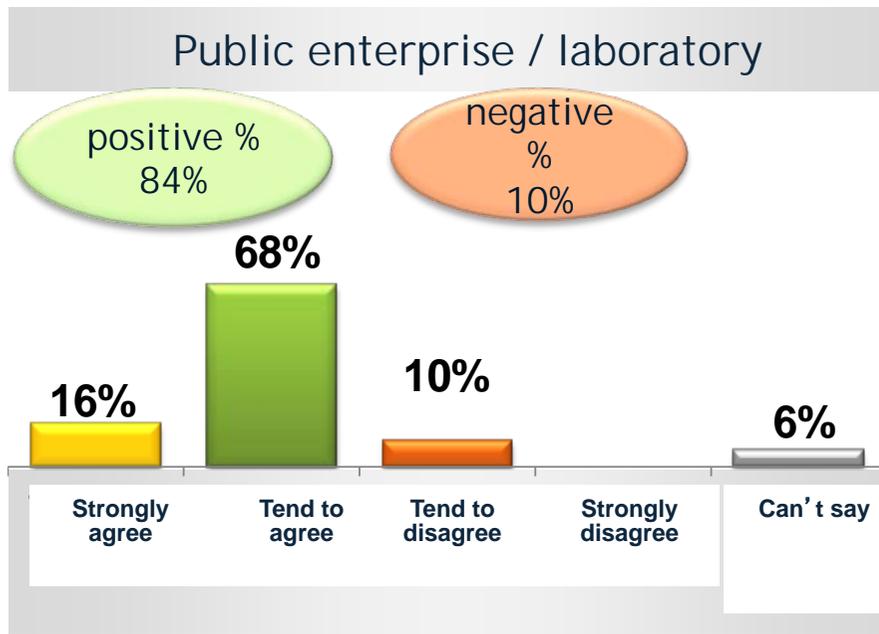


Basis: 153 respondents

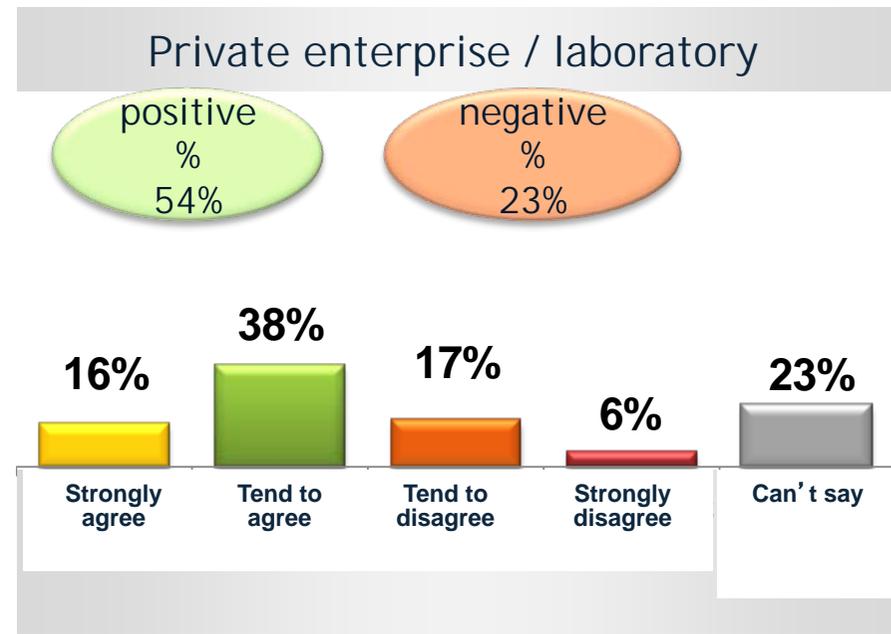
To what extent do you agree that:

DIFFERENCES PER SEGMENT

Q34 - NATs will continue to be used for other things regardless of the level of IPv6 deployment



Basis: 31 respondents



Basis: 70 respondents

There is a broad consensus among government agencies but a simple majority in private companies.

O_Q34 - FILTER: If you agree (strongly agree or tend to agree) with the statement about the NAT

If you agree

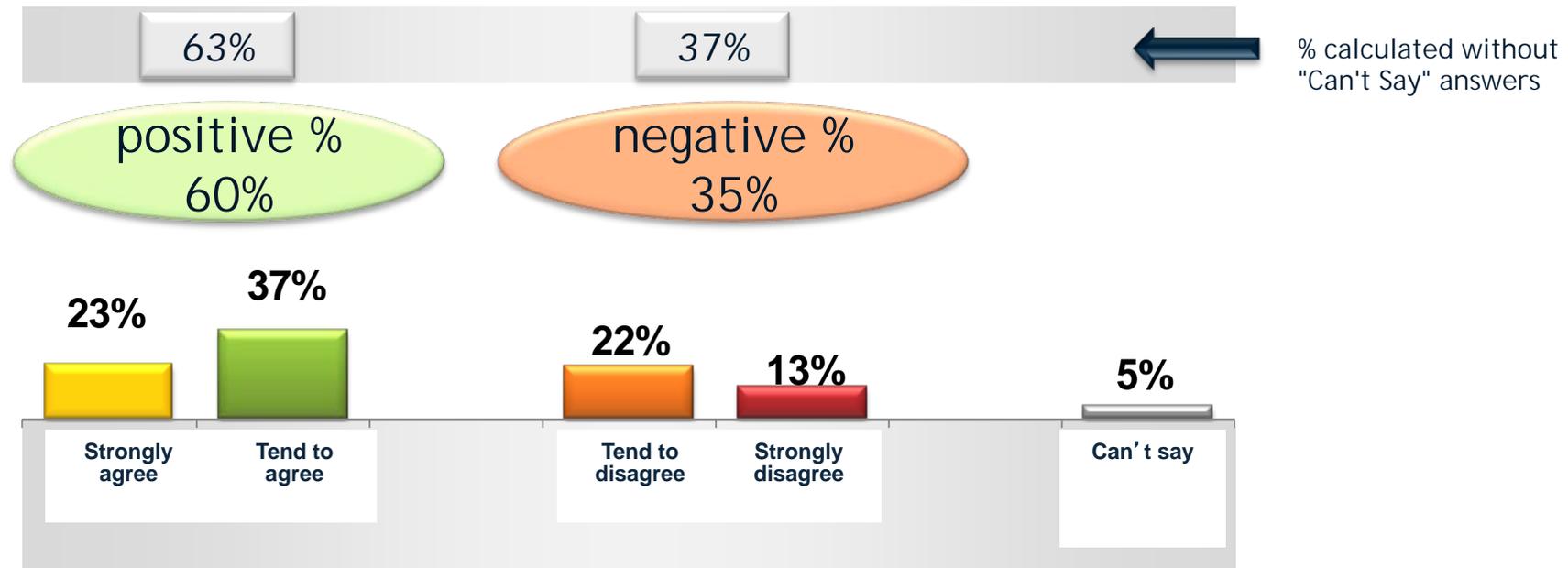
What will the NAT continue be used for? :

Public enterprise / laboratory
Abstraction between internal and external addresses for renumbering and "security by obscurity" My hope is that it does go away, but I'm not confident that it will.
Le poids du passé poussera à la conservation des NAT pendant quelques temps.
L'utilisation, sur un LAN, d'adresses privées, évite de se retrouver avec des routages par défaut et peut empêcher certaines connexions depuis l'extérieur. Cela dit, c'est parfois un leurre...
isolation du réseau privé d'internet.
protégé les réseaux locaux
Traffic engineering, mobilité
1) Masquage (inutile) @IP réseaux internes (-> Jeu du marketing sur le sentiment de sécurité associé à un plan d'@ privés). 2) Découplage adressage FAI/ réseau internet...

Private enterprise / laboratory
L'ipv6 ne remplacera pas du jour au lendemain les NAT, et de nombreux pays ne connaissent que ça (UK, ...). Après pour des raisons de sécurité, le NAT cache plus ou moins les machines qui sont derrière alors qu'en IPv6 le masque permet de savoir combien de machine sont sur le réseau (après les masques peuvent être grand vu le nombre d'adresse dispo mais bon ...), et si la sécurité laisse à désirer, y'a possibilité d'accès direct au machine (ne serait-ce que pour un scan des machines up)
Masquage d'adresse privée (prévues pour être non routables), "protection" des Michus. Déploiement d'IPv6 très improbable dans les 10 ans, anyway.
Translation adresses internes/externes + autres fonctionnalités intégrées (firewall, proxy, anonymisation...)
Il restera toujours des machines IPv4 qui seront très longues à remplacer * Certains réseaux resteront en IPV4 pour ne rien avoir à changer* J'imagine qu'il n'est pas facile de faire évoluer les mentalités et que pas mal de monde considère le NAT comme un façon de sécuriser un réseau et qu'il faudra plus de 10 ans pour changer cela.
Indépendance par rapport au FAI, (fausse) "sensation" de sécurité.
Accéder à l'Internet V4. Probablement NAT1-1 V6 pour accéder aux infrastructures d'entreprise.

To what extent do you agree that:

Q54 - For you, the weak points of the Internet infrastructure that could cause a major crash are: At the level of user applications (Google, Facebook, etc.)



Basis: 153 respondents

O_Q55 - For you, the weak points of the Internet infrastructure that could cause a major crash are:
Others. Please specify... ..

In French

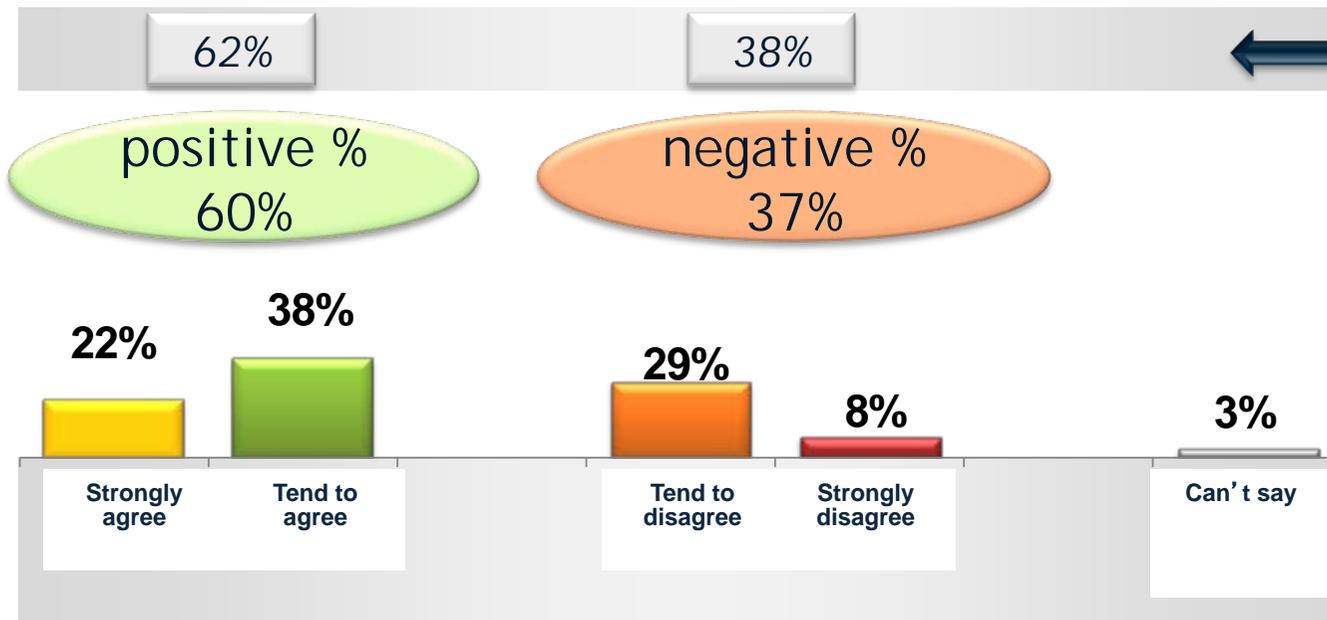
Encombrement des canaux suite à l'explosion des trafics de données
Attaque virale sur les serveurs, ou les terminaux ?
Surtout au niveau politique.
Cyber attaque étatique
Au niveau du poste client, autant au niveau des logiciels légitimes que malveillants
Au niveau des mesures de censure en cours d'adoption
Applications serveurs, Clients

In English

Isolated security incidents affecting part of q51-q53 (but not all)
Governments and laws trying to control the Internet
PKI providers
Layer 9 and above: lawyers, politics and moneymakers
Security issues/Political intervention
Walled gardens and lack of permission free innovation

To what extent do you agree that:

Q58 - The different types of wired Internet access (DSL, fiber, etc.) will be neutral in the sense that these access systems let through all the traffic exchanged without judging its nature



Basis: 153 respondents

Summary of dominant forecasts



	Criteria	Positive %	Negative %	Can't say	
1	Q36 - The routing protocols and algorithms used in today's Internet will withstand the growth of the Internet	69%	17%	14%	DOMINANT FORECAST
2	Q73 - In 10 years' time, the DNS will be more secure than it is today	64%	20%	16%	DOMINANT FORECAST
3	Q74 - In 10 years' time, the Internet name space will be globally governed by a single root (the DNS root)	64%	22%	14%	DOMINANT FORECAST
4	Q49 - In 10 years' time, security mechanisms for routing on the Internet (e.g. RPKI) will be adopted and implemented worldwide	63%	19%	18%	DOMINANT FORECAST
5	Q53 - For you, the weak points of the Internet infrastructure that could cause a major crash are: At the level of infrastructure services such as the DNS	63%	34%	3%	DOMINANT FORECAST
6	Q34 - NATs will continue to be used for other things regardless of the level of IPv6 deployment	63%	19%	18%	DOMINANT FORECAST
7	Q54 - For you, the weak points of the Internet infrastructure that could cause a major crash are: At the level of user applications (Google, Facebook, etc.)	60%	35%	5%	DOMINANT FORECAST
8	Q58 - The different types of wired Internet access (DSL, fiber, etc.) will be neutral in the sense that these access systems let through all the traffic exchanged without judging its nature	60%	37%	3%	DOMINANT FORECAST

Positive % or negative % between 60% and 70%

Summary of the results on the weak points of Internet infrastructure



- ✓ "For you, the weak points of the Internet infrastructure that could cause a major crash are:

DIVERGENCE INTO 2 SCHOOLS OF THOUGHT

- ✓ "Q51... Physical: underground / underwater cables, electricity, air conditioning, etc."
- ✓ "Q.52 ... At the network level (typically, BGP routing)"

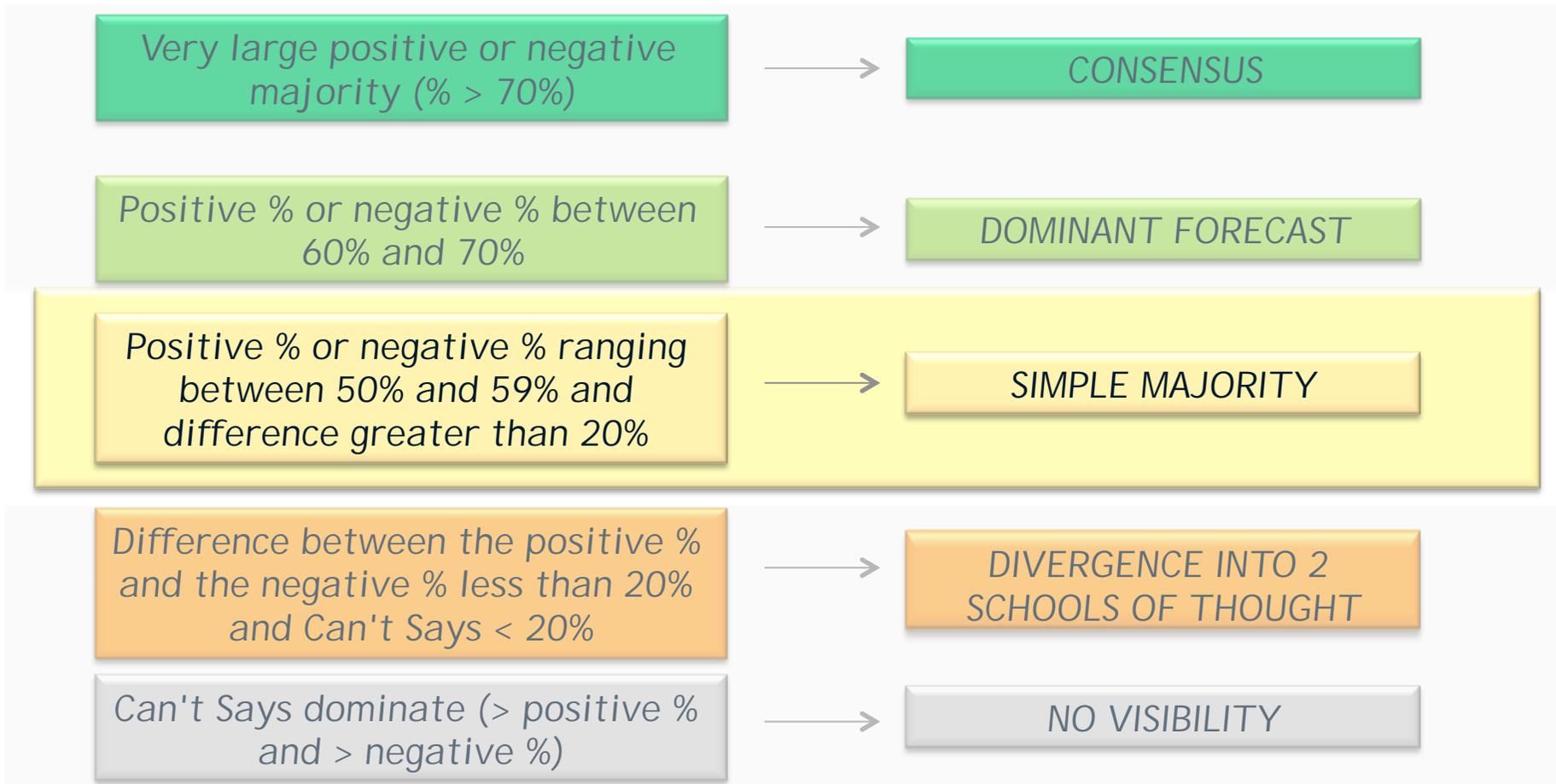
DOMINANT FORECAST

- ✓ "Q53 ... At the level of infrastructure services such as DNS"
- ✓ "Q54 ... At the level of user applications (Google, Facebook, etc.)"

Methodology



- ✓ The thresholds taken into account to analyze the results on semantic issues (Strongly agree ... Tend to disagree):



Simple majorities



Positive % or negative % ranging
between 50% and 59% and
difference greater than 20%



SIMPLE MAJORITY

✓ Analysis of the simple majorities:

- ✓ This phenomenon was not observed this year
 - ✓ The last two cases of dominant forecasts are at the limit of simple majorities (arbitrarily set threshold of 60%)
- ✓ Despite this fact, we shall keep this classification for the years to come.



Contents



1. Background and objectives of the survey
2. Methodology
3. Aspects of Internet access and use
4. The Backdrop
 1. Issues on which respondents agree
 2. Issues on which respondents disagree
5. Additional information: "Dominant forecasts" and "Simple majorities"
6. Conclusions and outlooks
7. Annexes

Conclusions: Internet use (1/2)



- ✓ Internet access: the current view of respondents and for the next 10 years
 - ✓ The use of desktops and laptops is currently dominant. But it will decrease in favor of other media (tablets, smartphones, TV, etc.)
 - ✓ At the professional level and in private life.
 - ✓ This decrease will not be sharp ("evolution" not "revolution")
- ✓ Internet use and content: the current vision of the respondents and for the next 10 years
 - ✓ Consultation of content on the Internet is predominant compared with other uses (both professional and private) but will decrease for the next 10 years.
 - ✓ On the other hand, exchanges on the Internet are already widely used and will increase for the next 10 years.
 - ✓ Greater use is made of "Machine to Machine" operations for professional purposes and this will increase.

Conclusions: Internet use (2/2)



- ✓ Data storage: the current vision of the respondents and for the next 10 years
 - ✓ Currently for professional uses, data storage is mainly taken care of by employers. This storage system will decrease but will remain the system used by most people over the next 10 years. The share of data storage media provided by a third parties or of data fully managed by third parties will increase.
 - ✓ The same phenomenon can be observed in private life.

This vision of the Internet for the next 10 years is fairly "conservative". It is not a real revolution but a significant change with the erosion of certain practices.



Conclusions: Consensuses



- ✓ The forecasts for the next 10 years lead to a consensus on the following points:
 - ✓ "The Internet will still be the dominant electronic communications network"
 - ✓ "The infrastructure of the Internet will continue to evolve to handle the traffic for all applications and services"
 - ✓ "The DNS will remain the dominant Internet naming and resolution system"
 - ✓ "The Internet of Things will have emerged one way or another"
 - ✓ "The use of personal data from user DNS queries will be generalized by DNS resolver operators (ISPs and alternative providers)"
 - ✓ "The geographical location of your data will have a major impact on your sense of security"
 - ✓ "The geographical or topological position in the network will significantly affect (in more than 1 case out of 10) the answers to DNS resolution queries"

Conclusions: Divergences



- ✓ The forecasts for the next 10 years lead to a divergence into two schools of thought on the following points: (excluding filtered criteria)
 - ✓ "In the case of DNS requests assigned to a third party (ISPs or suppliers of alternative solvers), the use of alternative solvers will exceed the use of one's own ISP resolver"
 - ✓ "Local DNS resolvers (caches installed on user machines) will play a significant role (25% or more) compared with ISP resolvers or "open" resolvers of the Google DNS type"
 - ✓ "The deployment of IPv6 will gradually result in the disappearance of Network Address Translation boxes"
 - ✓ "Office suites (provided as services on the Internet) will eventually completely replace traditional office suites (software installed locally on the user's machine)"
 - ✓ "The different types of access to wireless Internet (3G, wifi hotspots, etc.) will be neutral in the sense that these access systems let through all the traffic exchanged without judging its nature"
 - ✓ "Cloud computing will fundamentally change Internet protocols and services"

Conclusions: Dominant forecasts



- ✓ Forecasts for the next 10 years lead to a "dominant forecast" on the following points:
 - ✓ "The routing protocols and algorithms used in today's Internet will withstand the growth of the Internet"
 - ✓ "The DNS will be more secure than it is today"
 - ✓ "In 10 years' time, the Internet name space will be globally governed by a single root (the DNS root)"
 - ✓ "In 10 years' time, security mechanisms for routing on the Internet (e.g. RPKI) will be adopted and implemented worldwide"
 - ✓ "NATs will continue to be used for other things regardless of the level of IPv6 deployment"
 - ✓ "The different types of wired Internet access (DSL, fiber, etc.) will be neutral in the sense that these access systems let through all the traffic exchanged without judging its nature"



Outlooks



- ✓ The next edition of the survey will allow us to:
 - ✓ Monitor important trends and developments in the backdrop.
 - ✓ Show through concrete examples how that backdrop is used
 - ✓ Enrich the questionnaire with additional questions.
 - ✓ Improve the recruitment campaign in order to have a large number of respondents (why not 500+ respondents!?)



Contents



1. Background and objectives of the survey
2. Methodology
3. Aspects of Internet access and use
4. The Backdrop
 1. Issues on which respondents agree
 2. Issues on which respondents disagree
5. Additional information: "Dominant forecasts" and "Simple majorities"
6. Conclusions and outlooks
7. Annexes



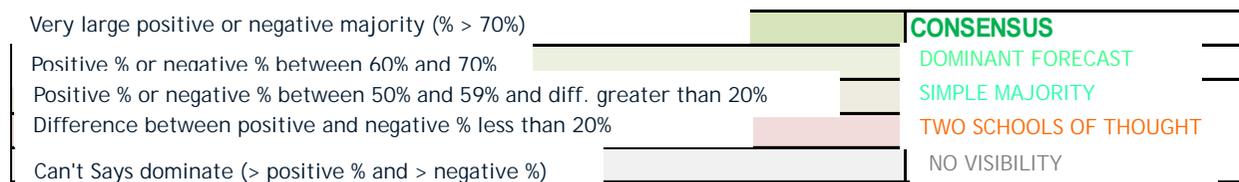
Analyses per theme

THEME 1 / THE PURPOSE OF THE INTERNET



Respondents

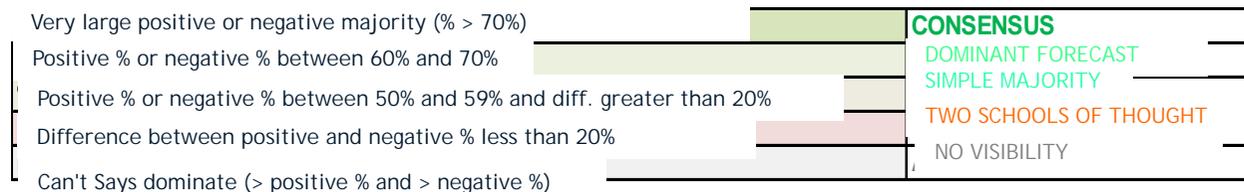
Criteria	Total	Positive %	Negative %	Can't says	Positive / negative % diff	
THEME 1 / THE PURPOSE OF THE INTERNET						
Q21 - Office suites (provided as services on the Internet) will eventually completely replace traditional office suites (software installed locally on the user's machine)	198	56%	43%	1%	13%	TWO SCHOOLS OF THOUGHT
Q30 - The geographical location of your data will have a major impact on your sense of security	198	71%	27%	2%	44%	CONSENSUS



THEME 2 / THE ARCHITECTURE OF THE INTERNET



Criteria	Respondents					
	Total	Positive %	Negative %	Can't says	Positive / negative % diff	
THEME 2 / THE ARCHITECTURE OF THE INTERNET						
Q31 – Do you agree with this definition? => The overall architecture of the Internet includes architectural issues (structural principles, protocols, mechanisms, etc.) of all the constituent layers of the Internet model, from its infrastructure to applications, via data routing and transport.	153	89%	6%	5%	83%	NO RANKING
Q33 - The deployment of IPv6 will gradually result in the disappearance of Network Address Translation boxes	153	47%	36%	17%	11%	TWO SCHOOLS OF THOUGHT
Q34 - NATs will continue to be used for other things regardless of the level of IPv6 deployment	153	63%	19%	18%	44%	DOMINANT FORECAST
Q36 - The routing protocols and algorithms used in today's Internet will withstand the growth of the Internet	153	69%	17%	14%	52%	DOMINANT FORECAST
Q39 - The Internet of Things will have emerged one way or another	153	72%	9%	19%	63%	CONSENSUS

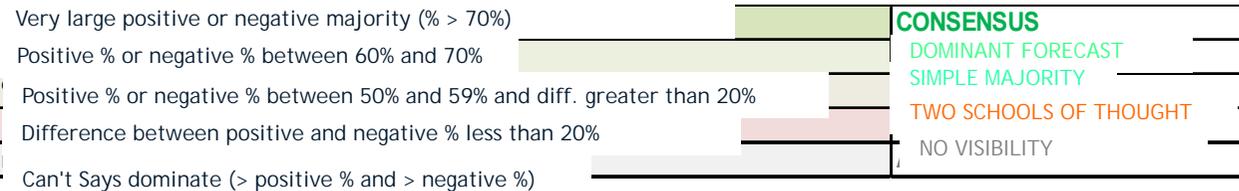


CROSS-CUTTING THEME



Respondents

Criteria	Total	Positive %	Negative %	Can't says	Positive / negative % diff	
CROSS-CUTTING THEME						
Q44 - In 10 years' time, the Internet will still be the dominant electronic communications network	153	94%	4%	2%	90%	CONSENSUS
Q47 - In 10 years' time, the infrastructure of the Internet will continue to evolve to handle the traffic for all applications and services	153	94%	5%	1%	89%	CONSENSUS
Q49 - In 10 years' time, security mechanisms for routing on the Internet (e.g. RPKI) will be adopted and implemented worldwide	153	63%	19%	18%	44%	DOMINANT FORECAST
Q51 - For you, the weak points of the Internet infrastructure that could cause a major crash are: Physical: underground / underwater cables, electricity, air conditioning, etc.	153	58%	40%	2%	18%	TWO SCHOOLS OF THOUGHT
Q52 - For you, the weak points of the Internet infrastructure that could cause a major crash are: At the network level (typically, BGP routing)	153	55%	35%	10%	20%	TWO SCHOOLS OF THOUGHT
Q53 - For you, the weak points of the Internet infrastructure that could cause a major crash are: At the level of infrastructure services such as the DNS	153	63%	34%	3%	29%	DOMINANT FORECAST
Q54 - For you, the weak points of the Internet infrastructure that could cause a major crash are: At the level of user applications (Google, Facebook, etc.)	153	60%	35%	5%	25%	DOMINANT FORECAST
Q58 - The different types of wired Internet access (DSL, fiber, etc.) will be neutral in the sense that these access systems let through all the traffic exchanged without judging its nature	153	60%	37%	3%	23%	DOMINANT FORECAST
Q59 - The different types of access to wireless Internet (3G, wifi hotspots, etc.) will be neutral in the sense that these access systems let through all the traffic exchanged without judging its nature	153	40%	56%	4%	-16%	TWO SCHOOLS OF THOUGHT
Q60 - Cloud computing will fundamentally change Internet protocols and services	153	39%	54%	7%	-16%	TWO SCHOOLS OF THOUGHT

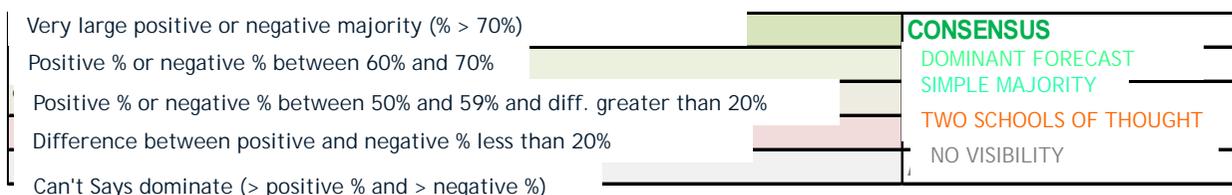


THEME 3 / THE INTERNET DOMAIN NAME SYSTEM (DNS)



Respondents

Criteria	Total	Positive %	Negative %	Can't says	Positive / negative % diff	
THEME 3 / THE INTERNET DOMAIN NAME SYSTEM (DNS)						
Q65 - The DNS will remain the dominant Internet naming and resolution system	153	86%	8%	6%	78%	CONSENSUS
Q70 - Local DNS resolvers (caches installed on user machines) will play a significant role (25% or more) compared with ISP resolvers or "open" resolvers of the Google DNS type	153	40%	42%	18%	-2%	TWO SCHOOLS OF THOUGHT
Q70A - Do you think this will allow a better guarantee of the integrity of responses (e.g. avoid "Liar DNS")?	61	62%	33%	5%	30%	DOMINANT FORECAST
Q70B - Do you think this will allow better performance in name resolution (lead-time, availability)?	61	70%	30%	0%	41%	CONSENSUS
Q71 - In the case of DNS requests assigned to a third party (ISPs or suppliers of alternative solvers), the use of alternative solvers will exceed the use of one's own ISP resolver	153	41%	39%	20%	1%	TWO SCHOOLS OF THOUGHT
Q71A - Do you think this will allow a better guarantee of the integrity of responses (e.g. avoid "Liar DNS")?	62	69%	31%	0%	39%	DOMINANT FORECAST
Q71B - Do you think this will allow better performance in name resolution (lead-time, availability)?	62	52%	45%	3%	6%	TWO SCHOOLS OF THOUGHT
Q72 - The use of personal data from user DNS queries will be generalized by DNS resolver operators (ISPs and alternative providers)	153	71%	17%	12%	54%	CONSENSUS
Q73 - In 10 years' time, the DNS will be more secure than it is today	153	64%	20%	16%	44%	DOMINANT FORECAST
Q74 - In 10 years' time, the Internet name space will be globally governed by a single root (the DNS root)	153	64%	22%	14%	42%	DOMINANT FORECAST
Q75 - In 10 years' time, the geographical or topological position in the network will significantly affect (in more than 1 case out of 10) the answers to DNS resolution queries	153	71%	13%	16%	58%	CONSENSUS





Transcripts per theme

THEME 2 / THE ARCHITECTURE OF THE INTERNET



O_Q32 - Do you have any other information or items to add to the theme of the overall architecture of the Internet?

Internet est un support pour les communications de nos différents équipements. Il doit rester agnostique des équipements connectés (type, marque, modèle, etc.), ainsi que les protocoles. La neutralité est donc importante.

L'architecture globale de l'Internet devrait prendre en compte de façon plus forte les applications elles-mêmes dans la réflexion qui est portée dessus.

La vision technologique est plutôt amenée à s'effacer devant des principes d'usage : neutralité des FAI, respect vie privée. Le moteur technologique (évolution des chipsets toujours sous les lois de Moore pendant encore 15 ans) va produire des objets (clé usb 10To, portable/tablette avec 20h d'autonomie, capteurs 10 fois plus précis que al Kinect, etc....) dont les effets sont imprévisibles en termes d'usage.

Internets cannot exist with a single monolithic model. Interoperability is difficult but indispensable. Computing and networking monocultures lead to the same sorts of weaknesses and vulnerabilities found in biological monocultures. In a small and isolated network (for values of 'small' up to the size of a major enterprise network, perhaps about an ipv6 /92) monoculture can be made to work and can in fact have salutary effects; but for larger and more geographically dispersed networks heterogeneity is not only inevitable but indispensable.

Une nouvelle couche constitutive de l'Internet fait son apparition : la personnalisation. Personnalisation veut dire adaptation du "contenu" (en particulier de la pub), des modalités de transport (qualité de service ou pas), de la facturation.

Je n'aurais pas spécifier les applications dans l'architecture globale d'Internet. Internet fournis une connexion de bout en bout sous une politique de best effort, les applications doivent être conçu pour s'adapter à cette architecture, ses avantages est ses inconvénient.

cette architecture globale groupe deux ensembles fonctionnellement différent: le groupe des "endhost" ou "terminaux" et le reste ou "routeurs". cette distinction est notable, car elle fait remarqué que les différentes couches constitutives de l'internet ne sont pas applicables partout (couche applicative sur les routeurs ou principe de routage sur le endhost).

THEME 2 / THE ARCHITECTURE OF THE INTERNET



O_Q38 - Do you have any other suggestions to make in terms of network and transport?

La taille de l'Internet actuel me fait penser que les protocoles tels que nous les avons aujourd'hui resteront déployés pour encore un bon nombre d'année. Le déploiement de nouvelle technologie semble de plus en plus difficile en ce sens qu'il n'est plus envisageable d'avoir de disruption du service de nos jours.

Decentralize and form multiple redundant long-hop links. "Last mile" links need to be provided and administered by local groups- municipalities, large companies or clubs, tribes, or whatever sort of organized group lives within a particular geographical area. Access to networks needs to be open to all comers and not owned by any person nor group.

Il faudrait que les fabricants de routeurs cessent de vendre la RAM à prix d'or ;)

La notion d'AS (Autonomous System) définit un réseau privé. Je vois donc une adresse publique comme <AS>:<IP>. cela permet un adressage jusqu'à 64bits. C'est moins qu'IPv6 mais c'est 4 milliards de fois plus d'adresses qu'aujourd'hui. Pourquoi garder IPV4? la grosse masse des équipements de opérateurs sont en distribution. Les changer pour IPV6 est couteux. IPV6 en backbone ne pose pas de soucis. Imposer des changements chez l'abonné est aussi un soucis. Idées d'implémentation (juste des pistes incomplètes): L'adjonction des AS (source et destination) en option dans les paquets IPV4 peut se faire sans changement de protocole et "insérés" par les Box des abonnés. Les box pourraient aussi faire du DNAT. Les implications sont au niveau protocole de routage et DNS. Une astuce consiste à utiliser IPV6 pour le routage et le DNS: adresse IPV6 virtuelle = 0:0:<AS opérateur>:<IPV4 privée de l'opérateur>.

Pas d'intelligence dans le réseau, il marche suffisamment bien comme ça. KISS. Quelques rares optimisations sont possibles, mais pas forcément souhaitable pour maintenir la stabilité, les performance et surtout l'universalité du réseau.

La question cruciale est bien entendue celle de la neutralité. Sauf ponctuellement en cas de catastrophe, dès qu'un réseau fourni de la connectivité dite «internet» celui-ci se doit d'être agnostique et neutre. Mais il ne faut pas oublier non plus que l'internet n'est *pas* les autoroutes de l'information (i.e. quelques grandes voies majeures, détenus par des géants, et rien d'autre) c'est un maillage complexe et mouvant. Traduction : les petits acteurs du transport sont aussi un élément important, et aussi un élément en danger. Le régulateur devrait se pencher sur le cas de la survie des petits, et les problèmes d'entente et de monopole.

Si les routeurs devraient tenir la charge:- les tables de routage vont se dégonfler en IPv6- la croissance des tables de routage se fait parallèlement à l'augmentation de la capacité de traitement des routeurs... il n'est pas sûr que l'espace d'adressage fourni par IPv6 soit suffisant dans 30 ans.

CROSS-CUTTING THEME



O_Q43 - Do you have any other suggestions about this theme? CROSS-CUTTING THEME

Running networks as dual-stack indefinitely is unsustainable. Once IPv6 support is common, network and application providers will both look to move to single-stack again to simplify management and operations. There will be pockets of IPv4-only legacy hardware where modifications to enable IPv6 are prohibitive, but there are plenty of IPv4 to IPv6 translation devices that will help these legacy devices can communicate as necessary, similar to the way that IP gateways helped to enable older-style SNA devices to communicate with IP devices.

IPv6 est une affaire de nerd réseau. Une fois RPKI mis en place, les IP inutilisées seront récupérées facilement par les RIR et de fait, on aura toute la place qu'on veut en IPv4 + NAT

En Europe et Amérique du nord, je ne vois pas d'incitant à passer en v6. Probablement qu'en Asie v6 aura un impact plus important que v4 dans les années à venir.

If ipv6 does not "dominate" ipv4 within 5 years, the Internet as we know it will be effectively broken.

Tant que la partie infrastructure n'aura pas enlevé la couche v4, tous les abonnés et services devront utiliser v4, le v6 décollera lorsque des FAI donneront uniquement des plages v6 à leurs abonnés, forçant les services à les déployer sous la pression des FAI qui voudront éviter de faire du 6to4 pour leurs clients

Once ipv6 cannot be ignored, people will shift and will WANT to kill ipv4 as it just takes time and money

Le problème du déploiement de l'IPv6 est double. D'une part il y a son déploiement effectif, soumis au bon vouloir des FAI de eyeballs. Et d'autre part il y a son support applicatif, et sur ce point malheureusement, le nombre de développeur et d'intégrateur compétent sur le sujet tend vers 0...

CROSS-CUTTING THEME



O_Q50 - Do you have any other suggestions about this theme?

I strongly agree that *a* mechanism to secure internet routing data will be adopted as a part of efforts to harden critical internet infrastructure as it becomes the primary/critical communications network. I do not necessarily agree that it will be RPKI. A lot can happen in 10 years.

Avec un superbe système de P2P dns chiffré, authentifié et anonymisé xD.

Rendre ces mesures obligatoires à long terme, ou proposer un réduction des coût associés à la création d'un AS si il s'engage à déployer RPKI dans l'année

des mécanismes plus léger que le RPKI seront identifiés

Mais avec des sécurisations "crackables" imposées par les états paranos (USA en premier)

augmentation des acteurs au niveau routage : meilleur sécurité au niveau de la propagation des routes (ex: Youtube/Pakistan)

if the RPKI does get implemented, that will speed up the death of the Internet.

CROSS-CUTTING THEME



O_Q56 - Do you have any other suggestions to make on the weak points of the Internet infrastructure? INTERNETW WEAK POINTS

Côté infra, y'a pas mal de redondance, la faille ce trouve plutôt dans le réseau (coupure BGP par les gvt ou par erreur, c'est déjà arrivé :s) ou les services d'infra (détournement de DNS par le FBI ;))

Avec le tremblement de terre au Japon, il a été démontré que l'infrastructure est robuste de par sa décentralisation. Cependant, les utilisateurs sont maintenant de plus en plus liés à des applications et services comme Google et Facebook ce qui rend l'Internet dépendant de la disponibilité de ces géants. Le développement de SDN et d'OpenFlow en particulier me fait m'interroger sur la robustesse future des réseaux: que se passe-t'il quand le contrôleur ne répond plus (e.g., après un gros tremblement de terre)?

I have seen failures in every category listed here. None have resulted in global failure of the entire Internet, but I have seen a flapping gateway router knock out a very large subnet (an ipv4 /18) for several hours. The Internet as a whole has proven surprisingly robust, mostly due to standards of interoperability acting in conjunction with the underlying heterogeneity of hardware and software.

Les faiblesses d'Internet viennent de ce qui est centralisé : sites comme Facebook, gestion de la racine DNS, autorités de certification. Internet doit rester le plus décentralisé possible et indépendant des décisions politiques d'un pays.

Governance changes that could lead to increases in the trend towards balkinization of the Internet that we are already seeing (c.f. the great firewall of China).

Government policies in countries could have a chilling effect on the internet (e.g. Great Firewall of China).

la plupart du temps. Du point de vue utilisateur, les pannes sont plus à craindre en périphérie du réseau, dans la fumisterie du Cloud et les services télématiques HD. Mais c'est pas de l'Internet, donc on s'en fout pas mal.

CROSS-CUTTING THEME



O_Q64 - Do you have any other suggestions to make about communication models?

the security, privacy and trust models have to be built into this infrastructure. It will gain wide acceptance regardless, but the risks to the common user have to be managed effectively or the results of data breaches and other security issues could be very significant. It's not a matter of if, but of when.

Outsourced clouds is just a trend. Create your own cloud on your watch in 10 years time, and wear it with you all the time.

les protocoles s'adaptent à la demande , aux capacités offertes par la technologie et surement aussi aux nécessités de l'ordre public. On peut s'attendre dans les 10 ans à une multiplication par 64 des débits (entrelacement wifi et réseaux tout optiques). Ca ira de pair avec l'offre ip6 généralisée. Il y aura des ip pour tout partout et des tas de sous-protocoles mais ca n'ira pas plus loin.

l'appareil connecté qui "écoute et voit" en permance notre environnement pour nous assister.

La criminalisation abusive de certains usages p2p nuisent à l'équilibrage des liens et invite certains opérateurs à se croire légitimement dépositaires d'une partie de la valeur des contenus, d'où la systématisation du racket chez les FAI dominant leurs marchés domestique. L'asymétrie accentuée par la vision actuelle du cloud va renforcer encore cette anomalie et doit être combattue pour ne pas déséquilibrer le modèle économique de l'interconnexion, au risque de réduire la complétude du maillage et de tendre vers un éclatement d'Internet.

Même si le cloud computing est à la mode en ce moment, je paris sur un coup de frein assez brutal dans les 10 prochaines années, lorsque les premiers problème de confidentialité et de conflit politique auront émergé. L'usage du cloud sera plus dans des cloud privé loué dans le pays de l'entreprise, bref, des serveurs dédié configuré par l'hébergeur...

une réflexion, des protocoles et des outils sur la gestion des canaux de communication applicatifs doit être pensé.

THEME 3 / THE INTERNET DOMAIN NAME SYSTEM (DNS)



O_Q76 - Do you have any other suggestions to make about Internet Domain Name Systems (DNS)?

Les noms de domaines deviennent une usine "à fric", je ne vois aucun intérêt à avoir des accents dans les noms de domaines. A part vendre deux fois le même nom de domaine. Comment vont faire les étrangers pour venir sur des sites "locaux" ?

1 cas sur 10, meme aujourd'hui nous ne somme pas loin (les CDN le font deja).

La création de nouvelles extensions de premier niveau devrait être dictée par l'intérêt général uniquement, et non pas par des intérêts privés.

Il faut que l'europe s'organise pour fonctionner en standalone, et en peer-to-peer avec les pays qu'elle décide.

The technical evolution of the DNS will have stalled because competing solutions will not necessarily interoperate

twitter/facebook? I hope so but I dont know

Même si la racine DNS restera unique (modulo quelques side project), ça gouvernance devrait être plus global, détaché des US pour être sous la coupe de l'ONU.