

GOVERNMENTS ENABLED WITH IPv6

Final conference – Brussels – 21st May 2015

# Self assessment by impact monitoring

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## Agenda

- Objectives of impact monitoring in GEN6
- Applying an impact monitoring framework to GEN6
- Results of progress and impact monitoring in GEN6



## Impact monitoring goals

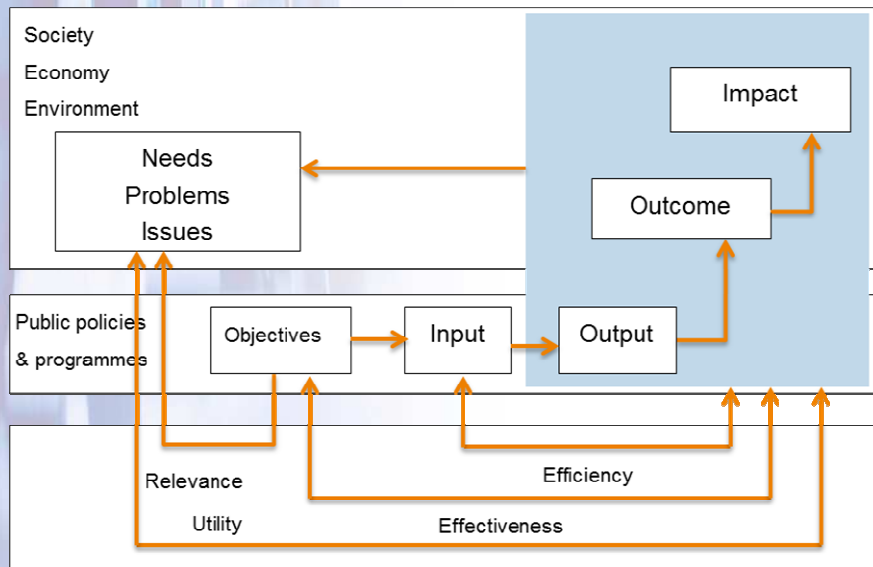
- **GEN6** > instrument to support EC IPv6 policy goals:
  - Stimulate IPv6 uptake in governmental services in Europe
  - Exploit benefits of IPv6 for new services
  - Prevent quality drop of online services when IPv4 would be depleted
- How does **GEN6** contribute to EC IPv6 policy goals?
  - monitors the progress and results of the pilots
  - assesses the impact of GEN6 by the lessons learned of the different pilots and identifying success factors, barriers and bottlenecks
  - no judgement on individual pilots

### Challenges:

- Some effects are visible only after a couple of years
- The data-set is limited and diverse (#pilots and #partners)
- Not an evaluation, but assessment *during* the project instead of hindsight

## The monitoring framework & intervention logic

- Intervention logic: main purpose is to be explicit about the logic – the rationale- of an intervention by policy makers.
- Brings together the high-level EC CIP goals and the goals for IPv6 from GEN6 and its partners in the IPv6 pilots.
- Monitors the progress and impact of the pilots on four different levels: input, output, outcome and impact.





## Focus of the impact channels

Knowledge

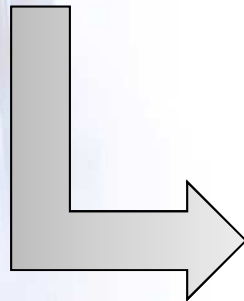
doing the **right** things: increase in knowledge supports more efficient and effective implementation in other networks and services

Technical Implementation

doing things **right**: effective and efficient technical implementation of IPv6 by users and suppliers

Costs & Benefits

show the **value** of things: costs and beneficial effects of introducing IPv6 >> input to 'lessons-learned' and 'best practices'



### Transfer your experiences to others

Awareness:  
disseminate and  
facilitate learning

Social Networks:  
collaborations, sharing  
insights

Human Capital: effects  
on employment and  
skills



# From IPv6 policy goals to impact channels - 1

## 1. Stimulating upgrades of public networks and eGovernment services

Need/problem/issues	Impact channels
<p><b>High costs resulting from a scarcity of IPv4 addresses or late implementation of IPv6 (e.g. costs of technical consulting):</b> stimulating adoption and preventing risks &amp; high costs of late implementation</p>	<p>Awareness Costs and benefits</p>
<p><b>More effective and/or efficient network management, e.g. address configuration, zoning and using the opportunity to ‘clean up’ legacy and piecemeal network management systems</b></p>	<p>Technical implementation Costs and benefits Knowledge Human capital</p>
<p><b>Better network performance, e.g. improved QoS implementation and security via IPv6 instead of applications</b></p>	<p>Technical implementation Knowledge</p>
<p><b>Action plans and regulations on IPv6 adoption:</b> providing inspiring and concrete examples, tools, guidelines and linking relevant stakeholders</p>	<p>Awareness Social networks Knowledge</p>



# From IPv6 policy goals to impact channels - 2

## 2. Stimulating development of new innovative IPv6 enabled content and services

Need/problem/issues	Impact channels
<p><b>Demand for IPv6 by customers:</b> understanding user requirements, stimulating demand for IPv6</p>	<p>Awareness Social networks Knowledge</p>
<p><b>New services or features:</b> how does IPv6 trigger innovation in services and features?</p>	<p>Knowledge Costs and benefits</p>





## From IPv6 policy goals to impact channels - 3

### 3. Prevention of quality drop in networks and services

Need/problem/issues	Impact channels
<p><b>A pending shortage of IPv4 addresses:</b> tackling this macro problem by addressing technical implementation issues</p>	<p>Awareness                      Knowledge                      Technical implementation                      Costs and benefits</p>
<p><b>Continuity issues resulting from a shortage of IPv4 addresses or from delayed introduction of IPv6:</b> prevention by reducing late adoption and creating information about technologies and processes to manage continuity</p>	<p>Awareness                      Knowledge                      Technical implementation</p>



## Monitoring time-line

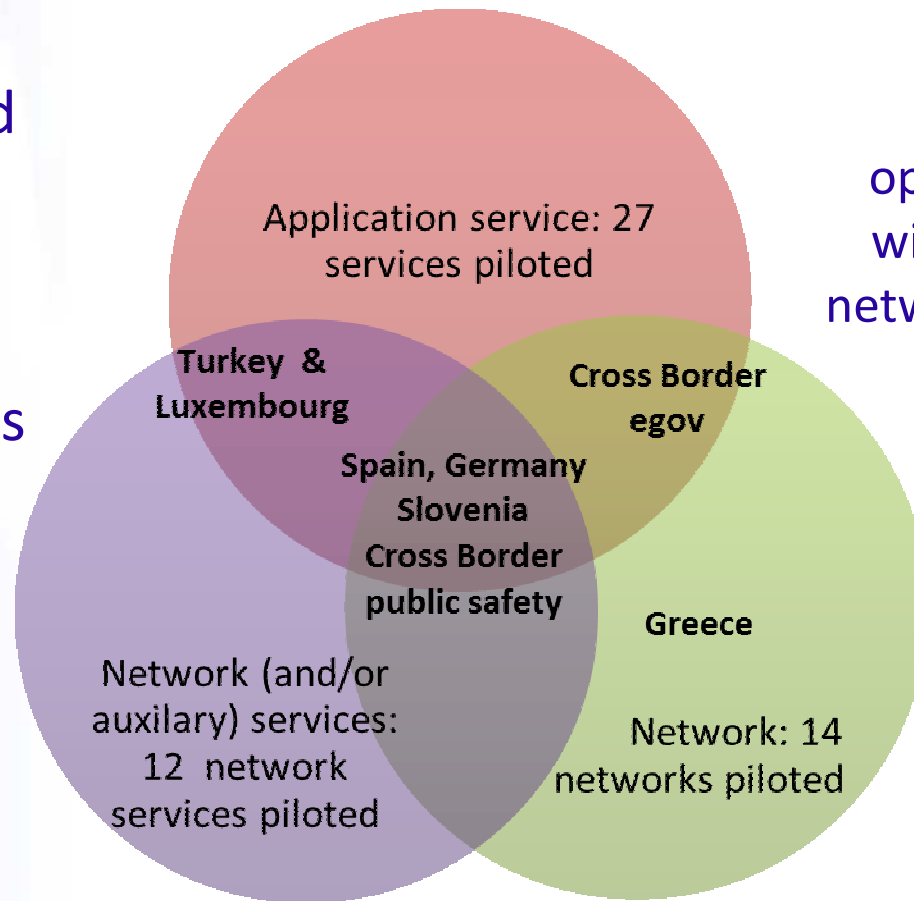


Analysis of GEN6 deliverables, surveys to GEN6 partners & external partners, data collection from pilot leaders, interviews with pilot leaders, workshop



# 1. Stimulating upgrades of public networks and eGovernment services:

GEN6 contributed by introducing IPv6 in 53 networks and services in 8 pilots

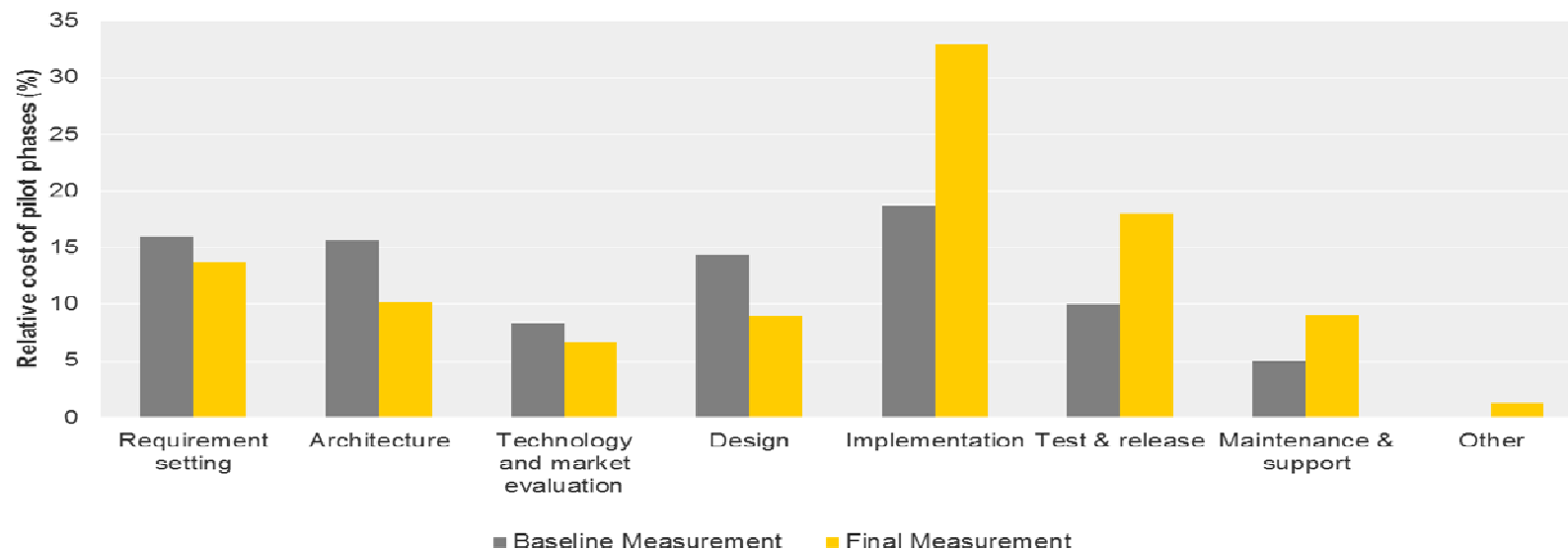


All pilots plan to continue the operation and >50% will expand to other networks and services



## GEN6 pilots show that:

- Technical implementation is possible without major technical challenges that cannot be solved;
- Practical implementation and deployment supports discovery and resolving technical problems, sharing experiences and developing solutions together;
- GEN6 partners became more efficient and effective in introducing IPv6: Implementation and testing clearly require the most effort.





## Costs & benefits

- Cost-effective way of introducing IPv6 step-by-step is possible;
  - GEN6 developed and disseminated guidelines, tools, best practices for introduction of IPv6
- Introduction of IPv6 does not lead to real changes in management and administration costs;
  - Small increase if introduced alongside IPv4
  - Small decrease by reducing NAT and overlapping address spaces
  - No costs effects related to IPv6 security

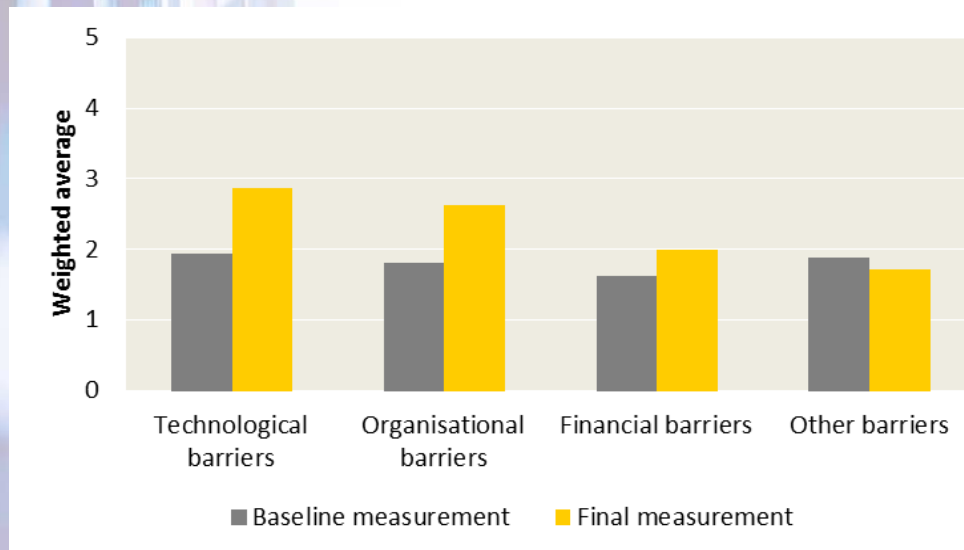


## Some (technical) lessons learned

- Hardware could be re-used in many cases, often software updates needed, but.....
- Cleaning up legacy is not straight forward, lack of support from vendors to adapt to IPv6
  - Connection and interoperability between multiple legacy technologies, systems , services and networks is challenging
- Short/mid term: network management can become more complex, as IPv4 is introduced along IPv6
- Simplified network management when single address block is used and NAT removed
- Simpler configuration of large sensor networks because of auto-configuration possibilities
- Large size of IPv6 address space enables more structured IPv6 addressing plans
  - Subnets based on functions also supports security management

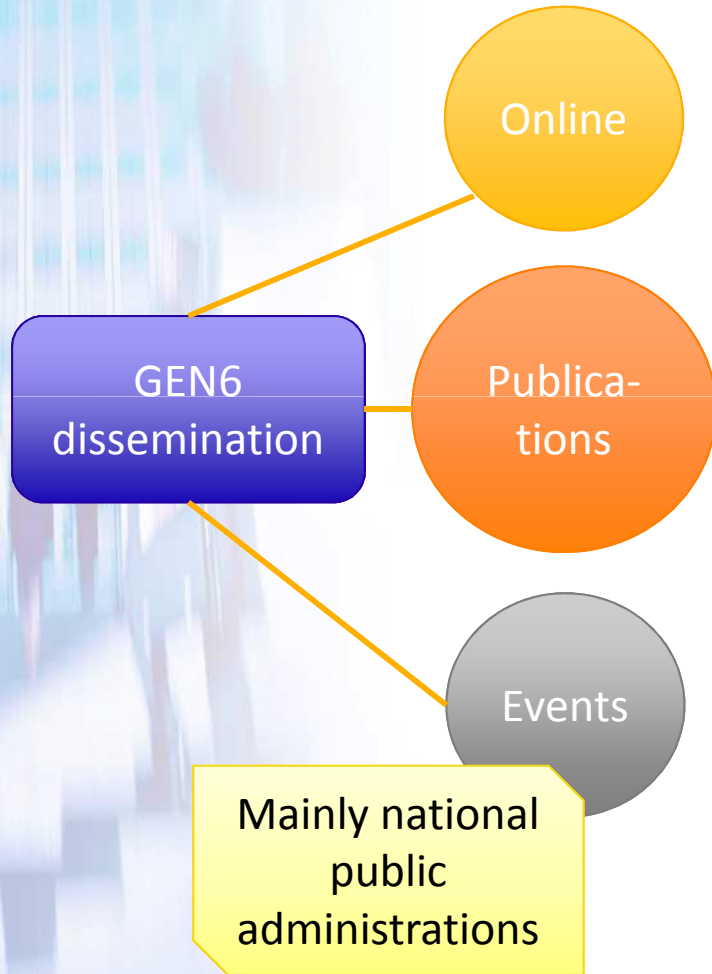
## Organisational issues are very challenging!

- Legal, administrative and organisational issues should be considered and relevant stakeholders should be involved / consulted in the implementation activities.
- GEN6 supported partners in overcoming both technological and organisational barriers: giving convincing arguments, creating awareness, providing a reason to deal with IPv6 and breaking resistances.





# Talking about creating awareness....



- [www.gen6-project.eu](http://www.gen6-project.eu)
- 70% of partners has GEN6 info online
- 14 online articles, blogs
- 28 articles and papers
- 20 booklets and leaflets
- 2 video's
- 54% target national audience

## Status January 2015

- 18 workshops
- 98 presentations
- 9 demonstrations
- 4 meetings
- 9 roadshows
- 2 trainings
- 3 real-life deployments

10 to 100s  
participants per  
event





## GEN6 insights raised interest by others:

- GEN6 addressing plans raised interest by other government organisations that aim for IPv6 introduction;
- GEN6 insights and addressing plans used for preparation of national IPv6 addressing plan for Dutch government;
- GEN6 insights used in new IPv6 related policies and legislative measures in Czech Republic;
- GEN6 led to over 30 stakeholders starting with implementation of IPv6;
- Expansion of piloted services considered to other domains and users in Greek and Slovenian pilot and cross-border pilot on eGovernment services.



## Role of government IPv6 policy?

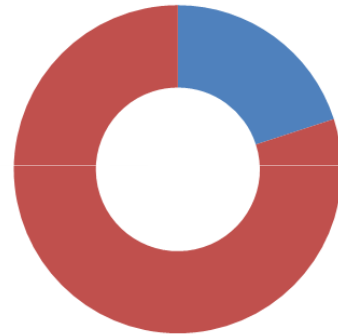
- Only public administrations participating in GEN6 experienced some influence to introduce IPv6:
  - national goals or obligations, net-neutrality policies, governmental IT board decisions
  - IPv6 introduced in existing guidelines (standards, net-neutrality) or as requirement in public tenders
  - Offering IPv6 transition checklists, support for IPv6 adoption plans
- Getting other government organisations on board is key to successfully introducing IPv6 in networks
- GEN6 made it easier for other public administrations to join:
  - linked IPv6 activities to other government policy goals, provided arguments to convince, offered stepwise approaches and tools
  - helps putting IPv6 on the agenda
  - GEN6 itself was major driver to cooperate in introducing IPv6
- No real need for other support measures identified
- :
  - Clearer goals, timelines, adoption plans could help



## 2. Stimulating development of new innovative IPv6 enabled content and services

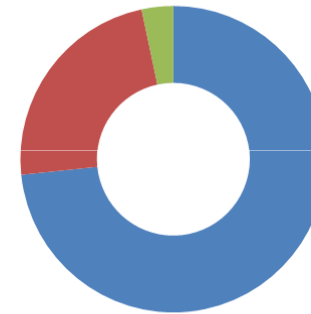
30+ new IPv6 related products and tools developed:

Type of IPv6 product and tool developed



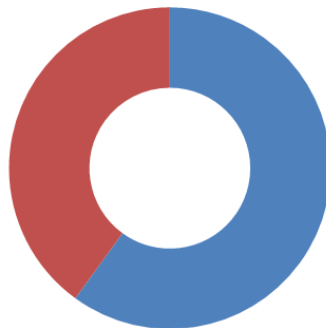
■ Hardware & Software ■ Software

Developed by whom?



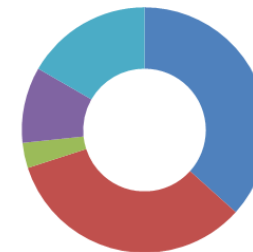
■ GEN6 partners only ■ With external partners ■ By external partners

Scope of development



■ Added new functionalities ■ Completely new

Used by others



■ Not used by others ■ Yes, made available to closed group  
■ Yes, made commercially available ■ Yes, made freely available  
■ n.a.



## New services exploiting IPv6 benefits

- Although not main goal of pilots,
- 2 pilots explicitly developed new content and services exploiting benefits of IPv6
  - In Slovenian pilot new possibilities for emergency response communication were developed
  - Slovenian pilot exploited network mobility features, mobile IPv6 host mobility and multicast in new services
  - In Greek pilot development of smart energy metering system at schools has been enabled
  - Greek pilot exploited IPv6 stateless auto-configuration in deployment of large sensor networks and integration of heterogeneous networks
- Leveraging benefits of IPv6 is hindered by presence of many IPv4 legacy systems

## Creating demand for IPv6

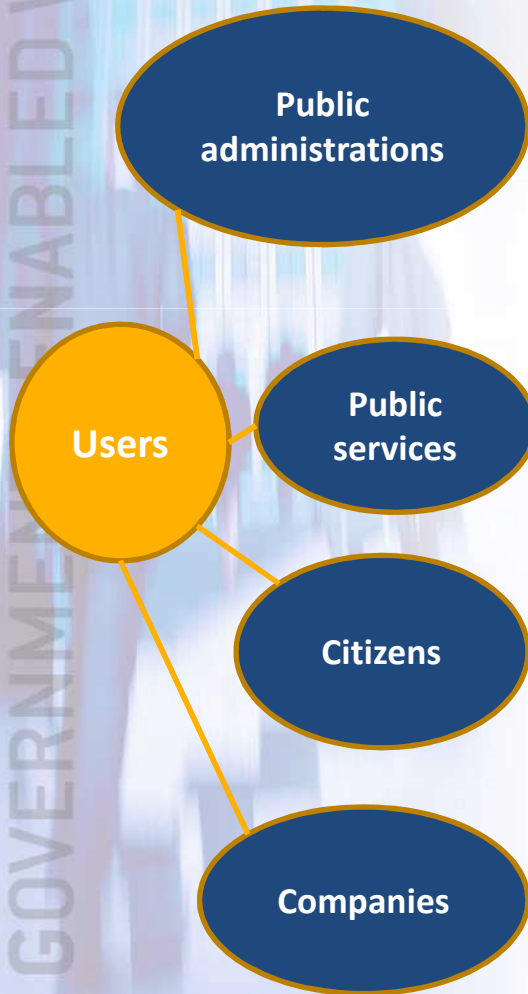
- Creating demand for IPv6 by creating awareness and developing new services
  - by showing what others do convincing stakeholders of the need and possibilities to implement as well



- Expansion of pilots to other domains, actors
- New implementation initiatives planned and being prepared
- External stakeholders starting to implement IPv6 as well
- GEN6 insights used in national IPv6 initiatives and policies

## Self assessment by impact monitoring

Potential reach of users is large and varies



		Current	Expected	Potential
Public administrations Cross Border egov, Cross Border public safety, Spain, Luxembourg, Turkey	Application services	2 to 20	100s	1,000s
	Networks	4 to 50	50	50
	Network services	2	some	100s
Public services Cross Border egov, Cross Border public safety, Slovenia, Greece	Application services	1 to 20	3 to 200	20 to 200
	Networks	4 to 50	5 to 200	30,000
	Network services	1 to 2	3 to 10	10s
Citizens Luxembourg, Turkey, Spain, Germany	Application services	3650 up to 510,000	5,000 to 570,000	millions
	Network services	n.a.	n.a.	1,000s
Companies Spain, Germany	Application services	50	5,000	10,000
	Networks	internal use by partner		

### 3. Prevention of quality drop in networks and services

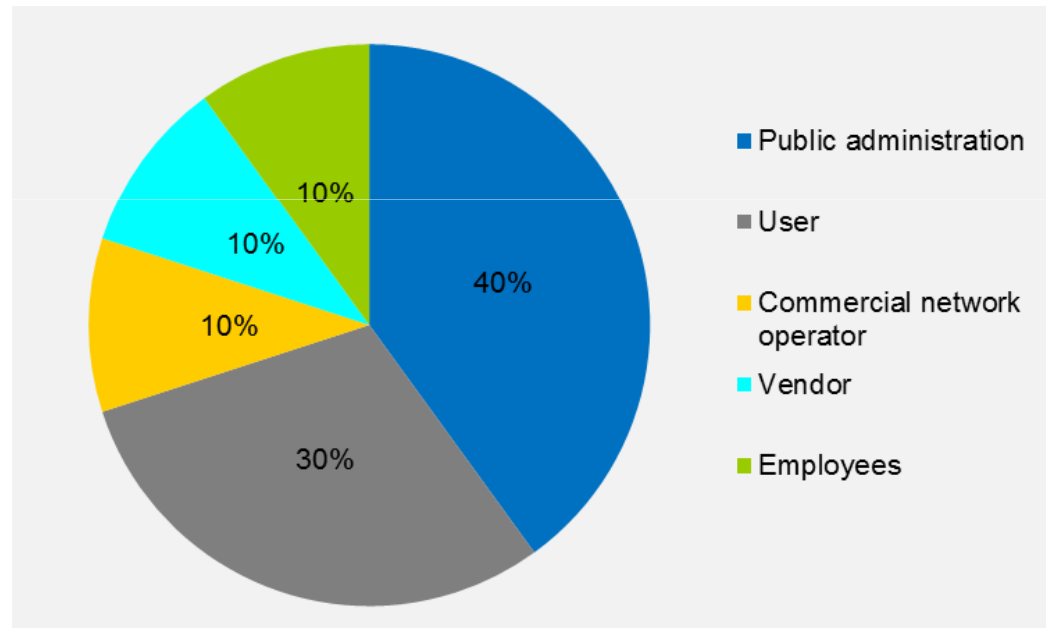
- Technical issues are limited, can be overcome, same performance level as IPv4 counterparts shown through extensive testing
- End-user experience is similar to IPv4, no issues reported to helpdesks etc.
- 3 real-life deployments proceeded successfully, no major problems encountered



## Building partnerships > 90 partners

- GEN6 initiated new collaborations and partnerships with external stakeholders

Public administrations most important



- Access to piloted services and networks and/or users of networks and services
- To be able to implement the pilot in realistic environment





## Building partnerships

- External stakeholders gain practical experience, learn about technical issues and requirements
- Getting and keeping external stakeholders is essential, but time consuming to establish close relationship and get high on their priority list
- Software vendors were missed; could be beneficial because of required software adaptations
- Partnerships are expanding to other, new projects and initiatives and new collaborations are being created because of GEN6 experiences



## Involving users – why and how?

- Main lesson learned in pilots: Involving users in use cases and focusing on user experience supports adoption of IPv6
  - Creating awareness and understanding user requirements
- However: involving users is challenging:
  - Depends on type of user: end-user (citizen, public servant) or ‘public administration’ as user?
  - How to measure user-experience and difference between IPv4 and IPv6 user experience?
  - End-users, especially citizens and public servants do not care about technology, only about the service working properly
  - Explaining what IPv6 is and what it does may not be useful or interesting for them