EUROPEAN COMMISSION
Directorate-General for Communications Networks, Content and Technology

Components and Systems

Report on the results of the public consultation on the "Future Joint Technology Initiative(s) on electronic components and embedded systems"

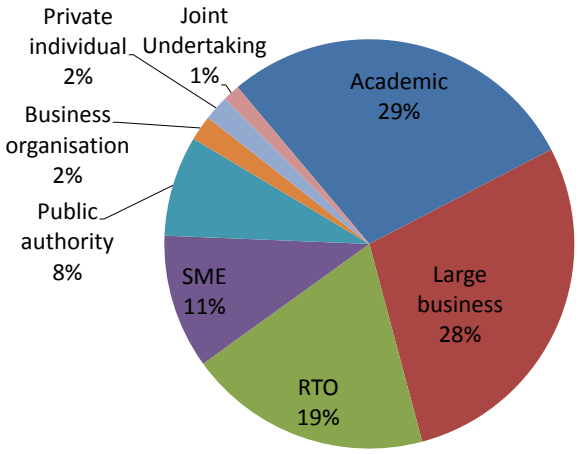
Commission européenne/Europese Commissie, 1049 Bruxelles/Brussel, BELGIQUE/BELGIË - Tel. +32 22991111

Context

The consultation was launched on the institutional platform (IPM) of the European Commission on 20th July 2012. It consisted of 21 questions covering the policy and economic context, the current ENIAC and ARTEMIS initiatives, the possible improvements and model for future initiative(s) under Horizon 2020 and the related performance indicators. The consultation open to the general public was announced through several channels, including a dedicated page on the DG CONNECT Components Unit webpage, the Digital Agenda website and DG CONNECT's newsroom. Furthermore the announcement of the consultation launch and five reminders were sent by e-mail to a list of more than 1,000 contacts over the 12 weeks public consultation. This balanced list was representative of all stakeholder categories and was achieved by combining contacts from the 7th Framework Programme, existing Joint Technology Initiative (JTI) project coordinators, and various public authority boards. The consultation closed on 12th October 2012.

Contributions

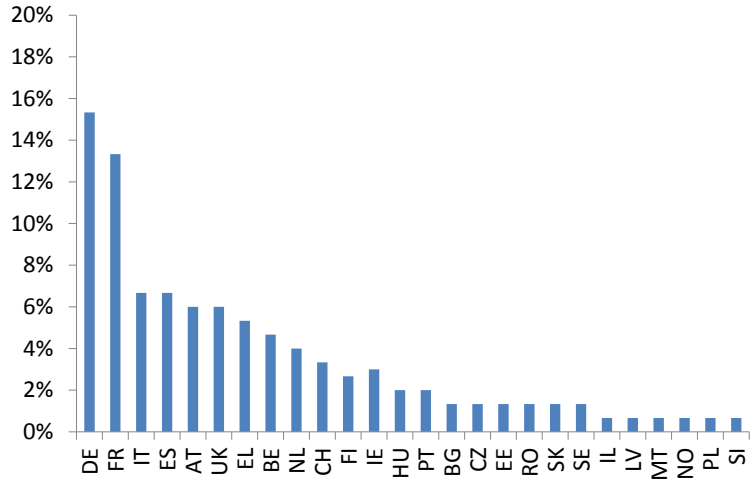
The consultation received 151 contributions with a distribution between respondent categories as follows



Research organisations and companies constitute more than 85% of the respondents, which means that the representational goal of the consultation is achieved in terms of these industry-driven, research-and-innovation-oriented initiatives. Nevertheless, despite the broad, inclusive e-mailing list only 16 SMEs contributed to the consultation. A larger contribution was also expected from Member State representatives involved in the current tripartite initiatives. In these circumstances no statistics can be extracted for these two categories but major specific orientations in their contributions will be highlighted in this report. A number of respondents were not on the e-mail list which indicates that the consultation was well publicised through the available channels.

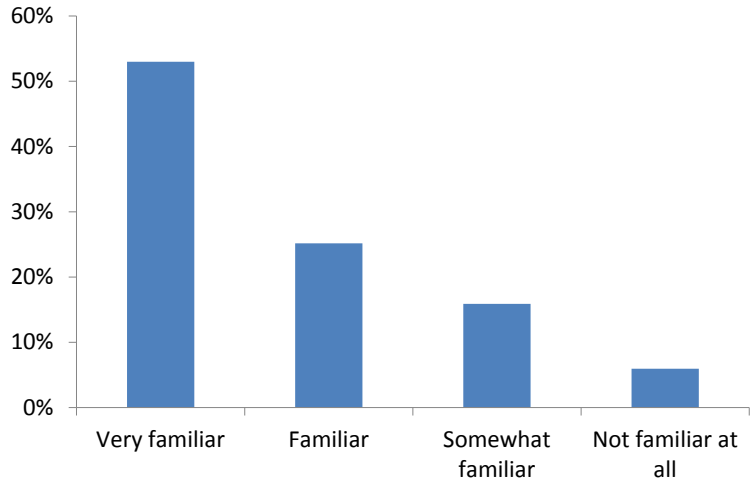
Respondent origins

The respondents come from a total of 36 countries including 23 European countries. More than 1/4 of the respondents are from Germany and France (28% of the total) and 12 countries (Member States and Switzerland) represent more than 75% of the respondents as shown in the following chart.

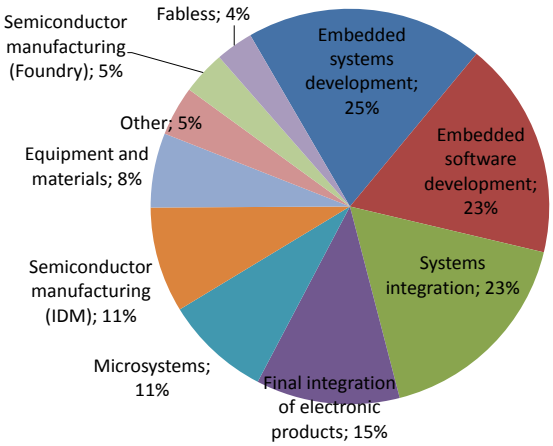


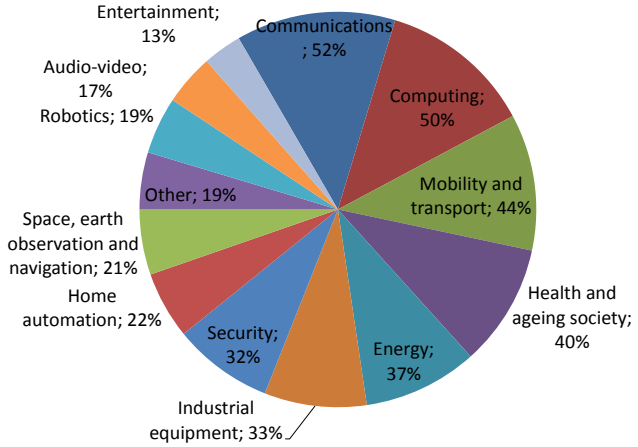
Domains of activity

The respondents are clearly active in the field. Very few respondents were not knowledgeable about the current initiatives. This indicates the validity of the respondents in addressing this topic. The highest familiarity with the current JTIs is by industry and the RTOs.



The fields of activity of the respondents are depicted in the following charts. This multi-response question indicates that half of the contributors are involved in activities related to systems. Semiconductor design and manufacturing is of interest to roughly 2/3 of the respondents. The large semiconductor companies participate in both current JTIs and it appears that the main elements of these initiatives were well addressed through the consultation. When looking further into the respondent categories, it seems, as expected, that the large companies are more involved in semi-conductor manufacturing (IDM) as well as in the final integration of electronic products, indicating the contributions of large user companies. SMEs, are proportionally, more involved in embedded software development. All the other fields have similar levels of involvement by both company categories.





The respondents are active in all major sectors where electronic components and embedded systems are used. The "endogenous" sectors of communications and computing sectors concern half of the respondents. Fields contributing to solving the major societal challenges involve one third or more of the respondents. While energy, security and the robotics fields involve all categories of respondents in a balanced manner, the industry is more active in mobility and transport as well as space, earth observation and navigation compared to actors in public R&D. The public R&D organisations are more active in communications, computing and health.

Funding through the current JTIs

Overall 60% of respondents have applied for funding from one or both of the current initiatives and half received funding. The proportions vary strongly with respondent categories: 90% of large company respondents applied for and received funding while for SMEs their proportions are respectively is 75% and 50%. 60% of RTO respondents have applied and received funding while half of academic respondents had applied and 40% received funding.

Policy context of the future initiative

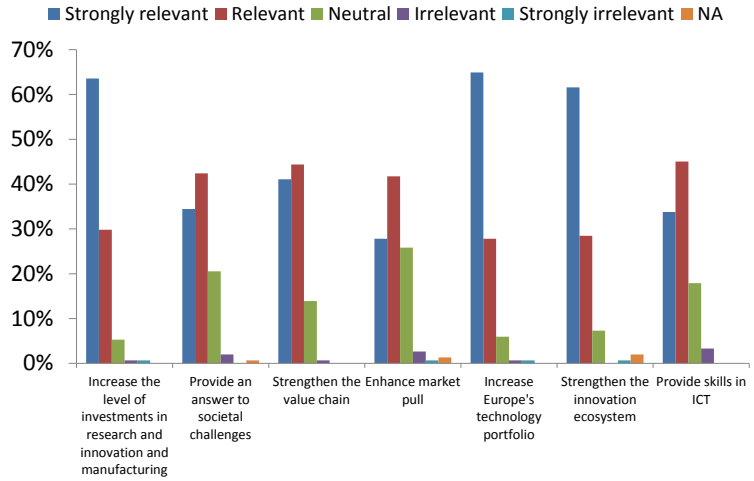
The aim of the consultation was to receive feedback on the need for action and on the direction such action needs to take to tackle the challenges faced by the electronic components and systems sector.

The first question targeted the type of actions:
Why is action needed in Europe on electronic components and embedded systems?

1. Increase the level of investments in research and innovation and manufacturing
2. Provide an answer to societal challenges
3. Strengthen the value chain
4. Enhance market pull
5. Increase Europe's technology portfolio
6. Strengthen the innovation ecosystem
7. Provide skills in ICT

With a general positive opinion about the need to act, it appears that 3 aspects are key:

- Investing more in R&I and manufacturing,
- Increasing Europe's technology portfolio, and
- Strengthening the innovation ecosystem.



Some distinctive features appear in the SME contributions. They see less need to invest more in R&I while still agreeing on the need. SMEs see less importance in providing answers to societal challenges, probably as this high-level goal is too far from their daily operations. Conversely they agree more strongly on the need to enhance market pull, which is understandable as it could help them to access new markets with reduced barriers. Academic respondents have less focus on strengthening the value chain because of their upstream position. Not unexpectedly they are more strongly focused on providing skills in ICT, which is part of their mandate as education and research organisations.

<u>Priorities</u>

Provide your perceived ranking on the need to act on the listed areas in relation with electronic components and embedded systems?

1. Improve coordination of activities between EU and Member States
2. Provide financial means to compete at a global level
3. Leverage public and private funded research and innovation
4. Align higher education and research with industrial needs
5. Develop policies to improve market take-up
6. Broaden the range of research and innovation funding mechanisms
7. Facilitate the participation of SMEs in European research and innovation
8. Facilitate innovation and industrial clustering
9. Enable close cooperation between actors along the value chain

The ranking of the areas where the respondents see the highest priority to act at the European level provided a set of results with four prominent aspects. Two are ranked on top:

- Improve coordination of activities between EU and Member States, and
- Provide the financial means to compete at a global level.

Two are ranked least important:

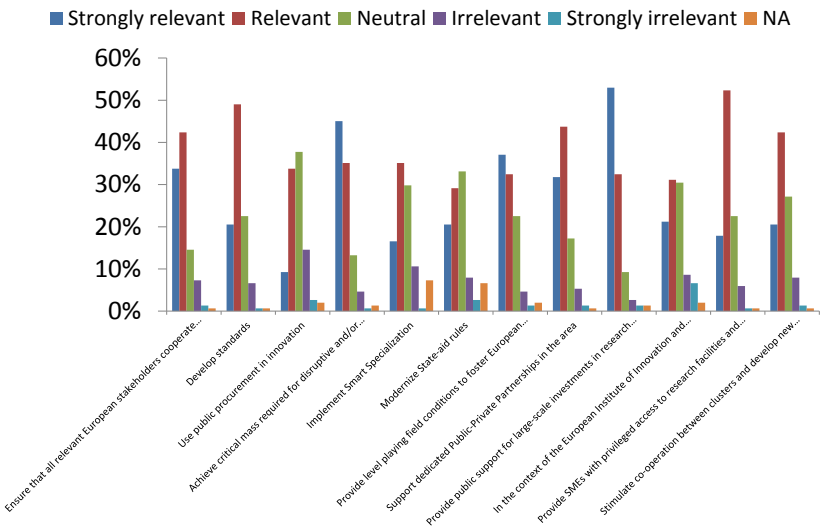
- Broaden the range of research and innovation funding mechanisms, and
- Develop policies to improve market take-up.

Among respondent categories we note variations. The two top ranked priorities are common for all categories except SMEs. For SMEs the financial means to compete at a global level is less important than to facilitate their participation in European research and innovation or to leverage public and private funded research and innovation. For academics, leveraging public and private funding is ranked first. SME participation is ranked 5 and 6 by RTOs and large companies respectively. Aligning higher education and research with industrial needs is ranked 3 by large companies.

Dedicated actions

Based on the present situation how relevant would dedicated actions at European level be in the listed fields in relation with the electronic components and embedded systems?

1. Ensure that all relevant European stakeholders cooperate towards defined goals and shared roadmaps
2. Develop standards
3. Use public procurement in innovation
4. Achieve critical mass required for disruptive and/or breakthrough research
5. Implement Smart Specialization
6. Modernize State-aid rules
7. Provide level playing field conditions to foster European competitiveness in the sector
8. Support dedicated Public-Private Partnerships in the area
9. Provide public support for large-scale investments in research and innovation
10. In the context of the European Institute of Innovation and Technology (EIT) set up a Knowledge and Innovation Community dedicated to electronics and embedded systems
11. Provide SMEs with privileged access to research facilities and services
12. Stimulate co-operation between clusters and develop new clusters as needs emerge



Three main areas of action emerge:

- Achieve critical mass required for disruptive and/or breakthrough research,
- Provide level playing field conditions to foster European competitiveness in the sector, and
- Provide public support for large-scale investments in research and innovation.

These three areas are especially strongly relevant for large companies. In this regard it is surprising to note that the modernisation of state-aid rules is ranked towards neutral. This is a consequence of the industry seeing it as relevant or strongly relevant while all the others actors have a neutral opinion.

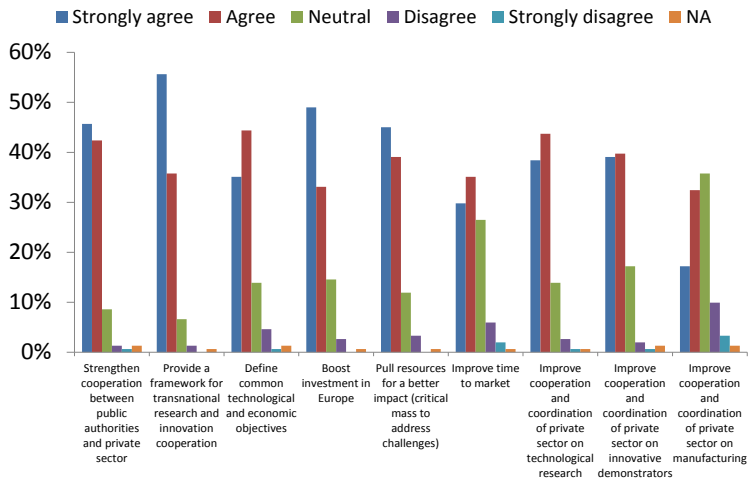
The industry sees the need to ensure that all relevant European stakeholders cooperate towards defined goals and shared roadmaps as more relevant than the other actors. Large industry sees Smart Specialisation implementation more relevant and SMEs are rather neutral as surprisingly are Member States.

Industry and Member States both have a rather neutral position on their interest in leveraging EIT to provide skills while the research community sees it as relevant.

<u>Role of the future JTI in research and innovation</u>

What should be the role of a JTI in research and innovation?

1. Strengthen cooperation between public authorities and private sector
2. Provide a framework for transnational research and innovation cooperation
3. Define common technological and economic objectives
4. Boost investment in Europe
5. Pull resources for a better impact (critical mass to address challenges)
6. Improve time to market
7. Improve cooperation and coordination of private sector on technological research
8. Improve cooperation and coordination of private sector on innovative demonstrators
9. Improve cooperation and coordination of private sector on manufacturing

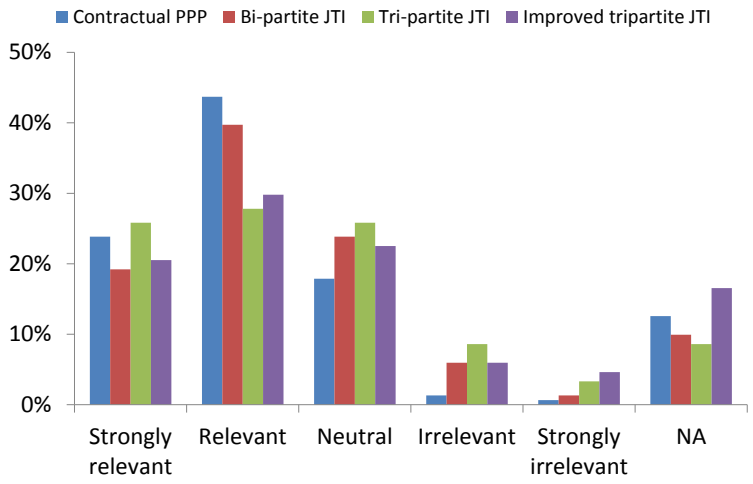


These nine future JTI roles receive a majority of positive opinion with the exception of cooperation and coordination on manufacturing in the private sector. In this case large companies are the most neutral about it while the public authorities are split with 40% strongly agreeing and 40% strongly disagreeing.
The highest priority for industry is to strengthen cooperation between the public and private sectors. Large companies are also strongly interested in a framework for transnational R&I cooperation and pooling resources to achieve critical mass. The second highest priority for SMEs is to boost investment in Europe and a large majority of the public authorities agree that this is highly important. They also strongly agree on the role of the JTI in improving cooperation in the private sector on technological research and improve time-to-market. SMEs are particularly keen on improving time-to-market. For SMEs, the role of the JTI is also very much about improving cooperation and coordination of private sector on innovative demonstrators.

Type of PPP implementation

How relevant are the various forms of Public-Private Partnerships (PPP) listed below to address the objectives of a PPP in electronics?

1. Contractual bi-partite PPP (European Commission & industry)
2. Institutional bi-partite Joint Undertaking (European Commission & industry)
3. Institutional tri-partite Joint Undertaking (European Commission, Member States & industry)
4. Mixed bi-partite and tri-partite Joint Undertaking as described in the background document



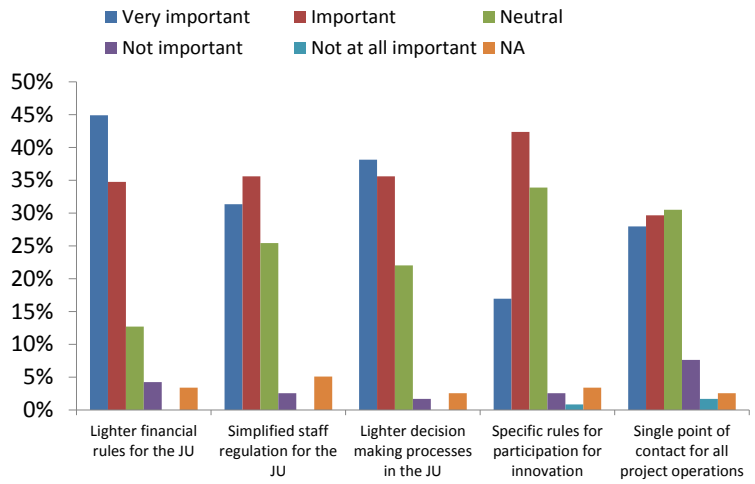
The bar graph above shows that there is a balanced opinion regarding the different implementation types centred on a "relevant" opinion. There is a slightly larger positive opinion towards bi-partite type PPP, either contractual or based on a Joint Undertaking. Industry is clearly mostly in favour of contractual PPPs since it is considered more flexible. Considering the budget size of such bi-partite PPPs are less than 50% of a tri-partite type PPP then this contrasts with the opinion of the industry that the future JTI should help reach critical mass.
In regard to the above, it is interesting to see that, the European Technology Platforms have a contrasting opinion. AENEAS rates the improved model of JTI as strongly relevant and above all the other types: "we support multiple tools and in case of Member States participation the one of EUREKA". The current tri-partite form is strongly relevant for the ARTEMIS-IA. The least relevant option for both organisations is the bi-partite JTI (irrelevant and neutral respectively) as it appears to have a smaller budget while involving the same administrative burden. More specifically "ARTEMIS-IA believes that participation of Member States increases the momentum of a R&D&I programme; so the default choice is tri-partite or partly-tri-partite, assuming that the boundary conditions (including full programme funding commitments per partner), as mentioned in the consultation response above, can be fulfilled. If tri-partite or partly-tri-partite is not possible, then a contractual PPP is the second option."

Possible improvements

Based on the existing JTIs, which of the following areas proposals do you see as important improvements?

1. Lighter financial rules for the JU
2. Simplified staff regulation for the JU
3. Lighter decision making processes in the JU
4. Specific rules for participation for innovation
5. Single point of contact for all project operations

This question was addressed to the 118 respondents being familiar or very familiar with the current JTIs.

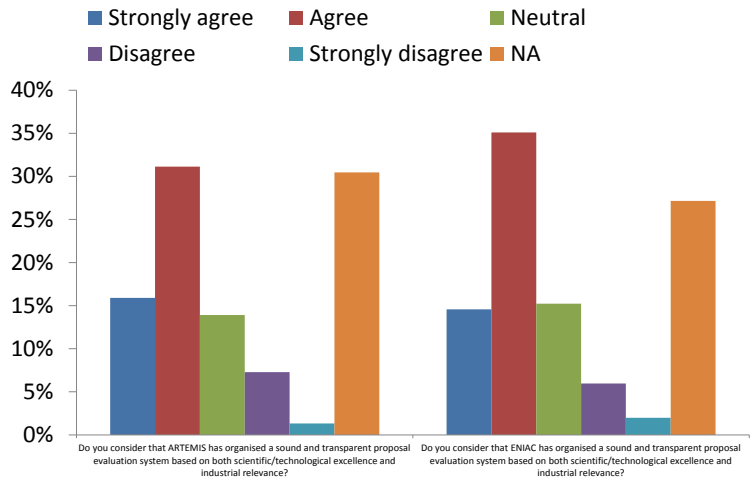


There is a general opinion on the high importance of lighter financial rules and decision making processes. On the latter only public authorities expressed a majority of neutral opinions.
The need for specific rules for participation at higher TRLs received a less strong opinion. The views on the single point of contact are mixed with a majority of SMEs and academics expressing a strong opinion. This reflects a desire for simplification of administrative procedure as the current two points of contact (national and JU) consume important resources.

Opinion on current JTIs evaluation process for project proposals

Do you consider that ARTEMIS has organised a sound and transparent proposal evaluation system based on both scientific/technological excellence and industrial relevance?
Do you consider that ENIAC has organised a sound and transparent proposal evaluation system based on both scientific/technological excellence and industrial relevance?

NB: the bars "NA" indicate that roughly 30% of respondents have no opinion on one or the other JTI.



The majority of opinions are positive. For SMEs and public authorities responses are spread equally over all opinions probably partly due to the small number of respondents. AENEAS indicates that "However, the boundary conditions imposed by differences in

eligibility criteria within different Member States, make it impossible to select on the basis of excellence and relevance alone".

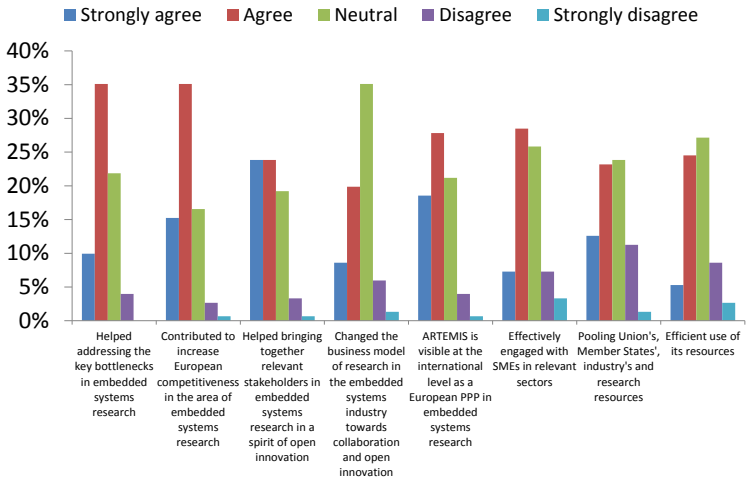
JTI achievements

Do you consider that ARTEMIS/ENIAC has succeeded in the following listed areas?

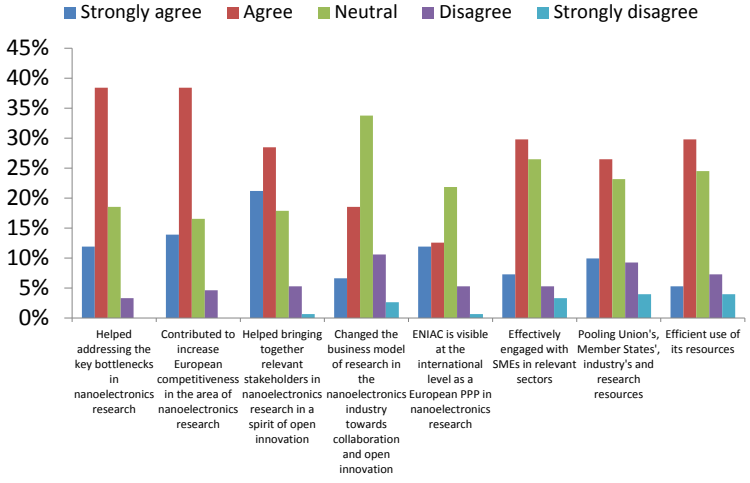
1. Helped addressing the key bottlenecks in embedded systems/nanoelectronics research
2. Contributed to increase European competitiveness in the area of embedded systems/nanoelectronics research
3. Helped bringing together relevant stakeholders in embedded systems/nanoelectronics research in a spirit of open innovation
4. Changed the business model of research in the embedded systems/nanoelectronics industry towards collaboration and open innovation
5. ARTEMIS/ENIAC is visible at the international level as a European PPP in embedded systems/nanoelectronics research
6. Effectively engaged with SMEs in relevant sectors
7. Pooling Union's, Member States', industry's and research resources
8. Efficient use of its resources

NB: to improve readability NA bars are not shown as they are identical to the previous question's graph.

ARTEMIS



ENIAC



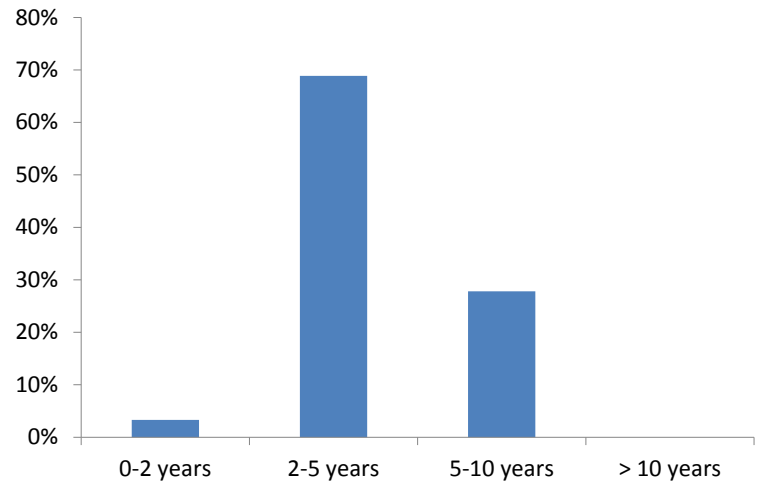
It is interesting to note that there is good consistency in the evaluation of the two existing JTIs. There is a general positive opinion for all criteria. The exceptions are the role of the JTIs in changing the collaboration model(s) and in the case of ENIAC the visibility of the initiative at international level. AENEAS indicates that "the level of cooperation and collaboration is actually high in the domain". There is generally a more positive opinion on the role of the JTI in bringing the relevant stakeholders together in the spirit of open innovation. The latter result mostly reflects the strong agreement from the large companies in both initiatives.
Some specific opinions are:

- The large companies in ARTEMIS have a higher agreement on the importance of contributing to increasing European competitiveness in embedded systems,
- They also have a positive opinion on the role of the ARTEMIS JTI in pooling resources from all stakeholders,
- The Member States expressed the opposite opinion with general agreement that ARTEMIS did not pool the resources of all its stakeholders, and
- For both JTIs the SMEs have a very mixed opinion on the engagement of SMEs in these initiatives with half strongly agreeing and half neutral for ENIAC. In the case of ARTEMIS there was a 1/3 split between strong agreement, neutral and disagreement.

Time frame for impact

On which time frame do you think the JTI(s) should impact the most?

- 0-2 years
- 2-5 years
- 5-10 years
- > 10 years

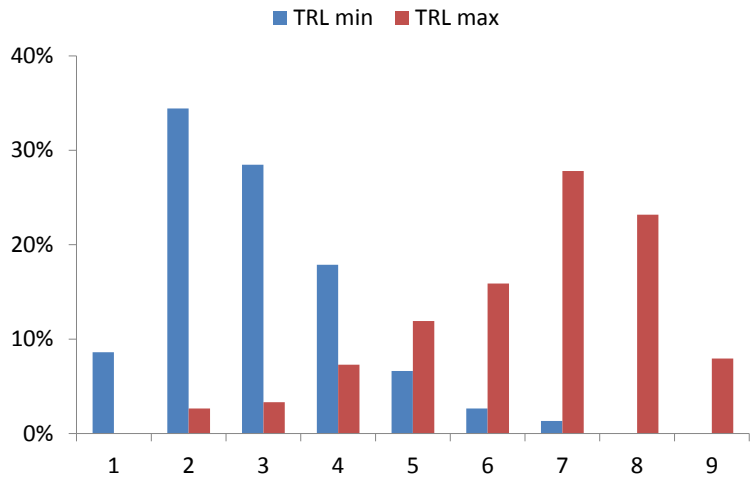


An overwhelming majority of the respondents viewed the strongest impact of the JTI(s) as relatively short term at 2-5 years. RTOs and Member States most strongly held this view (80% or above).

Position along the scale of Technology Readiness Levels

In order to position the JTI(s) to better tackle and focus on the innovation in components and embedded systems, how would you place the lowest and highest Technology Readiness Levels (TRLs) to be addressed?

Possible answers: from 1 to 9



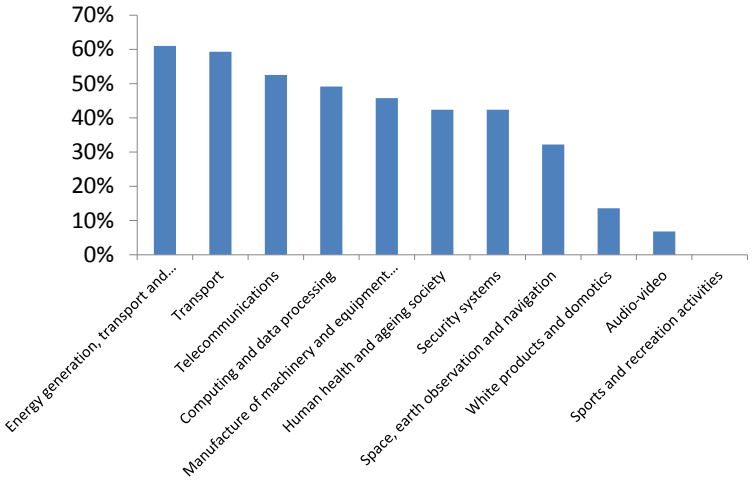
There was a wide spread of responses but there is a clear consensus that the JTIs should address TRLs from 2 to 7 or 8. This correlates with the call from stakeholders for a quick impact from the JTI(s) (previous question). It also shows that the stakeholders see the need for continuous support of upstream research to help new concepts emerge.

Sectors benefiting the most from or pulling the developments in electronic components and systems (multiple choice question)

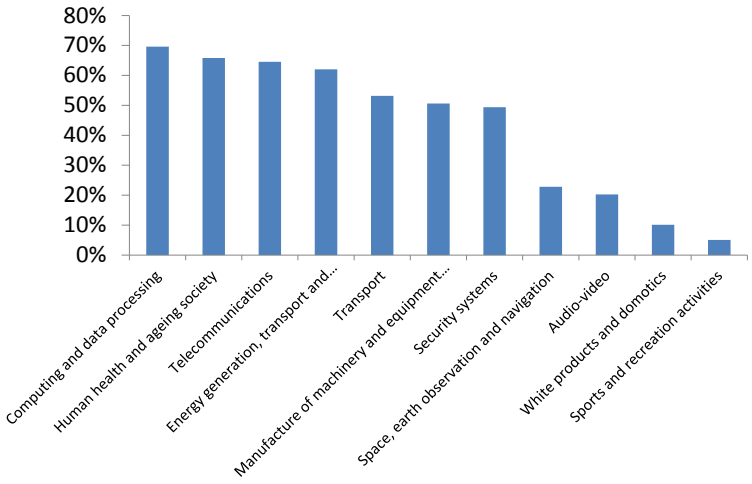
Choose among the following fields in terms of importance for developing the innovation whose spill-over can serve other sectors:

- Manufacture of machinery and equipment including robots
- Transport
- Space, earth observation and navigation
- Telecommunications
- Energy generation, transport and distribution
- Human health and ageing society
- Sports and recreation activities
- Audio-video
- White products and domestics
- Security systems
- Computing and data processing

Industry



Research community

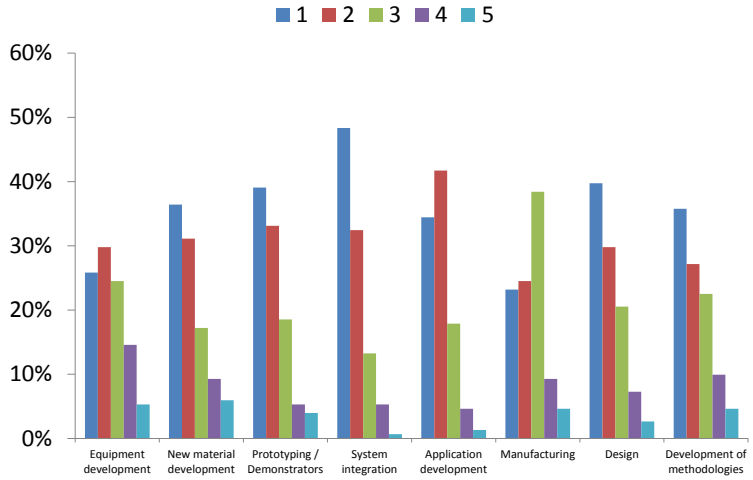


For industry the key sectors benefiting from electronic components and systems are energy, transport and telecommunications and with, at almost, 50% of responses highlighting computing and data processing. For large companies the energy sector is well ahead while for SMEs transport and telecommunications are most important.
For the research community, the 3 first sectors receive more than 65% of responses i.e. computing and data processing, health and telecommunications. RTOs see health and energy as key sectors while the academics are more focused on computing and data processing.
AENEAS noted that "there is always some spill over" which perfectly illustrates the enabling character of components.

<u>Issues to be tackled by the future JTI</u>

Nanoelectronics and embedded systems are fuelling the entire ICT value chain. Rate from 1 to 5 how much emphasis in the future JTI(s) should be placed on the following issues:

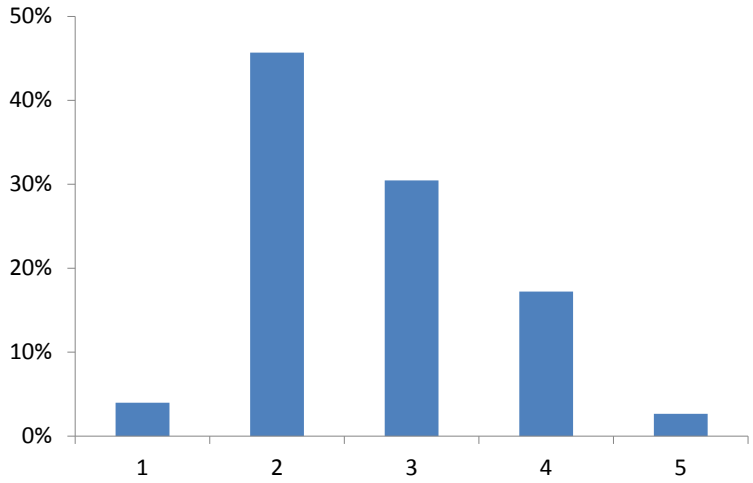
1. Equipment development
2. New material development
3. Prototyping / Demonstrators
4. System integration
5. Application development
6. Manufacturing
7. Design
8. Development of methodologies



System integration receives, by far, the highest rating as a priority for the future JTI focus. This is especially important for large companies (70% at highest importance) and RTOs, also with their highest rating.
Design and prototyping/demonstrators is in second place with large companies favouring demonstrators and SMEs prototyping. This correlates well with the call for higher TRLs and a medium time frame. Design is an important issue for both large companies and academics.
Public authorities' first priority is the development of new materials and applications. New materials development is rated second by RTOs and academics. Application developments are rated highly by large companies and lower by all other actors.
Finally the development of methodologies receives a high rating from all stakeholders except RTOs (equal rating from 1 to 3) and public authorities.
While AENEAS ranks all these issues at 1, ARTEMIS-IA puts less emphasis on materials and equipment development and manufacturing.

Roadmap or bottom-up approach?

Rate the balance necessary between a roadmap based action and an open approach to project proposals (1 = fully roadmap based, 5 = fully open approach)



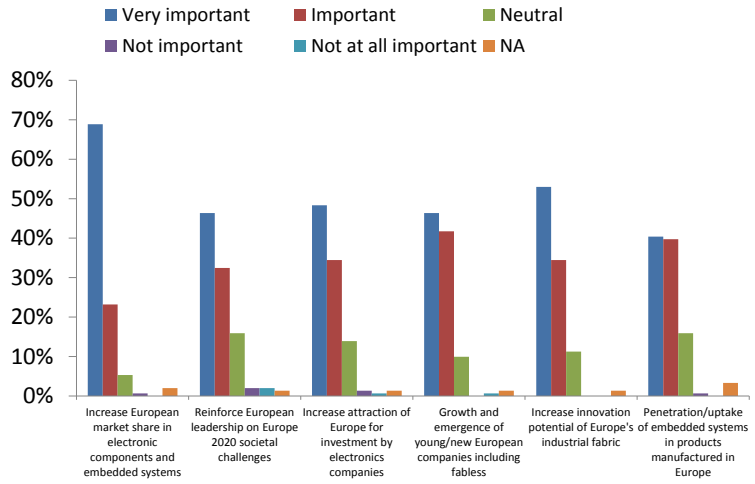
There is a majority of opinion asking for a programme that is more underpinned by roadmap(s). This is especially true for large companies - 60% gave a 2 rating

demonstrating a strong need for clear and visible research and innovation directions. Public authorities and academics have a more distributed opinion with a large majority opting for a 3 rating. A majority of RTOs and SMEs rate this aspect at 2 but there are a lot of opinions favouring a balance programme rated at 3.
Both ETPs also rank this aspect at 2. ARTEMIS-IA indicates that "innovation success come both from roadmap based approaches and fully open approached. An industrial programme should benefit from both approaches".

Economic impact

Ideally what impact would you like to see on the electronic components and embedded systems industry from the future JTI(s)?

1. Increase European market share in electronic components and embedded systems
2. Reinforce European leadership on Europe 2020 societal challenges
3. Increase attraction of Europe for investment by electronics companies
4. Growth and emergence of young/new European companies including fabless
5. Increase innovation potential of Europe's industrial fabric
6. Penetration/uptake of embedded systems in products manufactured in Europe



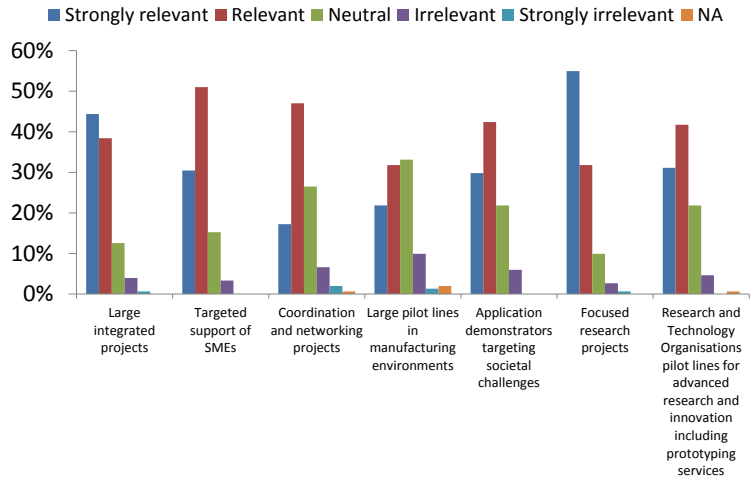
This question clearly provides a very positive response on the expected impact of the JTI on increasing European market share in electronic components and embedded systems. The other impacts are, to a lesser or greater extent, also seen as very important. RTOs express a mixed view on the impact on societal challenges (opinions vary uniformly between very important and neutral). SMEs are not as positive, as the other stakeholders, on the impact in increasing the attraction of Europe for investment by electronics companies. The large companies are positive but not as strongly as on the impact on growth and the emergence of young/new European companies including fabless. RTOs, public authorities and SMEs see as important (but not very important) the penetration of embedded systems into products manufactured in Europe.

Instruments for the future JTI

How relevant do you see the following instruments in the future JTI(s)?

1. Large integrated projects
2. Targeted support of SMEs
3. Coordination and networking projects
4. Large pilot lines in manufacturing environments
5. Application demonstrators targeting societal challenges

6. Focused research projects
7. Research and Technology Organisations pilot lines for advanced research and innovation including prototyping services



This question produced markedly different opinions from the different categories of stakeholders. The highest relevant instrument is focused research projects. The research community ranked this approach well ahead of the other options. It is the large companies second choice but less important to SMEs and public authorities.
Large companies strong preference is large integrated projects (~70% seeing it as strongly relevant) and SMEs see support targeted at them as highly relevant (~80% of SME respondents). This SME specific instrument also receives strong support from public authorities as their first priority.
It is interesting to find that large pilot lines in manufacturing environments receive mixed support from all the stakeholders i.e. only 30% of large company respondents rated it as strongly relevant. Similarly RTOs, despite acknowledging the relevance, do not rank pilot lines and prototyping services hosted by them as highly relevant.
AENEAS sees pilot lines as highly relevant while ARTEMIS-IA considers it more as irrelevant.

<u>Project preferred size</u>

Do you think there should be a preferred range of project budget size?
If yes, provide a range you think as suitable

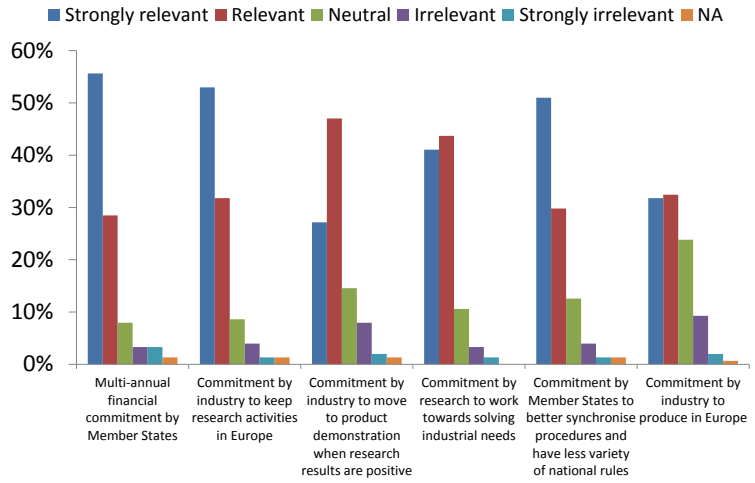
41 respondents (30% of the total) considered it beneficial to have a budget range for projects. For industry this increased to 40%. There are considerable differences in the budget ranges proposed. Large companies propose a minimum budget of between 3 and 10 M€ and a maximum budget around 150 M€, while all the other actors suggest ranges between 1-3 M€ and 10-30 M€.

<u>Commitments for the success of the future JTI</u>

What type of commitment do you think is required to put forward in this future JTI(s)?

1. Multi-annual financial commitment by Member States
2. Commitment by industry to keep research activities in Europe
3. Commitment by industry to move to product demonstration when research results are positive
4. Commitment by research to work towards solving industrial needs

5. Commitment by Member States to better synchronise procedures and have less variety of national rules
6. Commitment by industry to produce in Europe



There is a general opinion strongly in favour of the commitment of Member States to multi-annual budgets and better synchronisation of procedures, simplification and reduction of national rules, and for industry to keep research activities in Europe.
Support of these three commitments is the same for both the large companies and SMEs. Large companies and public authorities strongly favourable the opinion requiring the commitment of the research community to contribute to solving industry needs. Only public authorities put a strong emphasis on the commitment of the industry to produce in Europe. SMEs and academics see this as relevant while there are equal opinions between strongly relevant and neutral from large companies and RTOs.

<u>Source of budget increase (multiple answer question)</u>

In case you consider it necessary to increase the level of investments in research and innovation and manufacturing, indicate by whom (tick one or more actors):

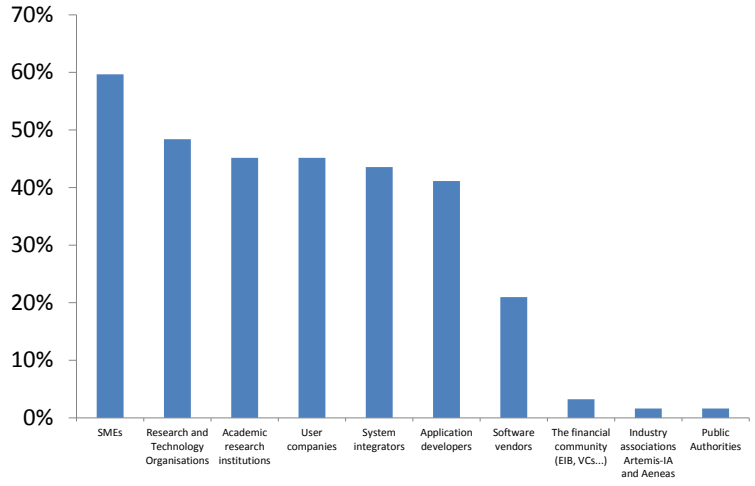
- European Union
- Member States
- Regions
- Industry

There is a general opinion that it is a necessity for European Union to invest more in the electronic components and systems sector. This view is followed closely by the wish to see more investment by Member States and also industry (all above 60% of opinions). The importance of Regions is underlined by only 40% of respondents despite the forthcoming Smart Specialisation programme, which could be a catalyst for Regions to invest in targeted (high-tech) sectors. Nevertheless Regions are seen as key investors by ~50% of the large company respondents and also, to a lesser extent, by Member States.
Depending on the respondent category the order varies strongly. Large companies, RTOs and academics see the European Union and industry as the primary actors to invest more in the sector while public authorities see themselves and industry as the key investors. SMEs see Member States closely followed by the European Union as the primary investors.

Broader community (multiple answer question)

If you see the need to involve other or more partners in the JTI(s), tick one or more categories:

- User companies
- SMEs
- Software vendors
- Application developers
- System integrators
- Academic research institutions
- Research and Technology Organisations
- Others

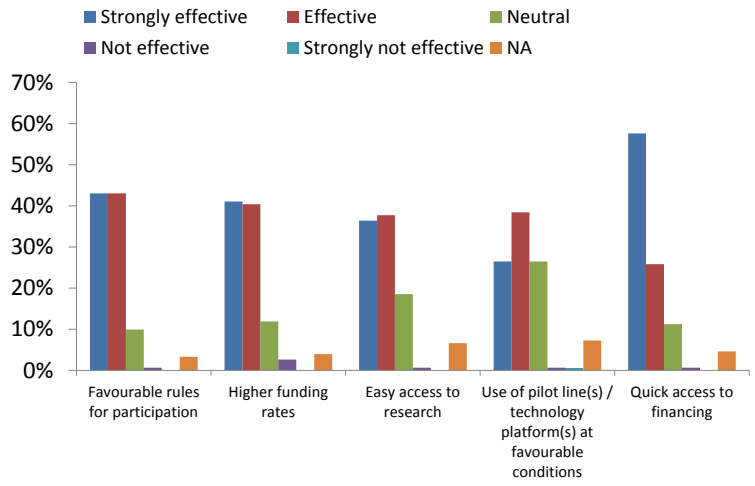


In general each stakeholder category sees itself as needing to be more involved in the future initiative. The involvement of SMEs in the future initiative is seen as key by public authorities. Large companies and public authorities express a strong opinion on the need to involve more user companies, system integrators and application developers (in this order). User companies are important for SMEs too but these three categories are not rated highly by the research community.

Support to SMEs

The industry is in need of a full set of SMEs for a strong and efficient ecosystem. To what extent do you see the following measures effective to support the SMEs?

1. Favourable rules for participation
2. Higher funding rates
3. Easy access to research
4. Use of pilot line(s) / technology platform(s) at favourable conditions
5. Quick access to financing



There is a general favourable opinion towards all the measures addressing SMEs needs with a strong agreement from all actors on the necessity of facilitating access to financing for SMEs. All stakeholders, except large companies, support higher funding rates for SMEs. Except for large companies and RTOs, having favourable rules for the participation of SMEs is seen as strongly effective.