Cluster-based Innovation through Embedded Systems technology

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Abstract:

The Joint Action Plan is an *action strategy* outlining the future development of the involved regions and cluster organisations. This strategic plan will pinpoint what it will take for the involved partners to push economic development in the four regions by enabling innovative research and technology partnerships within the collaborative area of Embedded Systems for Smart Cities (ESSC). The Joint Action Plan is defined to ensure that it meets with the expectations of the different stakeholders, that it is relevant to these stakeholders, founded in their strongholds, and creates commitments of the stakeholders leading to the expected economic development in the involved regions.

Keyword list: Joint action plan, strategy, Smart City, embedded systems

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Abbreviations

CLINES   Cluster-based Innovation through Embedded Systems technology – project 320043
ES   Embedded Systems
ESSC   Embedded Systems for Smart Cities
JAP   Joint Action Plan
SC   Smart City
SME   Small and Medium-Sized Enterprises
SWOT   Strengths, Weakness, Opportunities, Threats (analysis)

1   Introduction

Smart cities and the ideas of smart cities are on the rise. Many metropolitan areas and many large cities are working on the concept that should become digitalized. This digitalization is in part technology-driven and resides in the embedded systems to sense and monitor behaviour, to collect huge amounts of data (big data), to analyse these data, and then in smarter ways suggest condensed and relevant information to citizens or even intervention into the cyber-physical infrastructures of the city. The concept of 'Smart City' has been defined in several yet overlapping ways. It can be seen as the investment in networked infrastructures (traditional as well as information and communication technologies) to fuel a sustainable economic growth and a high quality of life (Caragliu et al. 2011), but also that these infrastructures should be more than intelligent, they should be smarter for the benefit of citizens (Holland 2008).

Embedded systems (also often referred to as cyber-physical systems) are systems based on information and communication technologies that reside in and control a device, product or system, i.e., it is embedded in a larger system. A cyber-physical system is an integration of computation with physical processes; and embedded software monitors and controls the physical process (Lee & Seshia 2011). Modern traffic control in a city could be an example of this where cars and trucks are monitored either by mobile sensors in the vehicles or on stationary locations, the sensor data communicated, analysed, and used in controlling traffic lights and information to drivers. The engineering of embedded systems is increasingly complex and involves reliably modelling the physical processes as well as utilizing very limited resources in embedded devices (Sangiovanni-Vincentelli et al. 2013).

The CLINES consortium has been formed around the idea of providing solutions for the Smart, Digitized Cities of tomorrow, based on Embedded Systems Technology.

The Joint Action Plan (**JAP**) presented in this document details a *strategy* outlining the actions necessary to promote the development of the involved regions and clusters. It pinpoints what it will take for the involved partners to push economic development by enabling innovative technology partnerships within the collaborative area of embedded systems for smart cities.

The Joint Action Plan was defined among all the stakeholders to ensure that it meets with the expectations of the different stakeholders, that it is relevant to them, founded in their strongholds, and created commitments of the stakeholders leading to the expected economic development in the involved regions.

The structure of the document is as follows. Section 2 contains the Joint Action Plan and the relationships between the joint actions and the strategies for research, funding, innovation, smart specialization, and knowledge transfer. Section 3 explains how the joint actions will be implemented through regional actions and the regional contributions to the joint actions. Section 4 contains the description of how the joint actions relate to the Joint Internationalisation Plan; and section 5 describes the methodology behind developing the Joint Action Plan.

2   Joint Action Plan

The overall objective of the strategic effort and its sustained activities beyond the CLINES project has been formulated based directly on the CLINES project's objective:

The overall objective of the Joint Action Plan

To define the particular actions taken by CLINES partners and regions to improve the domain of Embedded Systems for Smart Cities in Europe and in the four regions. The Joint Action Plan must drive economic development through both joint actions and regional actions within Embedded Systems for Smart Cities for the benefit of citizens.

At an overall level this objective is divided into five long-term goals for the sustained CLINES joint actions. These are:
- Improve ESSC Smart Specialisation
- Build a Vibrant ESSC Eco-System
- Develop Innovation Capacities
- Create More Business
- Mobilize Funding Sources for ESSC

The overall objective and goals are realised through a set of actions.

The following actions are organised under the headings of the above goals and sub goals. For each of the actions, the envisaged timeframe for the initial implementation of the action is given.
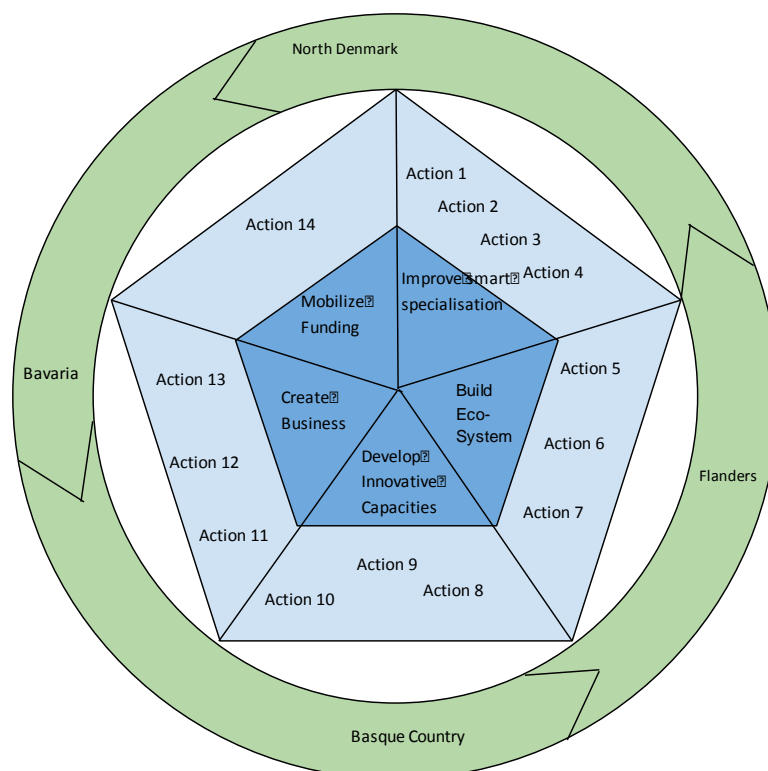
The relationships between the goals at the kernel and the joint actions designed to pursue these goals; encapsulated in the joint effort by the four regions.

2.1   Improve ESSC Smart Specialisation

The European competitiveness on Embedded Systems for Smart Cities (ESSC) must be strengthened through improved smart specialisation. The following joint actions are designed to achieve this.

Sub goals
- Create a joint vision
- Appreciate and leverage regional and joint strengths
- Focus on research effort
- Involve stakeholders
- Collaborate across sectors
- Create public and political awareness

Action 1: Create a common vision for ESSC based on the SWOT analyses

To improve the regional smart specialization within embedded systems for smart cities there is a need to utilize the different regional strengths and opportunities and to close gaps in regional weaknesses and towards threats. These differences are highlighted in the SWOT analyses produced in CLINES. The creation of a joint vision for ESSC that is well founded in the SWOT analyses and in the trend roadmaps and shows how the common vision links to both regional strongholds as well as other European clusters within ESSC.

The main thrust of this joint action is to leverage regional strengths and involve stakeholders, and to foster the cooperation across sectors (see Action 2). The common vision must hence focus on improving visibility and awareness, and a shared consciousness of the benefits of collaboration. The CLINES stakeholders in each region will as part of this develop the region's specialised CLINES vision to develop an ecosystem around ESSC topics.

The vision and its stakeholders must be focused to avoid the risk of formulating a thin vision with too many sectors and too many different stakeholders.

Timeframe: 1 year
Contributes: Smart Specialization Strategy

Action 2: Mediate across business sectors, public agencies, alliances, and initiatives related to Smart City and urban development

To improve the regional smart specialization within embedded systems for smart cities there is a need to mediate across and between otherwise separate business sectors and between public agencies. To reach the full potential of ESSC and smart specialisation there must be collaboration across sections, private as well as public. This collaboration can be launched and furthered by innovation workshops (see Action 8) and by supporting public procurement related to smart cities.

The thrust of this joint action is to mediate between stakeholders which in the outset seem to have diverse interests, business domains, technology domains, cultures, languages, and modes of operation (e.g., the differences between private and public organisations), but synergies can be found and translations must be sought.

Timeframe: 2 years
Contributes: Smart Specialization Strategy and Knowledge Transfer Strategy

Action 3: Establish a permanent Smart City roundtable
To improve the regional smart specialization within embedded systems for smart cities there is a need to create a permanent Smart City stakeholder roundtable. This will transition the regional stakeholders from being a CLINES project interest group to becoming useful for regional smart specialization beyond the project. This will involve a broader set of stakeholders, including businessmen and public policy-makers.

The thrust of this action is to leverage regional strengths, involve stakeholders, and to foster, facilitate, and coordinate the cooperation across sectors (see Action 2). This requires a particular focus on mobilizing the regional stakeholders to become useful for regional smart specialization and improve collaboration between different agencies, both public and private.

Timeframe: 1 year (Closer relations to cities 2 years)
Contributes: Smart Specialization Strategy, Knowledge Transfer Strategy

Action 4: Communicate ESSC vision through show cases and convincing stories
To improve the regional smart specialization within embedded systems for smart cities there is a need to communicate the common ESSC vision. In particular this communication must show how the vision creates linkage with the regions' smart specialisation strategies. The communication will utilise: (1) examples and convincing stories of collaboration within the ESSC vision; (2) the CLINES show cases; and (3) reports on identified and important ESSC problems.

The thrust of this action is both joint communication and preparation. It is also regional and the partners will utilise the ESSC vision and the communication material as means to tighten local ecosystems.

Timeframe: 1 year
Contributes: Smart Specialisation Strategy and Knowledge Transfer Strategy

2.2   Build a Vibrant ESSC Eco-System

The European eco-system for ESSC must be cultivated to become competitive and vibrant and to resonate with regional businesses, public agencies, and research institutions. The following joint actions are designed to achieve this.

To strengthen the competitiveness of European ESSC it is necessary to collaborate both across the regions and across different business sectors. It also involves boosting the visibility of the regional eco-systems' strongholds and their attractiveness for other ESSC eco-systems.

Sub goals
- Create a joint vision
- Appreciate and leverage regional and joint strengths
- Focus research effort
- Involve stakeholders
- Collaborate across sectors
- Create public and political awareness

Action 5: Create joint events and specific actions

The main thrust of this action is to create joint events that can promote a European ESSC agenda. The events can be both European-wide and as international outreach. The events should promote and exchange information on funding opportunities, calls, Smart City projects, as well as knowledge and research on ESSC. This may well involve the Smart City roundtables (Action 3). It will also include organised matchmaking across relevant Smart City sectors and across the four participating regions.

Timeframe: 1 year
Contributes: Smart Specialisation Strategy, Knowledge Transfer Strategy

Action 6: Establish a CLINES office to organise joint actions

To strengthen the regional cluster organizations and the cross-cluster collaboration a CLINES office to organise joint actions should be established. The office will have the main responsibility for match-making (Action 5) both formally in public event and informally as well as for the coordination between the CLINES regions (Action 7).

The thrust of the office will be in elaborating knowledge of interests and competences, public agencies, research institutions, and other stakeholders. The office will also seek knowledge and influence on pre-competitive public procurement. The office will further communicate its knowledge and insight in the regular CLINES Smart City newsletter circulated in the regions.

Timeframe: 3 years (Smart City newsletter 1 year)
Contributes: Innovation Strategy and Knowledge Transfer Strategy

Action 7: Coordinate regional actions and impact

The four regions will each have their local actions because of their regional differences and there will be regional actions that can be and must be coordinated to create larger impact both regionally and jointly. It is particularly important that the regional experiences and results are exchanged between the regions as this can facilitate the joint learning from past experiences.

The main part of this action will include creating closer ties with the city administrations in each of the regions and in particular to the cities' Smart City initiatives. It will also include the establishment of monitoring the footprint of CLINES in each region.

Timeframe: 2 years
Contributes: Innovation Strategy and Knowledge Transfer Strategy

2.3   *Develop Innovation Capability*

Innovation in the domain of ESSC is difficult and capabilities need to be developed and nurtured both regionally and jointly. It also involves the linking between research and technology on the one hand and application and value creation on the other hand, i.e. to link between research, business, cities, and citizens. This will be particularly relevant when it involves SMEs. The following actions are designed to achieve this.

Sub goals

- Develop innovation competences and capabilities
- Close research & technology gaps
- Stimulate SMEs as international innovators

Action 8: Facilitate innovation workshops and demonstrators

To improve stakeholders' capability to innovate it is necessary to build their competences in innovation and in creative thinking. This can be done by means of transferring methods and processes and by means of communicating exemplary innovation in demonstrators and showcases.

This will for the main part be done through facilitating innovation workshops. These workshops will be planned, stakeholders invited, the actual workshop facilitated, and the resulting innovative ideas communicated. The workshops will have a specific ESSC focus and the particular challenge will be designed beforehand. For this to work there must be deliberate action on inviting the most relevant stakeholders and on training of the workshop participants in the innovative and creative processes.

Timeframe: 2 years
Contributes: Innovation Strategy

Action 9: Liaise between business and research groups

Few ESSC businesses have proper access to research groups and vice versa. It is necessary to facilitate the liaison between these otherwise disjoint structures and interests. Business and SMEs in particular need help for gaining access to research groups, research labs, testbeds, and technical infrastructure for ESSC.

The main thrust of this action is for the cluster organisations to know the contents of the on-going ESSC research in the regions' universities and other research institutions, and to open doors for businesses in the regions and across regions.

Timeframe: 3 years
Contributes: Research Strategy

Action 10: Understand users and value-creating cases

Citizens and cities' employees are the users of ESSC; and with innovative applications their expectation, needs, requirements are initially poorly understood. It is necessary to build understanding of the users and consumers through use cases, business cases, and by exchanging user analyses as background for creating value for customers and citizens.

Understanding the users of smart applications and their visions for the future will be crucial in meeting needs for smart city applications with embedded systems solutions. This action will mainly survey citizens as well as cities' employees' expectations and map this to the different smart city domains and possible applications in a 5-year perspective. The mapping can be in terms of use cases, business cases, user analyses, and a systematic appraisal of what creates value for citizens and cities.

Timeframe: 2 years
Contributes: Innovation Strategy and Research Strategy

2.4   Create More Business

A particular challenge is to increase the volume and quality of business within the ESSC eco-systems and this needs to be supported by new and improved business models and entrepreneurial capabilities. This also involves a particular focus on start-ups and SMEs as well as linking with international partners and unleashing new opportunities through alliances and networks as well as close collaboration. The following joint actions are designed to achieve this.

Sub goals

- Develop business models
- Unlock new opportunities
- Improve access to international partners
- Focus on SMEs and start-ups

Action 11: Build knowledge of business models

To create more business in a new domain such as ESSC, there is a need for new business models that can explain how to create value across previous closed borders between sectors and between public agencies and private companies. New business models will have to incorporate radically new configurations such as value networks, quadruple helix cooperation, and alliances. There is also a need for devising specific actions on concrete topics within ESSC requiring more collaboration in more structured value chains. For these new business models to work there must be matchmaking across sectors and across regions.

The main thrust of this action is twofold. First, new business models will have to be elicited from successful business networks. The knowledge of how to structure business models for networks, alliances, value chains, and quadruple helix must be disseminated and diffused through the cluster organisations. Second, concrete topic for value chain and other collaboration must be identified and matchmaking between potential partners must be facilitated. This matchmaking should also include the facilitation of open development where the collaboration is less rigorous and more directed at learning from joint experience. This matchmaking will be particularly useful for SMEs.

Timeframe: 2 years
Contributes: Innovation Strategy, Funding Strategy, Knowledge Transfer Strategy

Action 12: Identify key industrial partners and establish matchmaking

This action is strongly linked with Action 11 as it also entails matchmaking, but the starting point is a different one. The starting point is the key industrial partners in each region that already are operating on a local global market. These should be identified and integrated into ESSC partnering, CLINES roundtables (Action 3), and events (Action 4). These key industrial partners have considerable influence and momentum both regional and internationally. They also need to link with (other) SMEs to become more agile through collaboration. Huge industrial partners can be instrumental in extending the eco systems beyond the CLINES partners.

The main activity in this action is the identification of who the key industrial partners are and how they can be beneficial for the ESSC eco-system. Based on this, matchmaking should be established.

Timeframe: 1 year
Contributes: Innovation Strategy, Smart Specialisation Strategy and Knowledge Transfer Strategy

Action 13: Reach for international collaboration

An important part of creating more business is connected to the facilitation of international outreach for SMEs. This is related to international matchmaking which is all the more difficult for SMEs as they are less known by potential international collaborators.

The main thrust of this action is directly related to the Joint Internationalisation Plan and it particularly gets addressed through: (1) attending to the specific needs of those SMEs that are seeking international collaborators, (2) in supporting their internalisation efforts, (3) facilitating exchange of key information and knowledge among SMEs, and (4) activation of SMEs from different regions and clusters.

Timeframe: 3 years
Contributes: Knowledge Transfer Strategy, Funding Strategy

2.5   *Mobilize Funding Sources for ESSC*

It is necessary to identify, understand, apply, gain, and report on all funding sources relevant to promote ESSC both joint and regional. This involves both public funding, e.g. for research, cluster organisations, SMEs, and commercial investment, e.g., venture capital. This may also involve informing policy-makers and funding agencies of the attractiveness of funding ESSC activities. The following joint action is designed to achieve this.

Sub goals

- Facilitate public-private-partnering
- Provide knowledge of commercial investment, entrepreneurial funding, and venture capital

Action 14: Exchange knowledge of public and commercial investment

To mobilize more explicit and relevant funding for ESSC in particular there is a need to facilitate the exchange of knowledge between the regions on the structure and availability of both public and commercial investments. For public investments this may be achieved through the facilitation of public-private partnerships. For commercial investments this may be achieved through the accumulation and communication of knowledge on venture capital, crowd funding, among other.

The main part of this action will be to establish and maintain an overview of investment structures and availability in the regional cluster organisations. There are general instruments in place for this and the particular focus will be to attend to ESSC and where the particular opportunities are for public-private partnering and for investment in private companies.

Timeframe: 2 years
Contributes: Funding Strategy

2.6   Strategy Mapping Table

An overview of which JAP action is contributing to which CLINES strategy: Smart Specialisation Strategy, Knowledge Transfer Strategy, Innovation Strategy, Funding Strategy, and Research Strategy.

	Strategies				
	Smart Specialisation	Knowledge Transfer	Innovation	Funding	Research
Action 1	√				
Action 2	√	√			
Action 3	√	√			
Action 4	√	√			
Action 5	√	√			
Action 6		√	√		
Action 7		√	√		
Action 8			√		
Action 9					√
Action 10			√		√
Action 11		√	√	√	
Action 12	√	√	√		
Action 13		√		√	
Action 14				√	

3   Implementation

The CLINES Joint Action Plan has been developed within the specific context of embedded systems sector and the reality faced by cities. The embedded systems industry is a global business. Many of the ES companies, whether large or small enterprises are part of global value chains. This means that competition takes place not on a regional nor on a national level, but on a global level. In contrast to the global character of the embedded systems industry, the challenges of cities have a very local or regional character rooted in the city ecosystems and culture.

A solid joint action plan to drive embedded systems for Smart Cities in Europe forward must take this context into account. An approach has to be defined where global solutions meet local opportunities. Driving value development in the area of smart and embedded systems for smart cities must be rooted in local city ecosystems and has to take advantage of synergy between regions, between globally developed embedded systems solutions. Matching 'local' smart city needs with 'global' embedded systems solutions requires a joint approach based on detailed analysis of local ecosystems, culture and needs and thorough knowledge of the embedded systems sector.

This chapter of the Joint Action Plan focuses on the approach defined by the CLINES consortium to match local city needs with global embedded systems solutions and to create synergy between regional to reinforce overall Smart City momentum.

3.1   Approach on joint action implementation

CLINES joined activities are rooted into local city reality where, on one hand, city stakeholders have to cope with city related challenges and opportunities and, on the other hand, local embedded systems stakeholders can benefit from cooperation with stakeholders from other regions to build city solutions.

As a **first step** in the CLINES approach local CLINES partners will have to keep track of local smart city needs and priorities. Furthermore, they have to gain a sound insight into the solutions which can be offered by embedded system stakeholders.

Knowledge on local Smart City priorities and capabilities of embedded system stakeholders will serve as key input for the **second step** in the joint CLINES approach. A step wherein CLINES stakeholders define cross region synergies to further elaborate on together. This will result in a list of prioritized joint actions. Following a structured and iterative process the CLINES consortium will periodically update this list of priorities actions to focus on. Impact on specific KPIs related to the JAP goals will be the key parameter to decide upon priorities.

As a **third step** stakeholders are mobilized to take on responsibility and to develop a joint team which will further develop and execute the prioritized joined actions. When monitoring and revising the joined actions impact on the KPIs related to the JAP will, again, be the key parameter.

A central role in this JAP approach is assigned to the **CLINES support platform** which will drive this process of joined activity planning forward, hereby keeping track of the first three steps described above. Joint teams have to realize/implement the joint activities. Reporting regularly on the progress of the joint actions.

3.2   Initialization of joint activities

Based on the analysis executed during this project each of the regions involved was able to prioritize the joint actions. This paragraph shortly discusses the areas in which joint actions can be initiated between the CLINES regions and describes some highlights of the regional action plans.

Summary

	Regions			
	North Denmark	Bavaria	Basque Country	Flanders
JAP Action 1	√			√
JAP Action 2				
JAP Action 3	√		√	√
JAP Action 4	√	√		√
JAP Action 5		√	√	√
JAP Action 6				
JAP Action 7				
JAP Action 8			√	√
JAP Action 9	√			
JAP Action 10	√	√		
JAP Action 11	√	√		√
JAP Action 12	√		√	
JAP Action 13			√	
JAP Action 14			√	√

3.2.1   Highlights Regional Action Plans

North Denmark
The cluster organisation BrainsBusiness and Aalborg University will in collaboration prioritise the following in the immediate future:

Regional Action: Develop a vision on Smart Cities for North Denmark
BrainsBusiness will through a targeted effort create a strong vision for Smart City in collaboration with Aalborg City and link this vision to specific competences within BrainsBusiness' member companies and research groups at the university. The purpose is to create awareness amongst stakeholders on challenges of modern cities and the added value of smart systems to overcome

those challenges and to utilise this in matchmaking and consortia arrangements for H2020 applications.

Contribute to the particular Joint Actions
Priority will be given by BrainsBusiness and Aalborg University to the following joint actions in a 2-year timeframe:

- JAP Action 3: Establish a permanent Smart City roundtable
- JAP Action 4: Communicate ESSC vision through show cases and convincing stories
- JAP Action 9: Liaise between business and research groups
- JAP Action 10: Understand users and value-creating cases
- JAP Action 11: Build knowledge of business models
- JAP Action 12: Identify key industrial partners and SMEs

Bavaria

List of priority actions that will be pursued locally:

- Foster the local ecosystem by having regular events, connecting to new companies.
  Establish a contact group for municipalities.
  Financing via: Cluster base funding, regional government funding, EU projects
- Consult municipalities about Smart City use cases that are of interest for them in the next 3 years.
  Financing via: Cluster base funding, EU projects
- Work with forerunner municipalities to implement showcase Smart City applications.
  Financing via: Cluster base funding, regional funding, city support
- Survey in-depth the Smart City capabilities of Bavarian (ICT-) companies.
  Financing via: Cluster base funding, cluster project funding, EU projects
- Create a local value-chain mapping for Smart Cities.
  Financing via: Cluster base funding, cluster project funding, national projects
- Produce and promote a vision document that explains the promise (and technical hurdles) of Smart Cities to political decision makers and the general public.
  Financing via: EU project funding, national funding
- Establish contacts to non-IT solution providers for Smart Cities.
  Financing via: EU projects, company-contribution to CLINES consortium.
- Pick up promising technologies at research institutions and companies.
  Financing via: Cluster base funding, project dissemination funds, company fees
- Gather a group of SMEs that are interested in "going international". Take them on board for the "SmartCityTech" international outreach project.
  Financing via: Local trade promotion funds

List of priority actions that will be pursued in strong collaboration with the international partners:

- JAP Action 4: Communicate ESSC vision through show cases and convincing stories
  Financing via: Marketing funds of companies & research institutions, Cluster base funding
- JAP Action 5: Create joint events and specific actions
  Financing via: Regional and national export promotion funds
- JAP Action 10: Understand users and value-creating cases
  Financing via: national projects
- JAP Action 11: Build knowledge of business models

Financing via: national projects, EU projects, company contracts

Basque Country

Aims:

- Presentation of the Experiences of Businesses and Participating entities.
- Analysis of possible Subject Areas to cover.
- Collaborative assignment of priority for Opportunity Spaces.
- Assignment of Coordinators/Leaders for Priority Areas to be worked on.

Core Public Politics Strategies:

- Impulse the Smart Specialisation strategy via science, technology, and innovation in order to respond to the social challenges of the Basque Country.
- Strengthen industrial leadership through public/private cooperation.
- Increase the excellence of the Science, Technology, and Innovation System.
- Guarantee the development of human capital in science, technology, and innovation.

Transversal Themes:

- Opening up and internationalisation of the Science, Technology, and Innovation System, especially in Smart City-software embedded.
- An innovative, connected system with European and others region.

Actions

- The Smart Connect alliance is forming within the scope of Smart Cities (JAP Action 3)
- National Smart City Solutions Catalogue (JAP Action 12)
- Hold a webinar with the collaborative agreement between GAIA and the RELAIS
- International NETWORK (JAP Action 13)
- Institutional and Business Commercial Mission (JAP Action 5)
- Workshop on Smart City Innovation (JAP Action 8)
- Analyse possible calls for projects.

List of priority actions that will be pursued in strong collaboration with the international partners:

- JAP Action 3: Establish a permanent Smart City roundtable
  Meetings with key stakeholders will be organized
- JAP Action 5: Create joint events and specific actions
  Financing via: Regional and national export promotion funds
- JAP Action 8: Facilitate innovation workshops and demonstrators
  Based on the innovation approach defined during the CLINES project several innovation workshops will be organized to mobilize stakeholders and to initiate ESSC projects.
- JAP Action 12: Identify key industrial partners and SMEs: e.g. Cluster on Smart Energy, Cluster on Machine and tools etc.
- JAP Action 13: Reach for international collaboration: e.g. hold a webinar with the collaborative agreement between GAIA and the RELAIS and established international network

Flanders

Mission:
Set up joint activities with global partners to drive economic development in the area of smart systems for Smart Cities.

Objectives:
- Improve ESSC smart specialization: develop and maintain an ESSC manifesto to align Flemish stakeholders
- Build a vibrant ESSC Eco-System: increase the number of stakeholders involved in ESSC activities by 10% each year
- Develop Innovation capability: organize 4 innovation workshops per year
- Create more business: initiate at least 5 projects in the ESSC domain per year
- Mobilize funding sources for ESSC:

Those objectives will be reached through focused activities in line with the JAP action lines.

Action 1: Create a common vision on ESSC
- An ESSC manifesto will be developed to align Smart City stakeholders on ESSC
- The manifesto will be used to promote ESSC vision

Action 3: Establish a permanent Smart City roundtable
- Frequent meetings with key stakeholders will be organized: e.g. V-ICT-OR (the cluster organization of city ICT coordinators), Smart Grids Flanders (Cluster on Smart Energy), academic organization (iMinds, imec, Flanders Make)
- This Smart City roundtable will serve as 'management board' for the ESSC activities in Flanders.

Action 4: Communicate ESSC vision through show cases and convincing stories
- A website will be developed to actively promote ESSC cases.
- A database of ESSC cases will be actively set up and maintained to show impact of ESSC

Action 5: Create Joint events and specific actions
- At least once a year a major ESSC event will be organized.
- Active participation in ESSC related events in Flanders and globally

Action 8: Facilitate innovation workshops and demonstrators

- Based on the innovation approach defined during the CLINES project several innovation workshops will be organized to mobilize stakeholders and to initiate ESSC projects.

Action 11: Build knowledge on business models

- Each of the cases gathered in the case database will serve as inspiration of ESSC value models.
- Those value models will be documented and distributed in case disclosable.

Action 14: Exchange knowledge of public and commercial investment

- For each of the ESSC project developed in Flanders and depending on the business model of the project knowledge on funding sources will be gathered.
- Strong connection with as well public as private funding stakeholders will be set up and maintained.

3.3 Financing the implementation of the CLINES JAP

To fund the CLINES support function the CLINES consortium is actively screening EU funding options with a priority on:

- The Cosme program, specifically the COSME Go international program and the COSME Smart Specialization program
- The H2020 Innosup program, specifically the topic cluster facilitated projects for new industrial value chains
- Interreg Europe aiming at a close cooperation between public authorities and cluster organizations

Regionally, the CLINES partners will focus on 'internationalization' funding allowing to build international partnerships and international collaboration.

CLINES is driven by regional partners. CLINES will create as much synergy as possible with regional initiatives. This allows regional partners to leverage regional funding, in kind contributions between regions. CLINES is working on a 'partnership agreement' which is due by 31/12/2016 and which will further detail this type of funding.

CLINES will offer services to stakeholders (e.g., events, matching events, international activities). To participate in those activities stakeholders will be asked to co-fund those activities.

4   Joint Internationalisation

The Joint Action Plan (JAP) laid down in this document is complemented by the Joint Internationalization Plan (**JIP**). While the JAP focuses on the 4 regions involved in the CLINES consortium, the JIP looks outward the existing consortium to other regions and aims to unlock new, global opportunities in the ESSC domain. By doing so, the CLINES consortium aims at reinforcing ESSC economic development with global activities in close collaboration with international partners.

Joint Action Plan (JAP)   Joint Internationalization Plan (JIP)
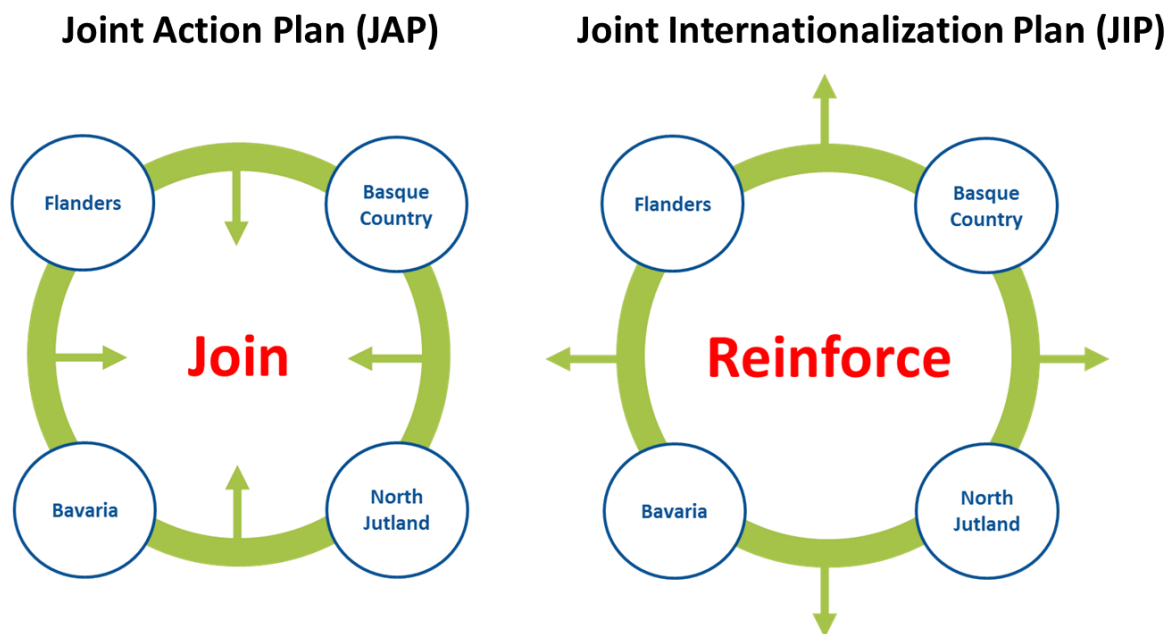
Within the scope of the CLINES activities, internationalization has been defined as the process of increasing involvement of stakeholders from other regions and continents in the CLINES activities. This definition is translated in a straight forward objective for the joint internationalization plan:

To increase the number of stakeholders from other regions and continents involved in CLINES activities.

This internationalization objective supports the realization of the CLINES objective and related goals but puts the CLINES activities in a global context. The combined Joint Action & Internationalization Plan will lead to particular actions taken by CLINES partners and regions to improve the domain of Embedded Systems for Smart Cities **globally**. The Joint Action & Internationalization Plan must drive economic development through both joint actions and **global** actions within Embedded Systems for Smart Cities for the benefit of citizens.

To increase the number of international stakeholders involved in ESSC activities the CLINES consortium has defined five internationalization strategies each of them grouping a number of internationalization actions and related Key Performance Indicators. As the internationalization strategy has as objective to reinforce the Joint Action Plan, those five strategies are related to the

overall CLINES goals and contribute to the realization of the overall CLINES objective. The figure below gives an overview of the five CLINES internationalization strategies and their relationship to the CLINES goals.
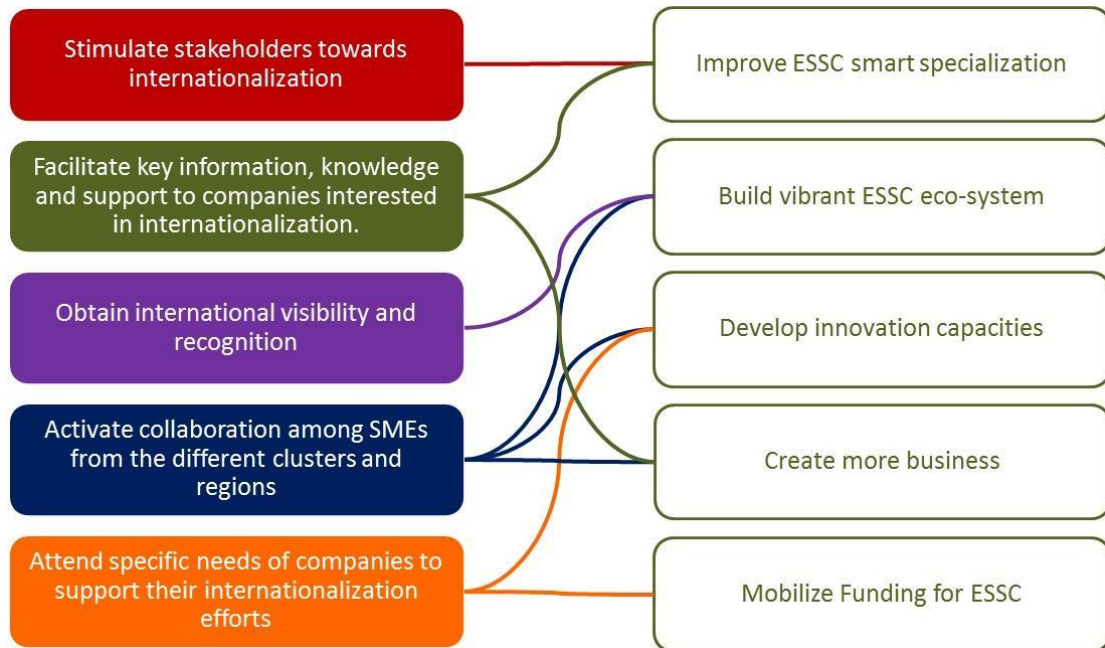

Further details on internationalization can be found in the JIP.

5   Methodical Background

The Joint Action Plan is the central document that lays out how the CLINES consortium will proceed in promoting Smart City development. In its methodical inception, all stakeholders were included. This chapter gives a brief outline of the process, and supporting intermediate documents.

The starting point for the actions required were the goals to be achieved (e.g., "Develop Innovation Capacities"), given by the call, and broken down into five CLINES goals and further sub goals as documented first in Deliverable D4.2 ("Intermediate Joint Action Plan"). Putting ourselves in the shoes of the stakeholders, and seeing the desired sub goals, possible actions to achieve those goals were brainstormed (see figure "Logical Model").
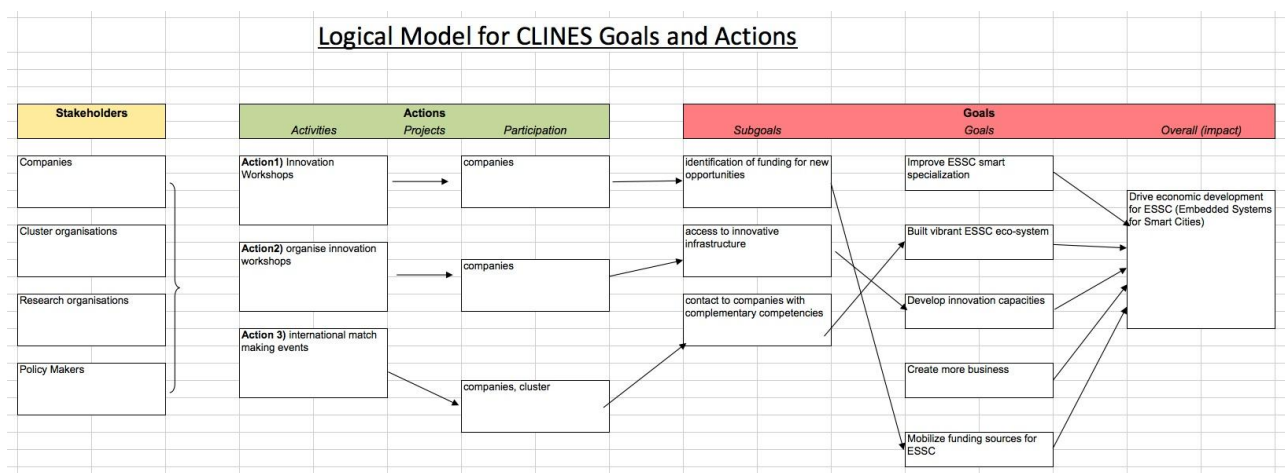
Ideas from the actions came not only top-down from the goals and sub goals, but also bottom-up via feedback from the ecosystems: Via questionnaires and interviews, the partners collected information from their SMEs on their fields of expertise, and more importantly, their business needs and strategies (collected in Deliverable D2.1 "Description of Cluster Competencies"). Those business strategies were then contrasted, among other things, with the local public policies on Smart Cities (see Deliverable D2.5, "Regional Match-Analysis"). All facts collected (including the trend roadmap from Deliverable D2.2, which is a meta-study of Smart City outlook studies) were then brought together in SWOT analyses (Deliverable D2.3) - which pointed out clear areas where action was needed.

The actions collected were presented to and rated by the local interest groups (see also reports in Deliverable D4.1, "Regional Interest Group meeting reports"). The cluster organisations held interviews with specialists to additionally assess the impact of each action (see Deliverable D6.2, "Intermediate Evaluation and Sustainability Report"). Core actions to ensure the liveliness of the Smart City CLINES ecosystem were collected in Deliverable D6.4, "Final Evaluation and Sustainability Report". All this contributed to and culminated in a refined and well-rounded final JAP.

Financing options given in the JAP were first collected in Deliverable D2.4 ("Analysis and catalogue of funding sources"), and then refined on an action-basis in Deliverable D6.4 ("Final Evaluation and Sustainability Report").

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