



Cluj-Napoca Digital Transformation Strategy

2021

Cluj-Napoca Digital Transformation Strategy

Coordinator: **College of Political, Administrative and Communication Sciences**



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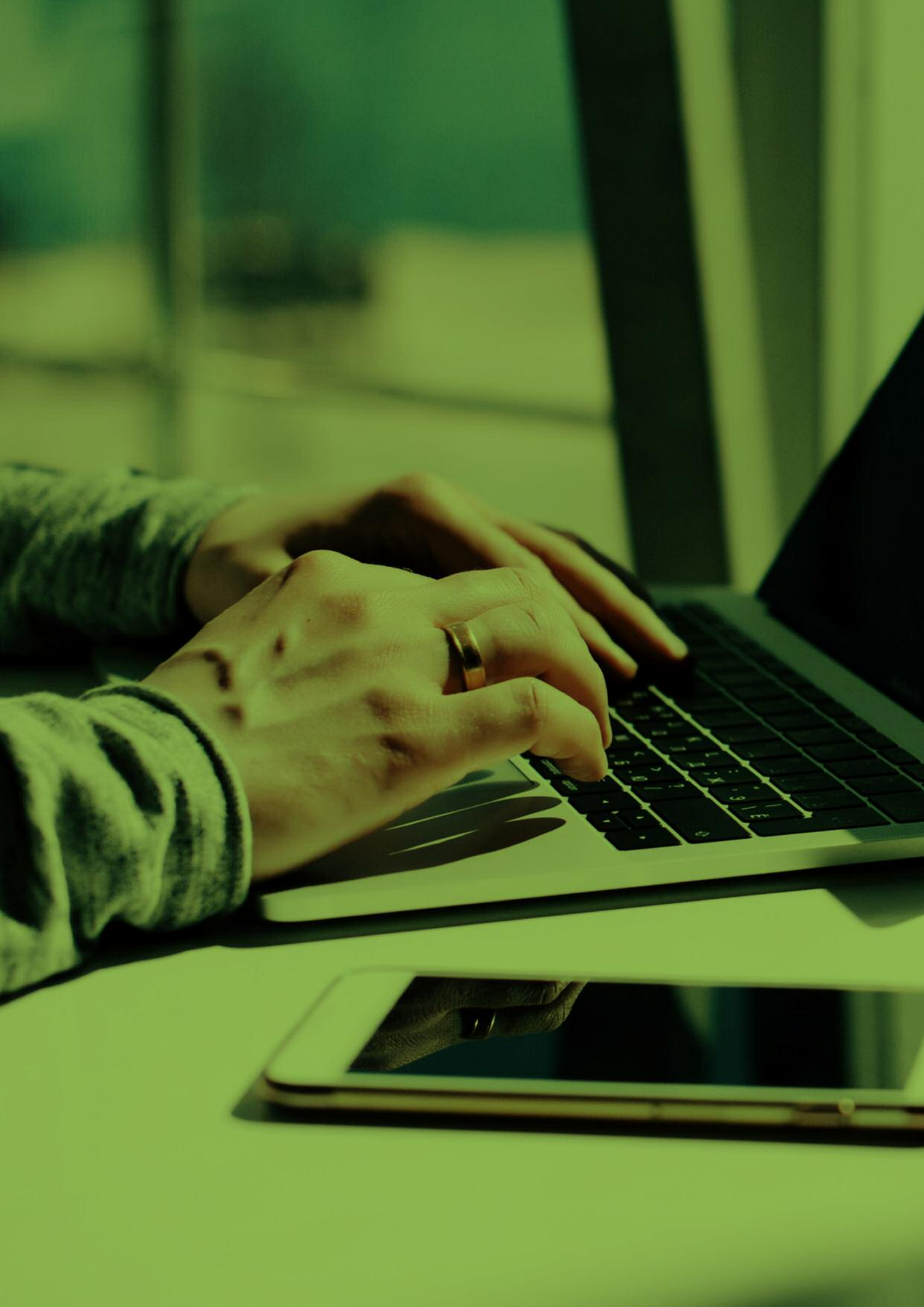
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In the last few years, Cluj-Napoca has undergone a major transformation that has even changed the strategic profile of the city. Some key elements that underline the profound change are the growth in economic importance based on knowledge, the forming of permanent partnerships within the community, the strong confirmation of the university character of the city, and the attention given to the overall quality of life. The city must integrate digital transformation in its long-term development. This challenge needs to be approached proactively, in a participatory, smart, and flexible way, as we are speaking of a field in which the pace of innovation and change is by definition extremely fast. Hence, only the programmatic and substantial cooperation within the community can bring positive results. The current medical crisis has proven that public institutions that manage to integrate technology into their strategic and operational processes are the ones that have better prospects of adapting to shock, transforming and being resilient. The development of a coherent digital transformation strategy would offer Cluj a major competitive advantage at both national and international levels, and allow it to naturally connect with the key strategic factors influencing the city.

This strategic document is a living one, and will adapt to and grow with the changes brought forth by the new technologies in society.

These changes are inevitable, but it is up to the community in Cluj to choose the way these changes will be integrated into the large-scale plan on the continuous improvement of the quality of life in Cluj-Napoca. In addition, the strategy does not belong to one institution or another, but to the whole community. The involvement of all relevant stakeholders, be they private companies, universities, not for profit institutions, local public institutions or citizens, is expected.

This strategy aims to support the development of the elements that make Cluj-Napoca a city in which citizens enjoy living, an attractive community for visitors from both within the country and from abroad, as well as a desirable destination for businesses and start-ups. The key strategic factors that are at the base of the development of the community – universities, participation, and innovation – are, and will continuously be influenced by digital transformation. Last but not least, this strategy needs to contribute to the establishment of a sustainable and resilient community that can continue to offer the citizens of Cluj-Napoca an ever-growing quality of life, and that can rapidly adapt to future events, even unforeseen ones.

Digital Transformation

Digital transformation can be understood as a continuous process that has flexible objectives, can change, adapt, be modified and eliminated, taking into consideration a multitude of other factors (technological innovation, economic development, changes in strategic priorities, crisis situations).

Within this strategy, citizens are recognised as the central element around which the entire strategy will be built, as both the users of public services and participants interested in the direction of the development of their community. Technology already plays and will continue to play an important, growing, part in the lives of Cluj-Napoca citizens, as it is an essential tool for increasing the quality of life in the city.

Technology can be seen as an instrument associated with the resilience of public institutions, and implicitly, of the whole community. When faced with certain crises (medical, economic, natural disasters) public authorities can use technology to better their capacity to adapt and transform in a way that not only allows them to keep functioning but also to offer quality services adjusted to the new conditions.

The operationalisation of this strategy will be undertaken by multiple departments within public institutions, and public managers, in cooperation with other stakeholders. Access to data will help take the right decisions and generate coherent public policy projects. Moreover, rethinking the internal processes of the City Hall can lead to increased efficiency and efficacy.

In terms of strategy, digital transformation generates a multitude of benefits for the city, public institutions, citizens, as well as other stakeholders. This strategic endeavour contributes to the transition of the city into a digital society and economy, and to the interconnection of relevant actors into an innovative and functional ecosystem. Digitalisation implies new organisational methods, new models and types of institutional processes, new social mechanisms, as well as a new type of value for society. The digital transformation strategy will also harness the regional innovation and digitalisation potential, in accordance with the metropolitan and regional connection strategy that Cluj-Napoca will follow for the next period. Digital transformation will have a transformative effect on society as a whole, contributing to the development of digital abilities, increased inclusivity, and the growth in

quality of life.

At an institutional and organisational level, digital transformation can generate multiple positive outcomes. Aligning institutions and organisations to digital economy principles implies ensuring a framework where data and information represent the resources that are at the core of redefining internal mechanisms, structures and processes. Internal systematisation and standardisation can lead to the automation of some flows and processes, which means a reduction in the quantity of repetitive work, and the better use of the human resource in offering higher quality, more sophisticated services, that require creativity and initiative.

In terms of the local impact institutional digitalisation can have on the community, we can talk about aspects such as: a new approach centred on the needs of citizens and companies, the optimization of all internal and external processes, the digitalisation of public services, the improvement of the services portfolio, the considerable shortening of response time, the automation of repetitive processes, increasing the level of decentralisation, and the quick and easy integration in institutional processes of external actors.

Strategically speaking, institutions that successfully adopt digitalisation become proactive and agile, developing flexible structures, and an open, inclusive, and entrepreneurial organisational culture. Looking at things from an ecosystem perspective, digital transformation creates a context for new approaches and scenarios, in which the collaborative potential, intelligence, information and digital resources generate new types of value for the city, citizens and stakeholders. The new institutional platform type models are focused on citizens, data and a new type of value for both society and the economy. Digital transformation brings the actors of the ecosystem of the city closer and implies a shared vision and common values. In the new digital paradigm, innovative mechanisms can generate value to citizens and institutional partners, answering differently to already existing and to new needs. Digital transformation brings city stakeholders closer and offers the context of open innovation for public products and services. In this new context, the innovative potential of companies and start-ups, that provide digital technologies and innovations, can be valued.



Strategic principles

The digital transformation strategy has as prime objectives the growth of the quality of life for citizens and the prosperity of Cluj community;

The digital transformation strategy is an integral part of the broader vision of the city (based on quality of life, innovation, universities, and participation). From the start, this project is thought of as a part of the strategic development plan of the city and is interconnected with other sectorial documents;

This strategy is an instrument, an enabler, and not a purpose in itself;

The strategy is capable of integrating and synchronising the energy and projects in this area of the community on an intelligent community platform;

The strategy must include an institutional vehicle (a permanent organizational structure)

that can permanently promote it and can ensure its implementation;

The strategy is based on a continuous consultation and communication process with the community;

The strategy will be built on cybernetic security and the protection of citizen's data, so that digitalisation effort is not affected by security incidents and violations of citizens' rights relating to the protection of personal data;

The strategy will undergo a permanent actualisation, through a functional and coherent mechanism;

The strategy will lead to the development of institutional capacities and capabilities, including resilience in adaptive and transformative capacity, based on innovation and digital technologies.

The digital transformation strategy needs to be **realistic**, **flexible**, and permanently open to necessary changes given the rapid evolution of the strategic environment.

It is essential that the strategy facilitate an **integrated approach** to the digital transformation in the Cluj-Napoca community, in a manner which supports the prime strategic objectives and direction, in a synergistic relationship with the other strategic and programmatic documents. The strategic digital transformation effort needs to be permanently connected to the **key strategic factors** of the city:

Digital innovation in key areas such as ICC (Innovative, Creative, Competitive) knowledge-based economy (KBE), Local Public Administration, Public Health, Entrepreneurship, Environment, Culture and Creative Industries, Mobility

Universities as research and development (R&D) and technological transfer hubs, providers of the specialised human resource, and educational services dedicated to bettering digital competences, analysis, synthesis and strategy formulation capabilities, and entrepreneurship stimulants of groups within the community. Universities are a central element in public health and community resilience, with significant contributions to projects in the mobility and environment protection domains, as well as others.

Participation – The digital transformation strategy needs to facilitate integrated and organic participation of actors (citizens, the local public administration, the business environment, universities, civil society) when it comes to both the improvement of the quality of public and private services, as well as the furtherance of transparency enhancement and democratisation of local governance. Another objective is the formation of an innovative ecosystem based around the local administration by involving the most relevant players and building an intelligent community platform. Digital Innovation Hubs, whose activity domain and projects pertain to Cluj-Napoca, will be essential for this process.

Strategic priorities

Being citizen-centric – the needs of the citizens, not the needs of the institution, are taken as the starting point;

The creation of a favourable economic environment for private companies and support for start-up development;

Stimulating the medium and long-term development of a regulation framework (this can include Local Council Charters, national laws, Government Decrees, Ministry Decrees, etc.) that can create the legal context necessary for digital development (Cluj Digital Law Package);

Involving the relevant IT&C actors (citizens, companies, local and central authorities, educational institutions, clusters, digital innovation centres, non profits);

Recognising the essential role of education in general, particularly digital education, especially for public servants, but also for citizens;

Prioritising innovation in all fields and forms (technological, social, process-related, etc.) especially innovation that leads to or facilitates the creation of digital services;

Interoperability, service integration, generation and usage of open data sets;

Emphasising cybersecurity and the protection of citizen's personal information;

Improving and optimising communication, information exchange, and inter-departmental, inter-institutional, citizen-institution co-participation;

Connecting makes a difference – from the onset, projects and applications need to be prepared for interconnectivity; technological investments need to offer increased measurement and analysis capabilities; minimising supplier lock-in; technology or infrastructure should be made a priority; access to data generated and stored by applications needs to be unrestricted; an explicit technological transfer process from supplier to beneficiary needs to be included; open code source should be used as much as possible and the source code of applications used by the municipality should be made public for reutilization);

Flexibility and adaptability of the strategy. Technology is a means, subordinated to the needs of the users and to local policies.



National context

Romania is a particular example regarding the development of digital governance. Contrasting many states, for a long period of time, the main impetus for the development of online public services came from local public administration institutions, especially City Halls from cities. This situation was brought on by the lack of prerequisites for supporting a national e-governance system, at a central level, with some of these prerequisites still missing at the moment. These would be, in no particular order, aspects such as a political consensus in terms of the general development direction in this field, national registries that consolidate collected data from all public institutions and offer the same institutions and other actors access based on well-established rules national interoperability framework implemented in public institutions (this was voted on already, but it is not fully operational) and a technical method in which different databases from the public system can be connected, an electronic identity used on a large scale, a central level agency that has the necessary resources (financial, human, authority) as well as the necessary expertise for the coordination of such an effort at the national level.

Analysing all the impediments that emerged relating to the implementation of a coherent Romanian digitalisation

strategy, it is not surprising that a growing number of cities have decided to form their own digitalisation strategies and create their own application ecosystem. Terms such as “smart city” and, more recently, “digitalisation” and “digital transformation” are often used, many times in a hyperbolic manner (intentionally or unintentionally). A number of Romanian cities have fought over the label of “smart city”, or, more specifically, for the title of “first Romanian smart city”, often basing their claims on limited results or incomplete organisational changes. Nevertheless, a series of steps taken towards the digitalisation of public services are visible, especially in large and medium cities (Cluj-Napoca, Alba Iulia, Iași, Oradea, Timișoara, some sectors of Bucharest).

In several cities, the incentive came from private companies that were looking for a local public administration that was open to pilot smart solutions. We are referring to both multinationals and local companies, with projects that touch upon the usual verticals encountered in strategies for developing a smart city (education, governance, innovation, environment, etc.)

Other cities try to develop in this direction through their own resources, or by collaborating with other actors from their own communities, with differing rates of

success. Here we can notice a typical issue where, depending on the way in which we want to approach the problem, we can either look at the glass as half full, or half empty. On the one hand, it is encouraging to see local Romanian public institutions understand the need to use new technologies in order to optimize their internal processes and to offer better quality services to citizens and companies. On the other hand, without a functioning national interoperability framework, common standards, and clear rules on interconnection, the particular solutions of different public institutions (and sometimes different departments within these organisations) have an issue in coordinating with one another. The duplication of data is the norm, and integrating these ‘islands of e-governance’ into a national coherent system will be difficult. In the last year, there have been signs that the digitalisation efforts at a central level have a chance to take a clearer, better emphasised, form. The new Authority for Digitalising Romania - Autoritatea pentru Digitalizarea României – has initiated a series of projects (relating to digital signatures, the interconnectivity of databases or the creation of a unitary national framework for the development of online services).

These signs of digital development at national level are encouraging, but until the central administration will find the resources (financial, human, authority) for a coherent reform programme that will develop the necessary infrastructure for a national e-governance system (here we are not only referring to the physical infrastructure, but also to software, and legislative and regulatory infrastructure), the cities will continue to create and implement digitisation projects tailored to their own priorities and resources, with all the advantages and disadvantages that this direction implies.

The situation in Cluj-Napoca

Cluj-Napoca is a good example of the aforementioned tendency. It is one of the few cities in Romania with a population exceeding 300 000 (and is on a slight increasing track). Cluj-Napoca is a city that has had an accelerated development in the last 15 years. A World Bank study presented Cluj as the most attractive destination in Romania for those who want to change their residence but still stay in the country. Cluj-Napoca is an important centre of the IT industry in Romania (studies show that approximately 1 in 11 employees work in companies related to the IT or communication sector), and the paid wages in this field are well above the national average.

The City Hall realised that it cannot be the sole actor in the effort to digitalise internal processes and services offered. Therefore, it asked for the help of the community. As a result of this approach, the City Hall has often adopted a facilitator role in digitisation projects and has tried to coordinate resources towards different actors, and direct them in a way that helps solve different issues or aids the implementation of some projects. The actors involved are the local administration, citizens, universities, companies (local and multinationals alike), and non profits. While implementing e-governance projects, the City Hall faces some objective obstacles: it cannot pay IT professionals at the market value (especially taking into consideration the other benefits offered by private firms), it cannot benefit from a national coherent infrastructure, while institutional inertia (internal and of other institutions) is hard to overcome. However, the Cluj community expects brave steps from local authorities towards digital transformation. In this context, the City Hall needs to assume the role of coordinator of some

digitalisation projects that will improve citizens' quality of life, but, at the same time, it needs the contribution of community actors.

Universities can provide expertise, as well as capabilities for the collection and analysis of data. The constant influx of educated individuals generated yearly by the 10 universities in Cluj-Napoca is an essential attraction factor for private national and international companies. Students represent at least 20% of the population, and their influence on the entire community and strategic profile of the city is crucial. An emerging desire is increasing the cooperation between universities (there the Education Cluster – C-Edu – or a new educational hub can play an important role), as well as between universities, local administration, the business environment and non profits, especially for the identification of intervention areas in which the academic environment can have relevant contributions. An advantage is that the universities are seen as a neutral actor, which can connect more community actors with different interests, mentalities, and working methods.

Private companies from Cluj-Napoca, especially those in the IT industry, are aware of the fact that maintaining and attracting a well-educated and professionally prepared workforce depends on the constant growth of the quality of life in the city. Therefore, they are progressively more involved in projects where they cooperate with other community actors. Digitalisation is an area in which many of these companies have incontestable competencies; therefore it is not surprising that this is one of their priorities.

It is important to also mention the impor-

tant role clusters play in Cluj-Napoca, especially the two IT clusters, in binding a semi-formal collaboration frame between actors of the community. Many initiatives, especially the ones related to digitalisation and the role of new technologies in the improvement of the quality of life in the city, have been initiated and supported with the necessary resources (financial, human, logistic) by these clusters and the companies that make them up. Moreover, although completely new, the two Digital Innovation Hub initiatives managed to attract projects relevant to the digital transformation process in the region, with funding from European Funding Horizon 2020, and Urban Innovative Action.

Cluj-Napoca is amongst the most socially active communities in Romania, with many nonprofit organisations that are highly involved in the city's development. Additionally, the bonds that Cluj's clusters and non profits built in the past years with other organisations (private and public) allow them to have a substantial influence in the formulation and implementation of the communitarian development direction. Citizens are increasingly invited to contribute to public policy drafting and choosing development priorities. The City Hall faces the issue of convincing citizens their voices will be heard and that they have a say in the development of the city. However, implemented participation instruments (the meetings of the Cluj Civic Imagination and Innovation Centre (CIIC), participatory budgeting, MyCluj, etc.) gradually prove citizens that they can constructively contribute to the improvement of the quality of life in the city.

The creation of a framework, even if it is informal, in which the collaboration between actors was facilitated, has led to

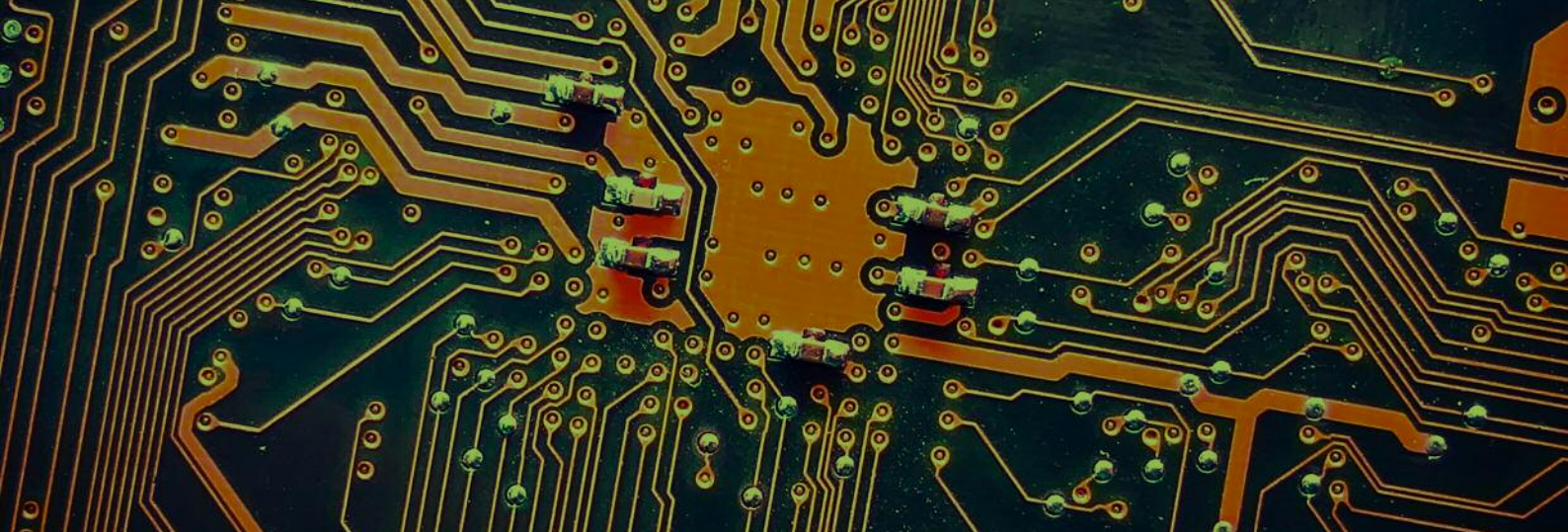
valuable initiatives. The most visible implemented projects are the collaboration between the City Hall and private companies for the update of the City Hall website and the introduction of some improved online services (many of these projects were done pro bono); the Advisory Council on Entrepreneurship and Innovation in IT, which unites City Hall representatives (including the Mayor), IT companies from Cluj-Napoca, and universities, meets regularly and can launch projects for the development of the city (for example the drafting of this current strategy on the digital transformation of the city, coordinated by the College of Political, Administrative, and Communication Sciences - FSPAC). A series of conferences on IT and innovation, in which the interested parties meet and constantly exchange ideas, which lead to the initiation of new common projects, is yet another example of these implemented projects. These collaborations between relevant actors are not always without issues, and some projects are not as successful as expected, however, things are evolving in a positive direction.

The Cluj-Napoca City Hall plays an essential and noticeable role in the digital transformation of the community. Any information that can help paint a better

picture of what the enabling factors are, or what hurdles public institutions face, can be valuable. A FSPAC study tried to find out, from the IT department heads of City Halls in the larger cities of Romania, what obstacles prevent the more profound digitalisation of City Halls. For Cluj-Napoca City Hall, the most important obstacles were the lack of qualified personnel, the difficulty of offering a salary package equivalent to market levels, the organisation and internal procedures unmatched to digitalisation needs, as well as the deficient interinstitutional interoperability. The same study tried to understand what the factors that helped the Cluj-Napoca City hall in this digitalisation process are. The most prominent factors were the collaboration with the providers of digital services and solutions, the support of the leadership, legal obligations, and the rethinking of internal processes. From these answers (and the rest of the study) it can be noticed that, for Cluj-Napoca at least (and other large cities in Romania), the main issues are not related to the lack of financial resources, but to the internal reorganisation capabilities and the lack of human resources (this is not a contradiction, seeing as legally they cannot compete with private firms in attracting IT professionals

due to the wage law and limits imposed by it). This limitation – the unequal ‘fight’ against private companies (which can offer a net superior salary package and benefits) in attracting specialists - appears repeatedly in discussions with public sector IT managers. This becomes apparent in our research and is valid for large cities as well as smaller sized municipalities, where there is a general lack of specialists in these domains. Cluj-Napoca is not exempt from this trend, which is strengthened by the traditional lack of importance given to the digitalisation processes in most of the public institutions (underlined by the small number of IT specialists hired and the relatively low levels of authority held by IT departments within public sector organisations). In the City Hall of Cluj-Napoca, the Computerization Strategies Service has 8 open job positions, being undersized for the current and future requirements. One-off collaborations with companies, universities, and non profits within this domain can only partially fill in this gap of professionals within the institution.

The following years are essential in the continuation of this collaboration between actors in the city and in strengthening the bonds created in the past years. If these partnerships grow and expand, the prospects for the transformation, including digital transformation, of the community, has concrete realisation chances.



Strategic development scenarios

Studies show that there is a series of prerequisites that need to be met in order to transition from a simple computerisation of internal processes within a public institution to digital transformation. In order to define these prerequisites, we need to analyse what the factors that lead to the success of digitalisation champions were. There are various examples we can analyse (either at state level: Singapore, the United Kingdom, Denmark, or at the local level: Barcelona, Lisbon, London, Hamburg, Vienna). For a comparison that is closer to Romania, we can learn the lessons of Estonia, considered by many as the wonder child of electronic governance implementation in Europe.

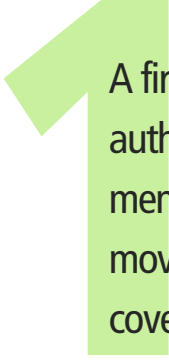
A classic comparison cannot be made between Estonia and Cluj-Napoca (seeing as the levels are clearly different), however valuable lessons can be extracted from the way the electronic governance ecosystem was thought out and built in a Baltic country. Analysis shows that this ecosystem is based on several of pillars, out of which the essential ones are the authentication system (e-ID), the electronic signature, which 94% of Estonian citizens have (as compulsory by law) and a data layer exchange, known as X-road, which is the interconnection intermediary between different public institutions, and facilitates access to uni-

form services (it is a data exchange interface between different platforms and systems from each public or private institution that wants to be a part of the ecosystem). Other important pillars are the central institution that supervises the implementation of all important digitalisation projects (in Estonia, it is the Department of State Information Systems – RISO), with the necessary resources to approve important investments in the area in any public institution, registries or national databases, the standardisation of data collection, and the means of interconnection between different public institutions and databases. Another key factor is a political consensus regarding the general direction that the digitalisation of the public sector needs to follow (so that it is not disproportionately influenced by the alteration of power). This is complemented by coherent long and medium-term digital alphabetisation programmes for functionaries, citizens, and companies alike (the success story of Estonia started longer than 25 years ago, with a program just like this, Tiger Leap, which provided all the country's schools with an internet connection and trained the teachers in using new education technologies). A high level of trust in governors by citizens is a bonus which, at national level, is not very present in

Romania (but it can exist at local level)

Another lesson to be learned from Estonia's experience is that legislation does not have to be very specific (for example, it doesn't need to specify the technologies to be used in various projects) but should provide a regulatory framework that allows for adaptation and the modification of the projects, planned or in the process of implementation, according to the rapid technological changes that we are currently facing. Legislation should also shift the focus from the citizens' obligations to the institutions' obligations (for example, in terms of interconnectivity, the 'once-only' principle, etc.).


Cluj-Napoca, like other Romanian cities that have made significant progress in digitalising local government institutions, is facing a problem that is difficult to solve. As the potential for streamlining internal processes approaches the maximum that can be achieved without an internal reorganization of institutions and the digitalisation of own services (which can be offered to customers - citizens or companies - without interconnection with other public institutions) is also reaching the maximum limit, the City Hall faces a complicated choice: continue its digital transformation alone or wait for the central government.



A first scenario is the one where the local authority chooses to continue its investment into the necessary infrastructure to move to the next digitalisation level, with a coverage area that includes at least the metropolitan area, if not the whole county. Such a project requires targeted action by a much larger number of local public institutions, and, potentially, private actors. Cooperation can be complicated by managerial, legislative, technical, financial and human-resource issues, as well as by the fact that some projects might be impossible to carry

out locally. These projects can be initiated in the hopes that the standards and solutions used in Cluj will then be adopted or potentially integrated into a future coherent national ecosystem. A large-scale takeover is in no way guaranteed, despite all the influence that Cluj-Napoca has in this field (in essence, Cluj-Napoca alone cannot impose its solutions at a national level). Due to this, there is a possibility that a significant part of the investments made may not be used to their full potential.

Another scenario refers to concentrating on the services that the City Hall can offer independent of other local or national public institutions, in order to increase the quality of these services as much as possible, in the hope that the necessary prerequisites for a national e-government ecosystem will be created relatively fast at the central level (this would lead to the possibility of accelerated digitalisation at the local level as well). This strategy has the advantage of

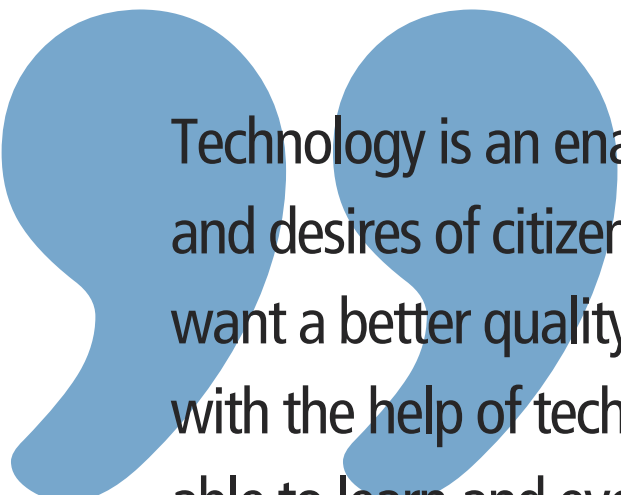


being less risky (essentially anticipating the advancement of digitalization at national level), but it does not help the real progress of the city towards the digital transformation that the most important actors of the community have repeatedly claimed that they want. Additionally, there is currently no guarantee that the central administration has the resources or political will to create these essential pillars.

We recommend adopting a strategy that attempts to implement the first scenario, regardless of all the risks presented above.



Central concept

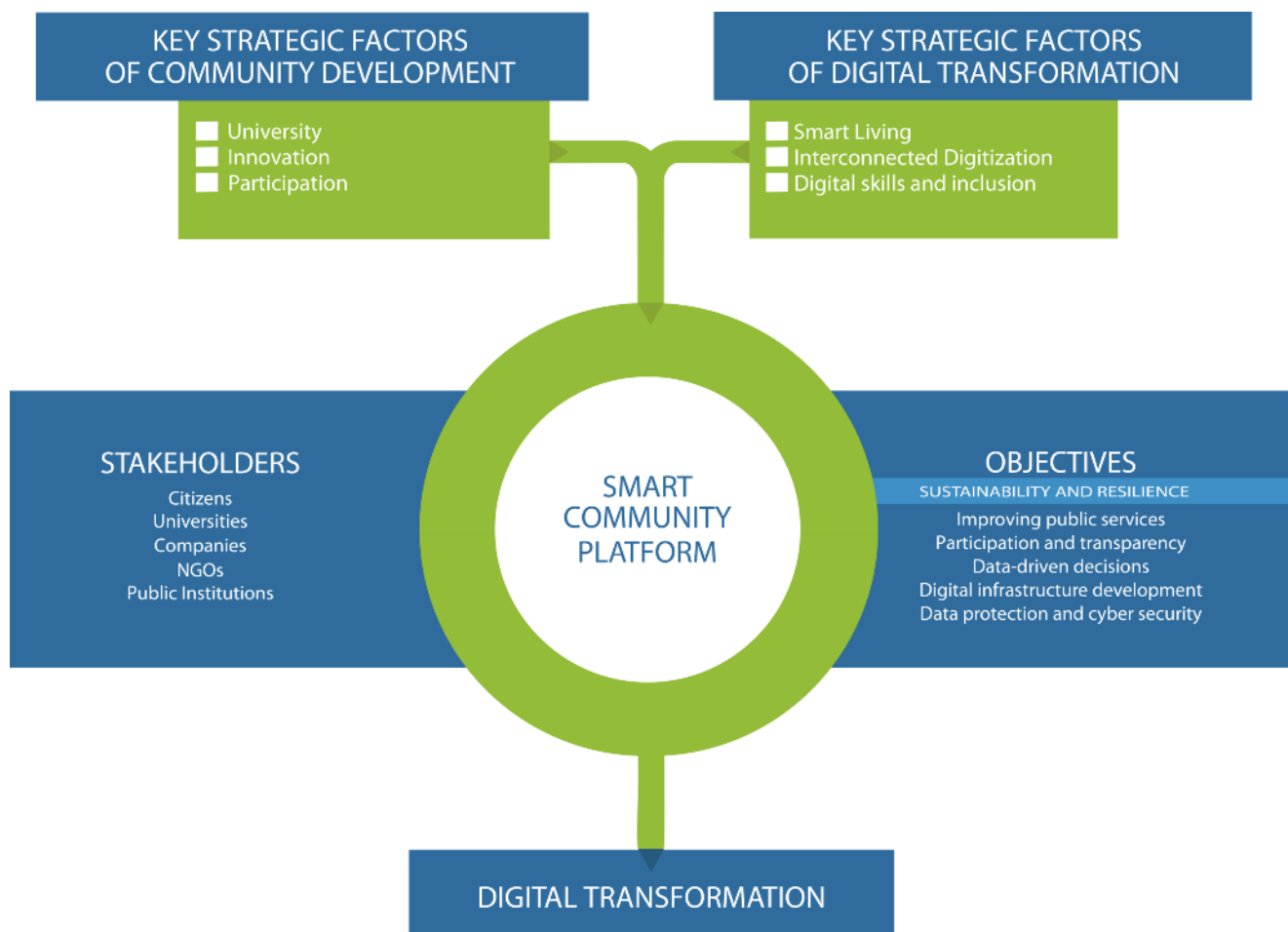


Technology is an enabler for meeting the needs and desires of citizens and the community - people want a better quality of life, which can be achieved with the help of technology. A smart community is able to learn and evolve rapidly, and digital transformation involves major changes not only in the use of technology but also in organizational structures, organizational culture, and community leadership.

Vision

Cluj-Napoca will **organically integrate technology** into the life of the community, in order to sustainably increase the **quality of life** of the people of Cluj-Napoca and the prosperity of the local, metropolitan, and regional community. The digital transformation will use all available resources and will involve, through **permanent partnerships**, citizens, the public sector, academia, private companies, clusters, non-profit organizations, and innovation centres.

For the strategy to be successful, it is essential that the whole process be understood as an intelligent community platform (ICP) that allows the continuous, connected, and active interaction and participation of different stakeholders in the digital transformation process, within the defined strategic framework (vision, objectives, strategic directions).



The success of the digital transformation strategy will not rely on the rigid pursuit of specific projects but on the capacity of the intelligent community platform to build a dynamic that allows the creation, selection, implementation, and strategic integration of digitalisation initiatives from inside or outside the Cluj-Napoca community.

Key Strategic Factors

Smart living – Integrating digital technologies in the community's life

Technology is not a cure-all for the problems of the community, but it can be a multiplier factor that has the potential to crucially help in the development of the essential areas.

The Local Public Administration:

we advocate to increase the degree of digitalisation of local public institutions, their integration into a logical functional scheme, doubled by a coherent flow of data exchange and a real interconnection. The aim is not to digitalise bureaucracy (keeping the same internal processes created before the emergence of new digital systems), but to transform them according to current and future technological possibilities (an example is the automation of repetitive processes with a small number of exceptions). Another objective is the gradual increase of the sophistication of public services offered, by attracting other public institutions into the e-governance ecosystem and by improving administrative procedures for foreign citizens living and working in Cluj-Napoca

UC&L (urbanism, construction, and landscape): the results must lead to reduced costs (both for the provider and especially for the beneficiary), increased accessibility, the elimination of differentiated practices, increased transparency, and the creation of tools for a continuous monitoring of public services within the field. Quality requirements imply the use

of secure processes, the provision of optional alternatives, customer support services, and the identification of responsibilities within the processes. The whole process needs to connect to already existing initiatives (Smart territory) at County Council level (Singular Access Point and Territory Atlas). Digitalisation will focus on 3 main directions:

Consultation and Visualisation (internal and public): Facilitate the understanding of, the process of obtaining information on, and the participation to the state of the development of the city, as a whole and in detail, by everyone. Databases, specific projects and their evolution must be easy to understand, so visual presentation and 'translation' tools are needed for both experts in the field and the interested public. The mapping of all information of public interest, municipal equipment, and access to public services and facilities is a must-have.

Management and implementation (internal): It is important to digitalise the flow of processes related to projects and plans in specific areas that can be accelerated and digitally facilitated. Digitalising the flow of docu-

ments and archiving information is a priority. Another important stage is compiling integrated databases.

Project Planning and Investments (internal and public): The required digital platform basically includes a functional GIS system and a 3D model, which target groups can use to test scenarios and project ideas, design themes, competitions, etc.

Education: The city bases its success largely on the excellence of the education system (at all levels), and digitalization can stimulate this. There is a need to continue investing in digitalization projects to attract the best pupils and students to Cluj-Napoca, streamlining the interaction of pupils and students with local institutions, facilitating the creation of direct links between educational institutions and other actors in the community. Moreover, universities must be given value and supported because they represent a key competitive advantage in the strategic development of the city, and can play a key role in the digital transformation effort.

Digital Public Health (e-Health): Public health issues should play an important role in the plans of public institu-

tions, with an emphasis on increasing the quality of life, making it easier to access health services, and preparing the health system for unforeseen events. Digitalisation will imply three main directions (synchronised with the European Institute of Innovation & Technology – Health priorities):

Digitalisation of personal information related to health status and integration with the digital identity of the inhabitants of Cluj-Napoca, for the promotion and support of healthier lives (management of one's own health)

Digital transformation of health services - the digitalisation and connection of various components of the local health system will imply integrating the workforce into the health domain (electronic support for their daily work and their continuous professional development), as well as positioning the home and workplace as electronic access to health services points.

Digitalisation and management of data relevant to the state of health – environment, urban planning, quality of air and soil, demographics, green spaces.

Local Economy and Entrepreneurship: To a significant extent, Cluj owes its recent accelerated growth to the local business environment (Romanian or foreign companies). The favourable investment environment must be maintained and improved, and the interaction with state institutions simplified and streamlined, so that companies' resources are not wasted. The idea of developing a friendly business environment, and attracting capital or business to the city, is essential here. The start-up ecosystem, support and infrastructure institutions (incubators, accelerators, formal and in-

formal associations) need to be supported, so that successful start-ups that benefited from City Hall support can subsequently contribute to the development of the next generation of entrepreneurs.

Environment: The quality of life is strongly influenced by the quality of air, water, soil, land use, surface, and by the quality of green spaces, waste collection, and recycling. Digitalisation can support the efficiency, interconnection, and systematization of environmental data collection, leading to the local administration setting clear and measurable objectives based on complex analyses that have digitally interconnected data sets at their basis and are relevant to the state of the quality of environmental factors in the municipality. By digitalising the collection and storage of environmental data, the local administration will have available in near real time (NRT) an overview of the quality of environmental factors in the municipality. The digitalisation of environmental information must be backed by transparent communication to citizens and stakeholders, that will lead to a better understanding of local environmental issues by the general public, to a greater receptivity to public local government environmental policies, as well as and a higher quality of life.

Mobility: It is important to bring all mobility data and services under the same umbrella, create online services that can interconnect different forms of travel (public transport, park & ride, bike sharing, car sharing, pedestrian), and prepare for the implementation of autonomous cars infrastructure, with pilot projects, for the establishment of Cluj as the most suitable city in Romania for such investments.

Smart City: The amount of data generated by the growing number of sensors

and measuring devices is growing exponentially. This data should be collected responsibly (in compliance with European privacy standards) and analysed to inform future decisions. Additionally, the Cluj community can use these data sets creatively and intelligently to create innovative products or services.

Creative industries and culture: Art and culture, at the intersection with the various dimensions of digital transformation, have the potential to generate inclusion, social cohesion and well-being, to stimulate civic participation and social creativity, to accelerate the adoption and adaptation of the city to the presence of technology, but also to contribute to the creation of a critical and ethical framework for its use. Efforts to democratize access to technology and education for its use can be significantly facilitated by the activities of cultural operators. The presence of cultural content in the digital environment, but also projects that creatively use the latest technological possibilities, connect the city to the artistic and technological avant-garde of Europe. Urban cultural vitality, a topic in relation to which the city of Cluj-Napoca occupies a leading position at the level of secondary cities in the country, depends on factors such as cultural infrastructure, qualified human resources, cultural participation and cultural industries, which are, in turn, correlated to the level of development and access to digital technologies. The city's creative human resource contributes not only to a diverse cultural offer and an effervescent cultural environment, but also to numerous opportunities for innovation and excellence in research, and the development of IT-based services.

2 Digital skills and digital inclusion

Online services implemented by public institutions or other private or non-governmental organizations often have a small number of users, which deeply affects their positive impact.

One of the main reasons for this is that the average level of digital skills is among the lowest in Europe, and even lower for those in risk groups (based on age, education, social status, ethnicity, disabilities). The digital transformation of a community can-

not succeed without correcting these deficiencies. Moreover, developing the digital skills of the human resource operating within public institutions in Cluj is highly important. The cooperation of all interested operators (public, private, and non-

profit) is essential in this area. Existing resources are significant, but they must be connected in a functional mechanism.





3 Interconnected Digitalisation

Part of the problems encountered by citizens and companies in relation to the public sector, but also by public institutions in their attempts to digitalise, is the lack of interoperability of existing information systems and applications, deficiencies in the connection between used databases, and lack of common standards.

These standards are related to the collection and storage of data, the implementation of the necessary connectors - for example APIs, security and privacy policies, access policies, etc. Without these, the quality and complexity of public services offered

will not be able to pass, with all the good faith of decision-makers, a certain level of sophistication. This problem is becoming increasingly difficult to solve as more and more online applications or services are designed and implemented without a func-

tional interoperability and standardization framework. To prepare for this interconnection, we propose measures to facilitate the connection of all interested organizations, not just those in the public sector.

Strategic objectives

The objectives below are obviously not independent. They are linked to each other and their areas of action intertwine. They can be understood not as pawns, but as knots in a net, knots that are connected to each other. If needed, these can be updated, within the implementation process of this strategy. Additionally, the implementation of these objectives will be accompanied by a series of key performance indicators (KPIs), whose operationalisation will be the duty of the new Innovation Office.

Transversal Strategic Objective: Sustainability and Resilience

From the perspective of this strategy, sustainability and resilience are transversal strategic concerns that should be found within all five strategic objectives but also within the directions of action and operational projects related to the five objectives. Below is a brief description of how sustainability and resilience connect to digital transformation processes at European, national and local levels.

Sustainability and resilience must be seen as major, systemic goals, which are found at all levels in the public policy process and all public policies, including those concerning digital transformation. Therefore, we are talking about a vertical and horizontal integration of the objectives connected to sustainability and resilience in relation to digital transformation.

In terms of vertical integration, at European level, the next decade is associated with the twin objectives of transitioning to a green and digital society and economy. However, this transition involves both opportunities and challenges and there is a need for support (including financial) for reforms from the EU and national governments. National resilience plans, developed in the context of the financial support proposed by the Commission to overcome the effects of the COVID 19 pandemic (NextGenerationEU), include an allocation of at least 20% of funds to digital transition priorities. These priorities need to be defined both in terms of digital infrastructure and digital capabilities. At local level, digital transformation strategies will need to be constantly aligned and updated according to European and national objectives.

At the national level, the Recovery and Resilience Plan refers to the development of major public services in the fields of education and health, in the online environment. Furthermore, infrastructure investments that contain elements of artificial intelligence such as management information systems for transport infrastructure, management systems for specific infrastructure for climate change, and smart grids for the transport or distribution of transition fuel, are also envisaged. These elements can be vertically integrated at local level, by adapting these elements in local public services and / or environmental risk management systems.

When it comes to horizontal integration, resilience and sustainability concerns need to be part of any digital transformation strategy. For the present strategy, all projects proposed under strategic objectives 1-5 must also take into account the impact on the environment (the green pillar of sustainability).

These effects must also be considered from the social perspective of sustainability, so that the digital transformation creates cohesion at the local community level and does not amplify existing imbalances and inequalities (the social pillar or the equity dimension of sustainability). From the perspective of resilience, technology and digital transformation must be seen as factors that increases the capacity of the local community to respond to shocks of various types (environmental, economic, health, etc.) and to recover, including through transformation and adaptation. Hence, as a transversal objective in a local digital transformation strategy, the possibility of modelling some risk scenarios using AI and technology must be analysed, as to have possible solutions or strategies to follow already outlined.

Technology can help us better understand how an ecosystem responds to various crises and shocks and what its ability is to return to the pre-crisis situation and / or to transform.

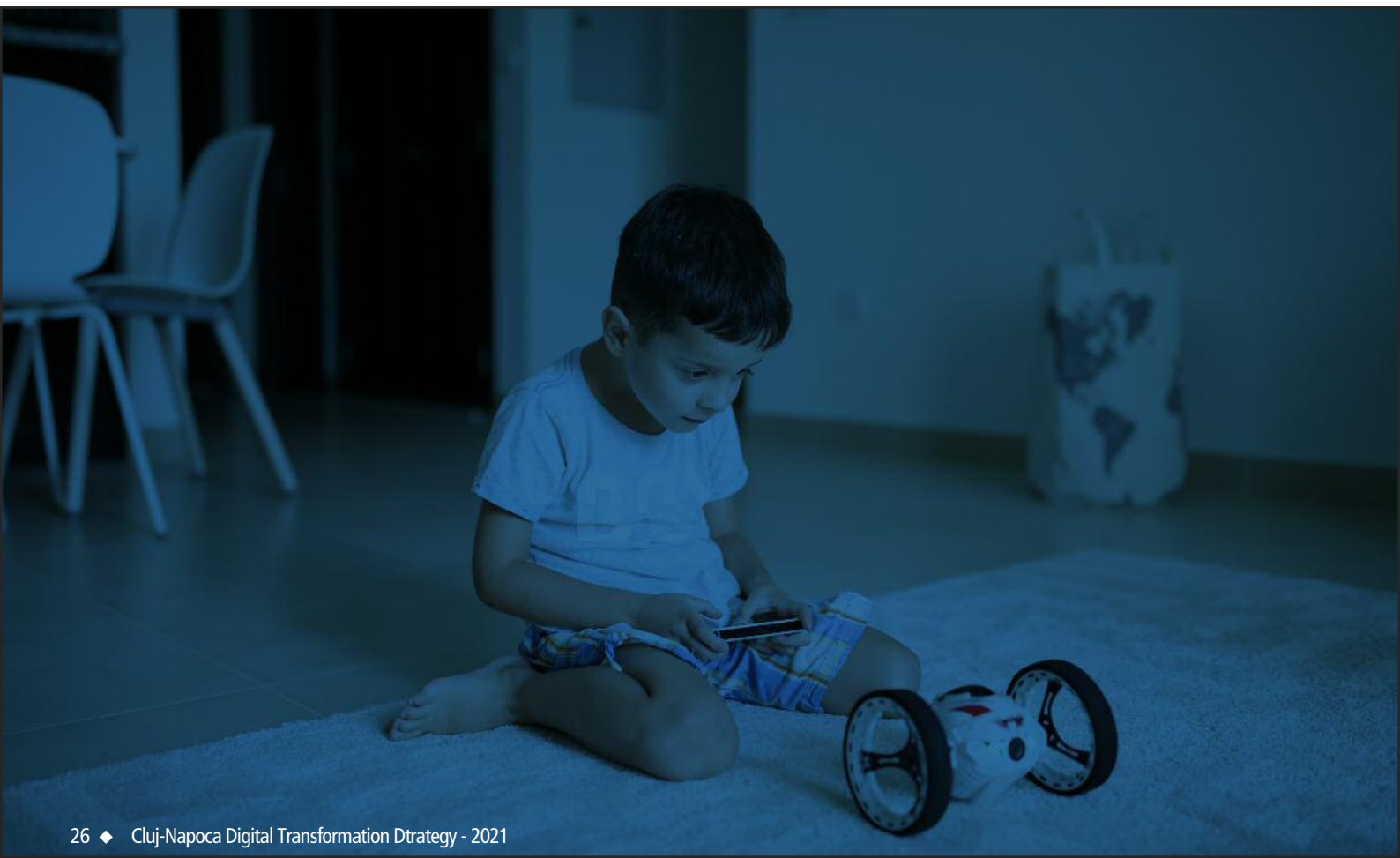
In terms of the strategic direction that is important to follow, relating to these transversal interconnected objectives, we consider the following aspects very significant:

- conducting mini-impact analyses for all projects included in the strategy from the perspective of environmental and social criteria and establishing minimum standards of green performance and equity according to which the performance of proposed projects can be evaluated

- creating a resilience index of public institutions based on data collected systematically by SMART sensors; the periodical

dissemination of performance results of public institutions in terms of resilience

- connecting concepts and strategies in the field of sustainable development (for example the circular economy, zero carbon footprint) alongside improving public services through digital transformation processes; using technology to maximize the environmental and social components of sustainability



1 Improving public services

Starting from the evaluation of the current state and, after an audit, of the existing services and their degree of digitalisation, we want the gradual online transfer of the most used services (step 1), and their interconnection in a functional logic - for example that of life events: all services provided by public institutions for a given event to be available centrally and be able to exchange data (step 2). Additionally, there is a need to in-

terconnect databases and applications used within public institutions (ideally through a common framework at national level), implement a single sign-on (ideally as part of a national system as well), standardise data collection and ways of exchanging data, open as many sets of data collected or generated by the public sector to the community. Online services for companies need to be improved and streamlined in order to

simplify their interaction with public institutions as much as possible. The services given to the private sector must increase in complexity and number, which may result in an increase in the number of companies created or attracted to the community.

Developing the digital infrastructure

The increasing amounts of data, which will be collected and transmitted by the growing number of sensors, will have to be collected and analysed. Decisions regarding infrastructure (cloud or municipal data centre, wired or wireless – and what type of wireless, what IoT sensors, etc.) are important and should be established from the beginning of the project, as part of a master plan on the digital infrastructure of the city, which needs to offer the possibility of

ulterior adaptation to future technological developments. The City Hall must also support the development in the community of the physical infrastructure that supports digital innovation (incubators, co-working spaces, maker spaces, etc.). Establishing interconnection standards for the future urban data platform will facilitate the creation of a network that will include public and private organizations, through which companies and citizens are offered complex

digital services. An adequate budget should be set aside for the regular updating of IT equipment in public institutions, in order to keep up with technological development. The pilot projects will be able to test, in addition to digital software solutions and services, new equipment (for example various sensors) which, if they prove suitable, could be introduced on a larger scale.

3 Data-driven decision-making

There is an increasing need for the systematization of data collection and analysis, as well as a need to set up a department within the City Hall to specialize in data analysis. The creation of a data warehouse where data can be collected from, periodical reports based on interconnected data, a digital dashboard for the mayor and City Hall managers, and the establishment of tools to periodi-

cally collect sociological data from the city, are imperative. Gradually, both what data is collected and access to it should be extended beyond the public sector. With the help of technology, decisions can be based on concrete, real or modelled data, for example, one of the long-term goals is to create a digital twin of the physical city, which can be used to test ideas and projects before imple-

mentation, to determine much more accurately the possible effects and consequences of projects. A medium-term goal would be the gradual automation of some decisions, which can lead to the optimisation of processes within the institution and to the decrease of the repetitive workload for City Hall officials.

Participation and transparency

The implementation of massive programs to increase the digital skills of citizens, especially for those in risk groups (age, education, ethnicity, social status, people with disabilities) is vital. Such a separate program should have civil servants as beneficiaries so that they can understand the objectives of the strategy, and what the benefits for the institution and

themselves personally are, a project backed by the retraining and training programs for those affected by digitization. It is beneficial to expand and advertise participatory services (My-Cluj, Participatory Budgeting, the tools of the Centre for Innovation and Civic Imagination (CIIC)) and possibly create such new tools, continue to make internal City Hall

processes more transparent and to open existing data sets - within the City Hall, as well as in subordinated institutions, and to support their use by the actors in the community.

Citizen data protection and cybersecurity

The growing volume of data collected by public or private institutions brings with it new security and data management challenges. Citizens' rights relating to their personal information should be recognized and taken into account from the outset of any projects (possibly with the help of relevant international actors).

Moreover, the technical and organizational requirements for the security of information systems must be the basis of each new project developed. It is vital to train all those who have access to the IT systems of public institutions in terms of security risks and strategies to minimize them. Technological tools for systems and

data security need to constantly be updated and improved as the nature of threats evolves.

Strategic action directions

The prioritization of action directions and projects will be done by the new department created for this purpose in the City Hall, the principle being that of **Innovation Office**, used by most cities that stand out through digitalisation and innovation.

Improving public services

- a. an inventory of existing public services and proposals for their simplification or aggregation.
- b. an inventory of online services, their condition and suggestions for improvement for each.
- c. proposals for the digitization of some services and their interconnection in a functional logic, in collaboration with UX / UI specialists.
- d. a single sign-on for citizens in relation to organizations (initially public institutions) and attaching a digital signature to it (first conceptual steps have already been taken in the Digital Citizen infrastructure project, this should be continued).
- e. modelling the internal processes in the mayor's office and proposing simplifications and optimisations.
- f. the creation of a "single-point-of-contact" office for citizens that want to live, event temporarily, in Cluj-Napoca.
- g. proposals for priority programs for areas of major interest:

UC&L (urbanism, construction, and landscape)

- a. Digital model of the city, with various information layers (volumetric model, elements of public facilities - parks, hospitals, functions of university, school and preschool education, health, culture, etc., visualization of data of public interest, zoning and regulations urbanism, public interest queries in the GIS system).

The development of a digital cadastre at the metropolitan level is essential.

- b. Integration of project/building/investment proposals in the digital model, as part of the processes of participation and civil society consultation.

- c. Complete digitization of the submission/issuance of documents by citizens in the urbanistic field.
- d. Digitalisation of the internal processes of progress, approval, archiving and viewing/accessing projects and plans, and issuance of all documents issued by the Urbanism Department in digital format.
- e. Testing scenarios and variants in digital format, through the construction of and access to databases and graphical queries.

Pre-university education

- a. Assessment of digital infrastructure and equipment needs for all schools in the metropolitan area.
- b. Equipping schools with state-of-the-art technology. Cluj schools must train generations of innovators, and they must learn the language of the future as soon as possible.
- c. Supporting the activities of the Education Cluster C-Edu.
- d. Supporting the creation of automated data exchange links between schools, the county inspectorate, public institutions and other stakeholders, based on standardized protocols.
- e. Initiating training programs in the use of new technologies in teaching for teachers, with the support of other stakeholders (for example IT companies).
- f. Supporting community initiatives to discover and reward examples of good practice in this area.

Public health

- a. Initiation of a Public Health Hub, integrating the various relevant actors in the field: local administration, public and private providers of health services, universities, private

companies, start-ups, and non profits.

- b. Organizing regular innovation events and projects (organized by the local administration and academic institutions), followed by the validation and implementation of solutions in real contexts and situations.
- c. Implementing a mechanism for continuous health-related data collection (micro - of the city's inhabitants, and macro - of the physical, social and cultural environment of the city).

Environment

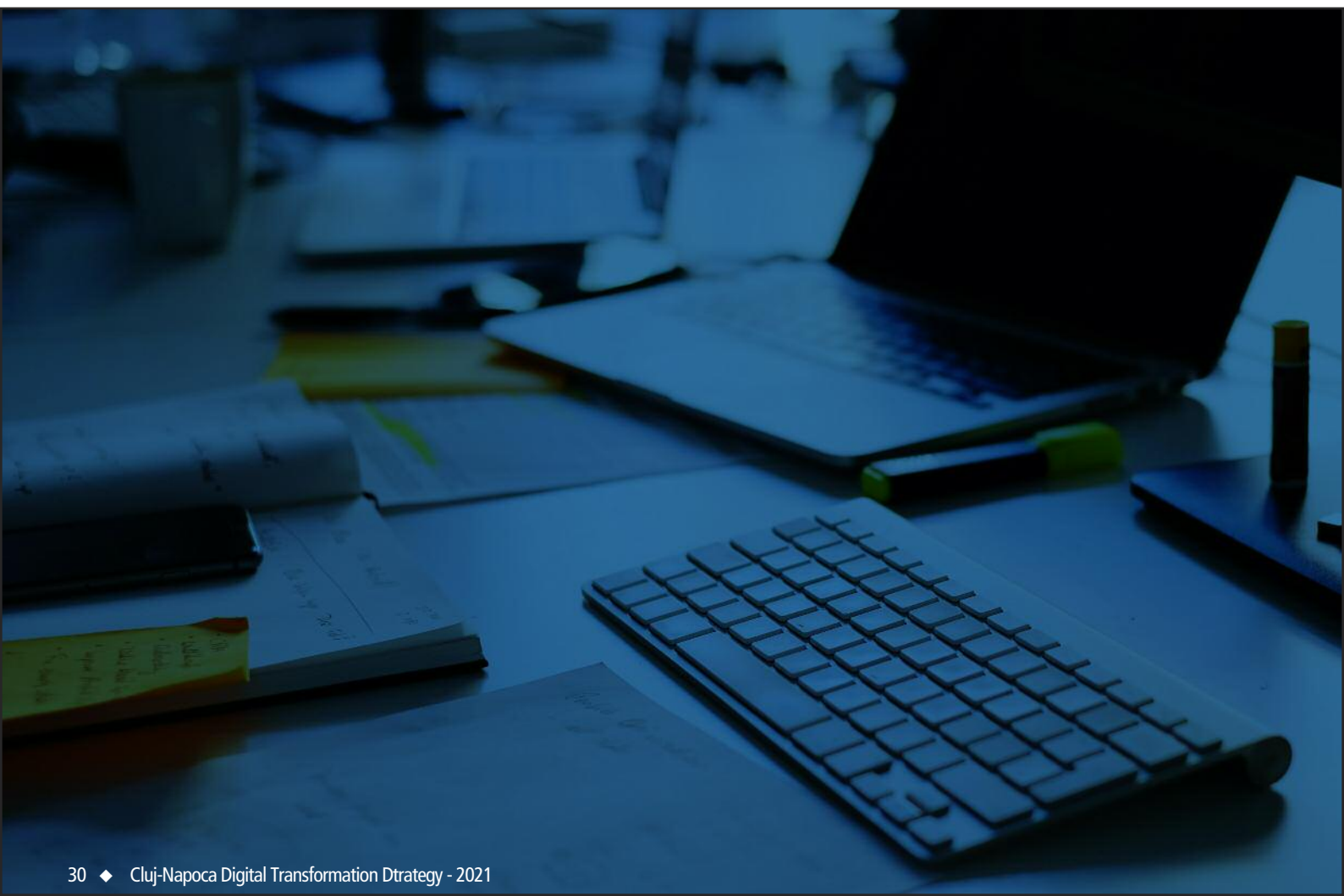
- a. Developing a digitalised and automated data collection circuit from environmental sensors, with a component of real-time wireless communication of this data-to-data storage and analysis centres, the local administration and community.
- b. Developing of a digital environmental atlas for Cluj-Napoca and its Metropolitan Area that includes environmental data (air, water, soil, biotopes, climate, land use, green energy, green spaces, traffic, noise, etc.), metadata and views.
- c. Developing a mobile application regarding the accessibility of blue green areas (green spaces and water bodies).

Local economy and entrepreneurship

- a. Establishing programs to support start-ups in Cluj-Napoca (financing, co-working spaces, incubators, accelerators, etc.).
- b. Establishing programs to attract companies to the city, by offering incentives (fiscal, bureaucratic, etc.).
- c. Supporting existing institutional projects that help develop the business environment in the city.
- d. Supporting the organisation of business events in priority economic areas (evidence-based economy) – after the softening of current social distancing measures

Culture and creative industry

- a. Initiating a project for the digitalisation of cultural heritage, coupled with the development of digital tools for wide and/or personalized access to museums, libraries, archives and cultural institutions, and the development of collaboration, co-creation and streaming platforms to enable the creation and the dissemination of artistic content online.
- b. Developing an integrated digital platform (CulturalInCluj.ro), which will host the cultural agenda, the cultural guide of the city, and a series of services to facilitate wide access to culture.



2 Digital inclusion and competencies

- a. Initiating projects to increase the digital knowledge and skills of officials, including online security risks and key protection measures.
- b. Initiating projects to increase citizens' digital literacy, focusing on people within risk groups (the elderly, children, people with disabilities, people with less education).
- c. Adapting online services to the needs of people with disabilities and creating new services with their needs in mind.
- d. Creating marketing campaigns to advertise both the existing digital inclusion programs and available services.
- e. Developing a functional mechanism to enable the various private and non-profit sector operators to initiate and participate in digital education and inclusion projects.

3 Citizen data protection and cybersecurity

- a. Analysing the data collected from the perspective of GDPR and establishing clear rules for the collection, use, and sharing of such data, complying with European data protection standards, and educating officials and the public about these rules.
- b. Applying a security risk assessment matrix and a minimization plan for each digitalisation initiative.
- c. Conducting a security audit of the current digital systems and services of the City Hall.
- d. Training employees on security risks and strategies to minimize them.
- e. Initiating collaborations with Cluj companies with competencies in the area of cyber security for joint projects and increas-

ing the level of security for all relevant actors in the community.

- f. Enrolling the City Hall in relevant international initiatives in the field of personal data protection, for experience and know-how.

4 Universities, innovation, and cooperation

- a. Supporting cooperation between universities, the business environment and local public administration.
- b. Supporting universities in developing their research and development, and technology transfer capacities.
- c. Stimulating local entrepreneurship through universities, by also creating or supporting the necessary infrastructure.
- d. Supporting the ability of universities to attract international students as an essential part of the city's international connection.
- e. Developing smart specialization mechanisms to identify and develop competitive advantages with innovative impact (such as the InfoBioNano4Health project).
- f. Constructing a permanent working group in the field of digitalization of Cluj universities to permanently provide ideas on the integration of university action in this area.

5 Interconnectivity and data-driven decision-making

- a. Creating an inventory of existing databases and their interconnection (standardization, simplification, elimination of duplication).
- b. Implementing standards for the acquisition of software to ensure the possibility of interconnection and exchange of data with the existing application ecosystem.
- c. Establishing the way of storing data (cloud, data-center) and creating or adapting internal analysis and visualization tools.
- d. Establishing a data analysis department and training City Hall officials in the use of these new tools.
- e. Consolidating and standardising (taxonomy, nomenclatures, storage, analysis) of the data collected by the City Hall departments or by the subordinated institutions
- f. establishing clear and transparent key performance indicators for City Hall officials and their automatic monitoring (management dashboards, for example).
- g. Periodically collecting as rich a set of sociological data as possible from the community (in collaboration with other interested actors).
- h. development of public APIs that allow third parties to build applications that access and consume open data of public institutions.

6 Developing the municipal digital infrastructure

- a. Designing the master plan for the city's digital infrastructure, accompanied by a cybersecurity plan.
- b. Creating the institutional framework (through the new Innovation Office) through which pilot projects using the latest technologies can be tested.
- c. Creating innovation infrastructure - makerspace, lab makers where local entrepreneurs are encouraged to collaborate/innovate, an incubator managed by the City Hall, digital innovation centres in collaboration with other local stakeholders, etc.

- d. Evaluating and improving the internal IT&C infrastructure in public institutions where appropriate.
- e. Establishing IoT interconnection protocols (possibly in collaboration with ANCOM).

7 Participacion and transparency

- a. Developing existing participation services (MyCluj, Participatory Budgeting, CIIC).
- b. Operationalising the open data platform of the City Hall (including the rules for standardizing existing and future data sets), with the stated objective of including (standardized) data sets from other organizations (public or private).
- c. expanding and deepening the visibility of internal processes in the institution (improved and expanded online registry, for example).
- d. Formulating an "Open data local law", a Local Council Charter that would drive the opening of existing data sets to the community.
- e. Operationalising a City Dashboard solution, either an already existing commercial variant (for example CityDash), or one created especially for Cluj-Napoca.

8 Interconnected mobility

- a. Interconnecting different existing mobility services (bike-sharing, public transport, park & ride, car sharing).
- b. Piloting projects related to interconnected and autonomous mobility.
- c. creating solutions that allow for the more efficient use of existing infrastructure and their promotion (car sharing, residential parking, etc.) and expanding projects that reduce rush hour traffic (school buses, for example).
- d. Constantly analysing and adapting the network of public transport lines to the realities on the ground (emergence of new residential complexes, for example).



Implementation and project types

Understanding the implementation and operationalisation of the strategy needs to be done in a context specific to digital transformation, which places the strategy in a long-term development frame, and concentrated on the construction of a smart community platform capable of permanently uniting the existing community energies.

In order for the strategy to be successful in terms of implementing operational projects there is a need for an institutional vehicle, at City Hall level, coordinated by a Chief Innovation Officer, which disposes of personal human re-

sources, and can unite local stakeholders and representatives on his board. This board will have a tactic and operational role and will permanently coordinate with the Entrepreneurship and Innovation in IT Consultancy Council.

Once the strategic framework is defined, and can offer objectives and a primary strategic direction, operationalisation becomes a key element in the successful implementation of the strategy. In a field as dynamic as digital transformation, it is useless to rigidly establish long-term lists of operational projects. A much more flexible and effective approach is the de-

velopment, within this strategic framework, of continuous construction processes of operational projects that connect with the strategic objectives and priorities of the city.

Projects will be divided in three distinct areas:

1

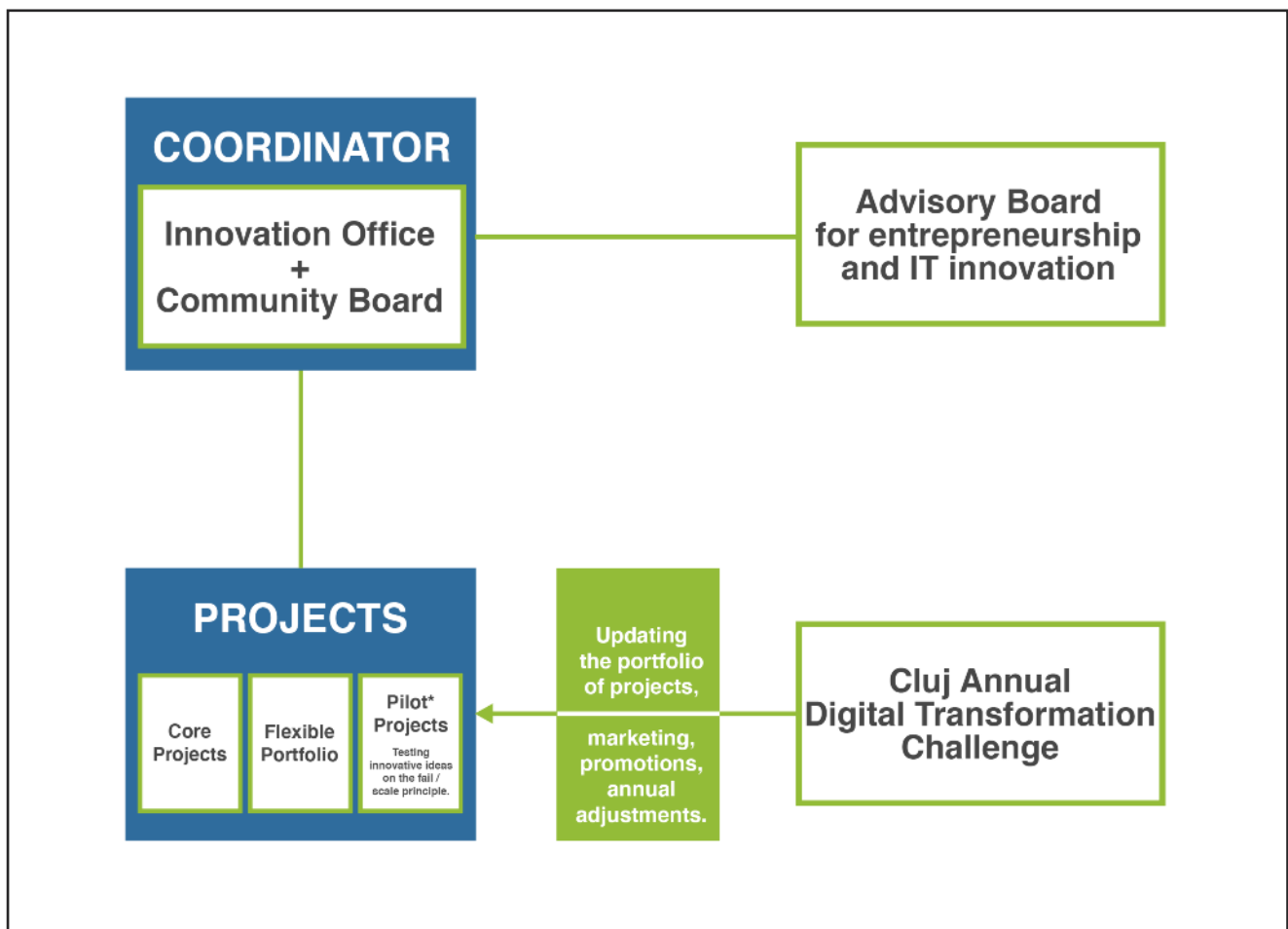
Core projects (capable of widely affecting the community in the medium and long term, in areas such as digital identity, urban data platform, mapping of internal processes, the degree of digitalization, or digital innovation hubs)

2

Operational projects (flexible portfolio) care that appear periodically, are limited to strategic objectives and are permanently connected with technological and environmental developments

3

pilot projects - *proof-of-concept*, in which ideas from the community can be quickly tested, scaled if successful, or abandoned if not appropriate at the time. Supporting the City Hall for the construction of the initial infrastructure is essential.



The permanent connection of the smart community platform with various resource groups in the field of digitalisation, such as local clusters, the educational hub, the interuniversity work-group on digitalisation, the public health hub, business associations, and interested citizens, is essential for operational success.

An important role here will be played by the construction of a Cluj Innovation and Experiment Fund (FIEC,) which can bring together (in addition to the available European or national funds) private resources (banks or other investors) to support the development of projects in the field of digitalisation.

Core projects

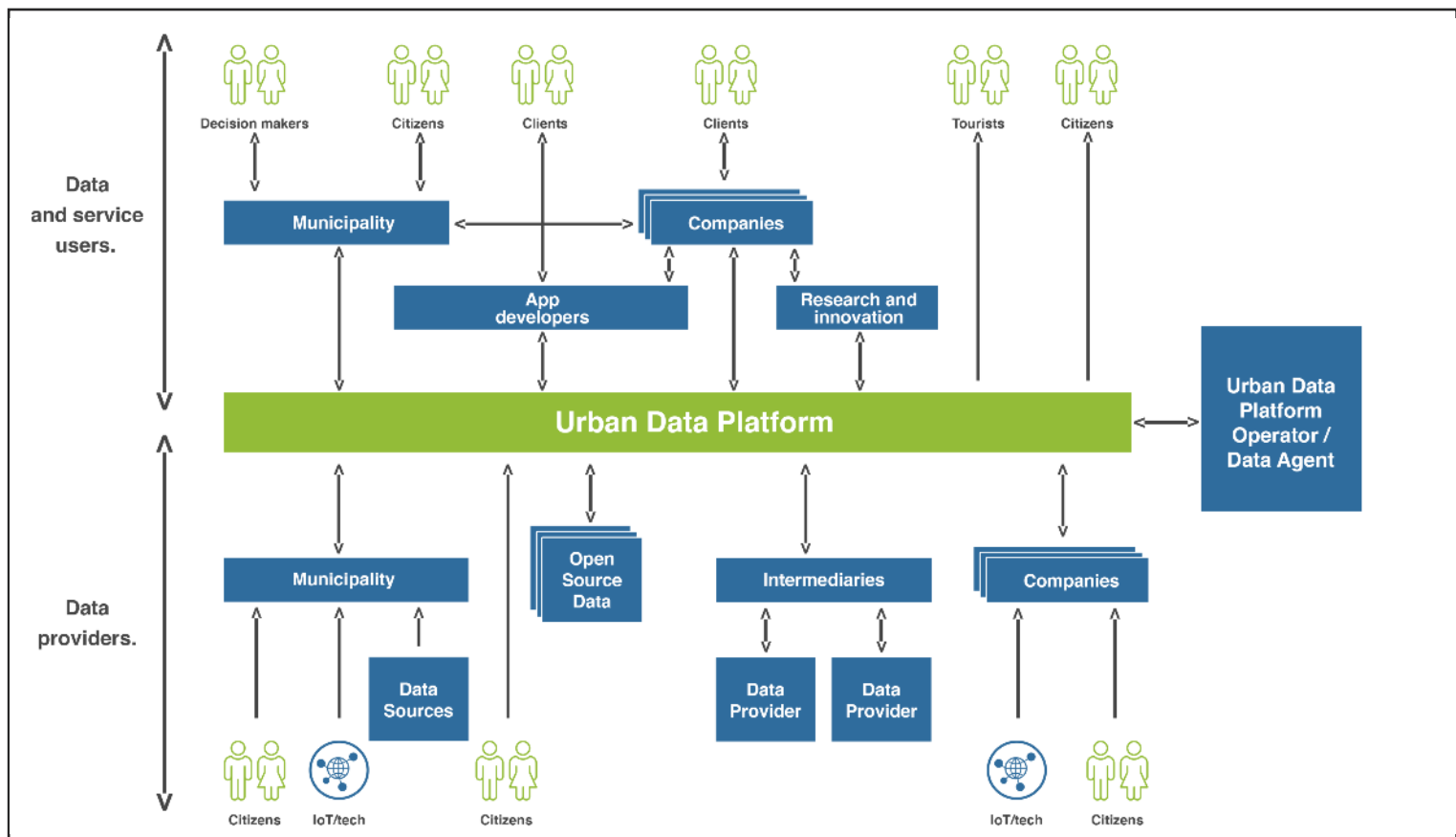
1 Urban Data Platform

The Urban Data Platform (UDP) helps decision-makers at the municipal level have a comprehensive and long-term vision of how data is used in the city, and how innovation and citizen involvement can be encouraged. The value of such a platform comes from the fact that it offers a 'space' for innovation, participation, collaboration and value creation - public

and private.

Such a platform allows data providers to make their data available in a structured and secure way through a common platform (see Figure 1). Data providers can be the municipality with all subordinate services, companies, other public institutions, data providers or other open data sources. The data provided may be struc-

tured or unstructured, from databases operated by each provider, from sensors or IoT-type devices or generated as a result of citizens' interaction with those data providers.



Urban Data Platform (UDP); adaptation of a SAP diagram

The beneficiaries of the data are the citizens of the city, the tourists who visit the city, the decision makers within the municipality, economic agents or institutions involved in research and innovation. The data platform will consolidate the data provided in a data warehouse and will function as a “marketplace” where data users register and subscribe to consult one or more data warehouses, depending on their domain of interest. Access to data will be secured with the guarantee of confidentiality and protection of personal data. At the UDP level there will be an operator who will ensure the maintenance and operation of the entire platform (our recommendation is that this operator be the new **Innovation Office**).

For the data provided by each participant to be useful to the other participants, the quality of the data is essential. Regarding the data provided by the Municipality, at the level of the institution, a strategy for the development of existing IT systems will be formulated, to make it possible to transmit coherent data in the UDP. In this respect, based on the analyses that will be performed, proposals will be made to eliminate data redundancy, common authentication and authorization platforms will be built for all systems, as well as unitary GIS platforms and common nomenclatures for all applications. Additionally, the platforms that will manage the various IoT systems of the municipality must be able to be coordinated and ordered uniformly and have coherent data structures.

Starting from the reference architecture proposed by European Innovation, Partnership on Smart Cities and Communities (EIP-SCC) for urban platforms, we have identified the following capabilities that UDP must have:

Field Devices/Equipment - includes sensors, data capture and recording, event generation, and local or remote accessibility.

Communications, Network, and Transport - network management capabilities element, network element configuration, network security, provision of devices, device connection management, device or event data processing, device or event data storage and distribution, and data transmission security (by encryption).

Device Management and Operational Services - device registration and configuration capabilities, device status monitoring, and alarm and error management.

Data Management - includes capabilities for data discovery, data modelling, data ingestion, data virtualization, data transformation and aggregation, data security and confidentiality management, meta-data management, semi-structured or unstructured data management, master and reference data management, data search, data analysis, data publishing,

and geo-referenced representation of data.

Integration and orchestration - includes capabilities for data exchange, messaging, API management, rules management, event management, transaction management within an organization or between several organizations, orchestration and process monitoring, collaboration, communication and social media, and service customization.

Security and Confidentiality - includes capabilities for security governance, access and rights control, security and privacy risk management, cryptography, and auditing.

Common Services: includes operations centre, service management, and access channel management.

2 Digital identity

One of the biggest problems in the relationship of public sector institutions with citizens, companies or non-profits, is related to authentication. States or communities that provide quality digital services with a high degree of sophistication have solved the problem of identity, in one way or another.

Ideally, digital identity and authentication would be projects at least at national, if not at European, level.

However, moving to a higher level of

public services offered in Cluj-Napoca requires finding a coherent and scalable solution to this problem, which can be divided into several interconnected projects:

- Defining accepted authentication methods;

- Defining the degree of trust required for the various services offered - eIDAS regulation;

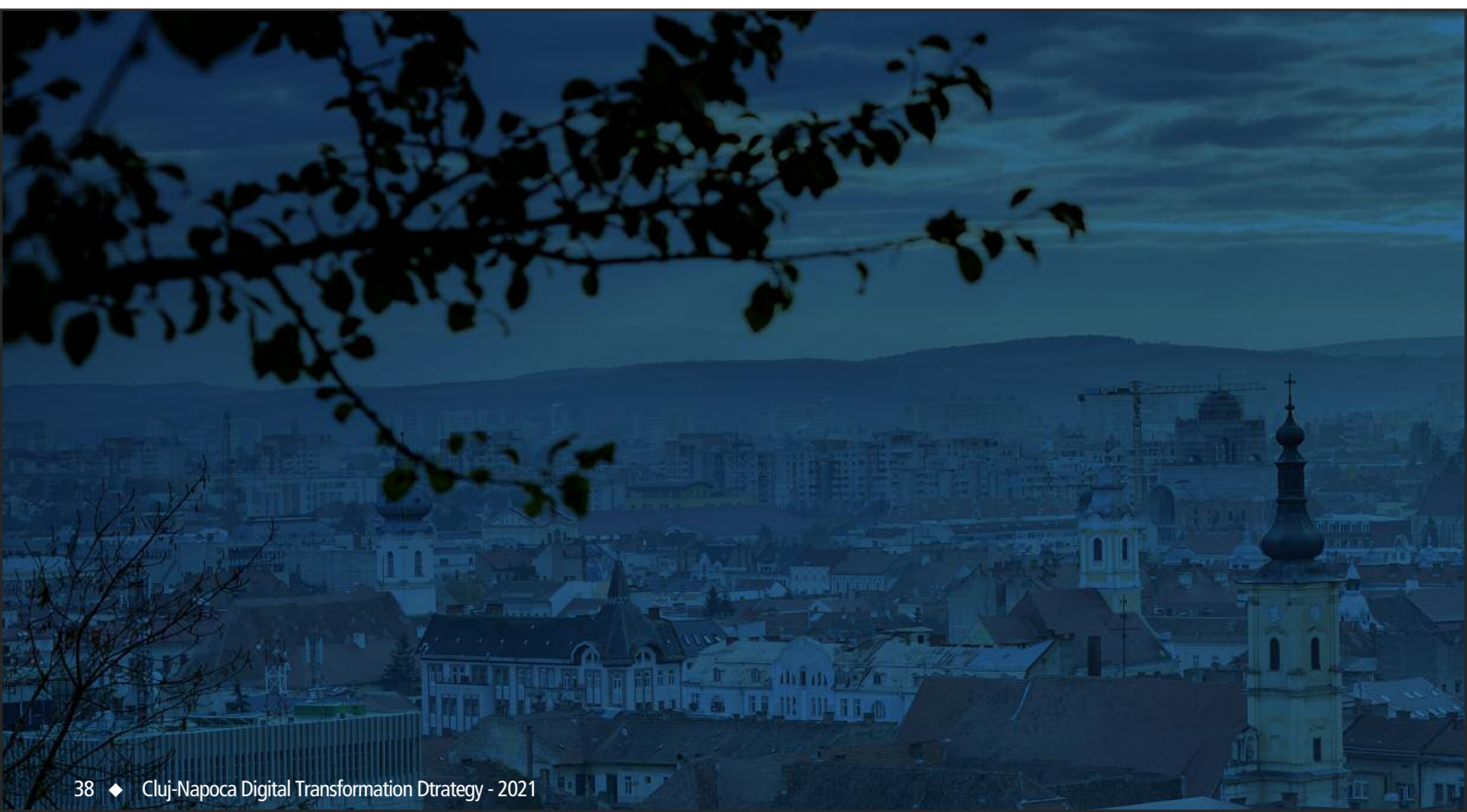
- Implementation of the "Once-Only" principle, ideal in the citizen-centric

option;

- Establishing the way of collecting and storing identity data;

- Establishing access levels and rules on data security and confidentiality, as well as mechanisms for preventing and identifying unauthorized access.

Creating a functional digital identity, even only at the level of the Cluj community, would allow for the development of more complex digital services. This project could be developed in partnership between local public institutions (especially the City Hall) and private companies with experience in this field (such as banks or mobile operators).



Mapping internal processes and their digitization



Understanding the internal workflows of public institutions (and especially those of the City Hall) is essential when thinking about coherent and realistic projects. Also, understanding the current state of digitalisation of processes - both internal (within the organization) and external (services provided to citizens, companies or other entities) - is an essential step in defining the starting point for the digital transformation of public services.

Continuing the idea of evidence-based decision-making, we believe this project should be initiated as soon as possible, because it will build the information base which supports decisions regarding other projects, both core, and flexible portfolio.

In this regard, a number of initiatives can be carried out in parallel to describe how the organization currently operates:

- Creating the comprehensive list of services offered by the Cluj-Napoca City Hall, and the dependencies (legal, process, administrative, etc.) for each of them;

- Establishing the degree of digitalisation of each such service;

- Defining clear rules according to which internal processes would be evaluated to determine the possibility of their automation (manual, laborious, repetitive and rules-based tasks are suitable for their takeover by RPA - Robotic Process Automation);

- Creating an Inventory of databases used within the institution, and in relation to other institutions or organizations, and an inventory of data and metadata collected;

- Establishing 'digital ambassadors' within the city hall departments, to propose and support digital transformation projects.

These projects can be the first steps to a better understanding of how internal processes work. Subsequently, projects will be proposed based on these initiatives (standardization of data collection, automation of processes - possibly with the help of interested IT companies, automatic or semi-automatic analysis of data and their visualization, rethinking of internal processes or flows working to benefit from technological developments, increasing the quantity and quality of open data sets provided by the institution, interconnection with other organizations and institutions, etc.).

4 Supporting digital innovation hubs

Digital Innovation Hubs are new structures that will operate at the regional level and will become collaboration platforms through which partners from the regional, national, and European ecosystem will collaborate on innovation and digital transformation. Digital Innovation Hubs will contribute to the transformation of industries and the public administration by incorporating digital innovations, technical and technological progress, and integrating society through the development of digital skills.

Digital Innovation Hubs in a regional and local context can have four main functions:

- Creating and using an infrastructure through which digital technologies and

innovations can be tested in real contexts.

- Developing an innovation ecosystem and the necessary structures to facilitate interaction, exchange, knowledge and know-how transfer.

- Developing skills and abilities at the level of society, in public institutions and industry.

- Offering support for finance identification.

Digital Innovation Hubs will have multiple roles in the development of Cluj-Napoca. On the one hand, they will capitalize on the potential of IT&C companies and start-ups to offer digitization solutions for industry and public adminis-

tration, and on the other hand, they will contribute to the digitization of areas of regional strategic importance. Public administration will have a particularly important role in Digital Innovation Hubs, as a partner in the Hubs' ecosystem, but also as a beneficiary of the digital tools developed and tested in the DIH infrastructure. Public administration will also benefit from digital skills training programs for employees and citizens in order to adopt the digital tools and innovations on a larger scale, which will contribute to the faster digitalisation of the public administration.

To achieve these objectives, the Digital Innovation Hubs will organize innovation experiments whose results will be technologies and innovations that will be tested and validated by the public administration and beneficiary industries.

Another advantage Digital Innovation Hubs will bring will be the synchronization of the city and region with the European vision for digitalisation, with the most important European strategies, policies and documents, that capitalize on the potential of digitalisation in the economy, society, and public administration.

Flexible project portfolio

For the permanent portfolio of projects that can be proposed by various actors in the community, we propose the periodic organization (every year) of an event (Cluj Annual Digital Transformation Challenge), in which to analyse the evolution of key elements of the strategy and to present, in an open competition, operational projects correlated with the defined strategic objectives.

This will allow, on the one hand, the medium and long-term connection with the existing strategic objectives and, on the other hand, the maintenance of the connection with the evolution of the internal and international digital context. Such an approach will allow a coherent dynamic of the implementation of the digital transformation strategy. The event should last 2-3 days and allow, in

addition to the part related to competition related to projects, a space for communication and connection of all interested parties.

It is essential that this digital transformation platform be an area of innovation and to permanently encourage the testing and incubation of digital transformation projects in the community (the living lab that should be Cluj), to stimulate the

construction of innovative approaches that have the potential for growth and further development.





Pilot projects

The pilot projects will be proposed for implementation in a framework initiated and organized by the Innovation Office. This type of project is important because technology and society are experiencing change at an accelerated pace, and often no longer satisfactorily fit into the processes of public procurement and implementation of classic projects. It is expected that many of these pilot projects will not be fully successful, but by adopt-

ing part of the agile way of working of private companies, especially in the IT field, there is the possibility of finding new and innovative solutions (New Urban Mechanics from Boston can provide ideas on how such projects could be coordinated).

The ideas of these projects will come from within the public institutions or from the actors from the community, with an emphasis on breaking the interdepartmental or inter institutional barriers, on the efficiency of the processes, and the use of the resources.



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