



CITYSPIN

**Cyber-Physical Social Systems for
City-wide Infrastructures**

Deliverable 8.1: Dissemination Plan (V2)

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Executive Summary

This deliverable sums up the dissemination results of the second project year, and identifies concrete dissemination actions for the last project period (half a year).

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1 Introduction

Dissemination is an important part of CitySPIN. It is coordinated as part of WP8 and makes sure that results of all WPs are disseminated to the suitable stakeholders.

This deliverable sums up dissemination actions performed in the second year of the project (Section 2) focusing on diverse stakeholders ranging from research communities, to related projects and company internal dissemination. We also identify concrete dissemination actions for the next year in the project and beyond (Section 3).

2 Project Wide Dissemination in the second Project Year

2.1 Project Website

The project Website (<http://cityspin.net/>) was maintained up-to-date with project results (deliverables, papers) and news.

2.2 Project Post-Card

We prepared a project Post-Card for fast dissemination at various events, such as conferences and fairs. The post-card provides a mechanism to share the essence of the project and allow quick access to further information.



Project Funded by FFG – IKT der Zukunft Programme

Project Number: 861213

Start date: 03.10.2017

Duration: 30 months

Fig 1: CitySPIN Post-Card, Frontal View.

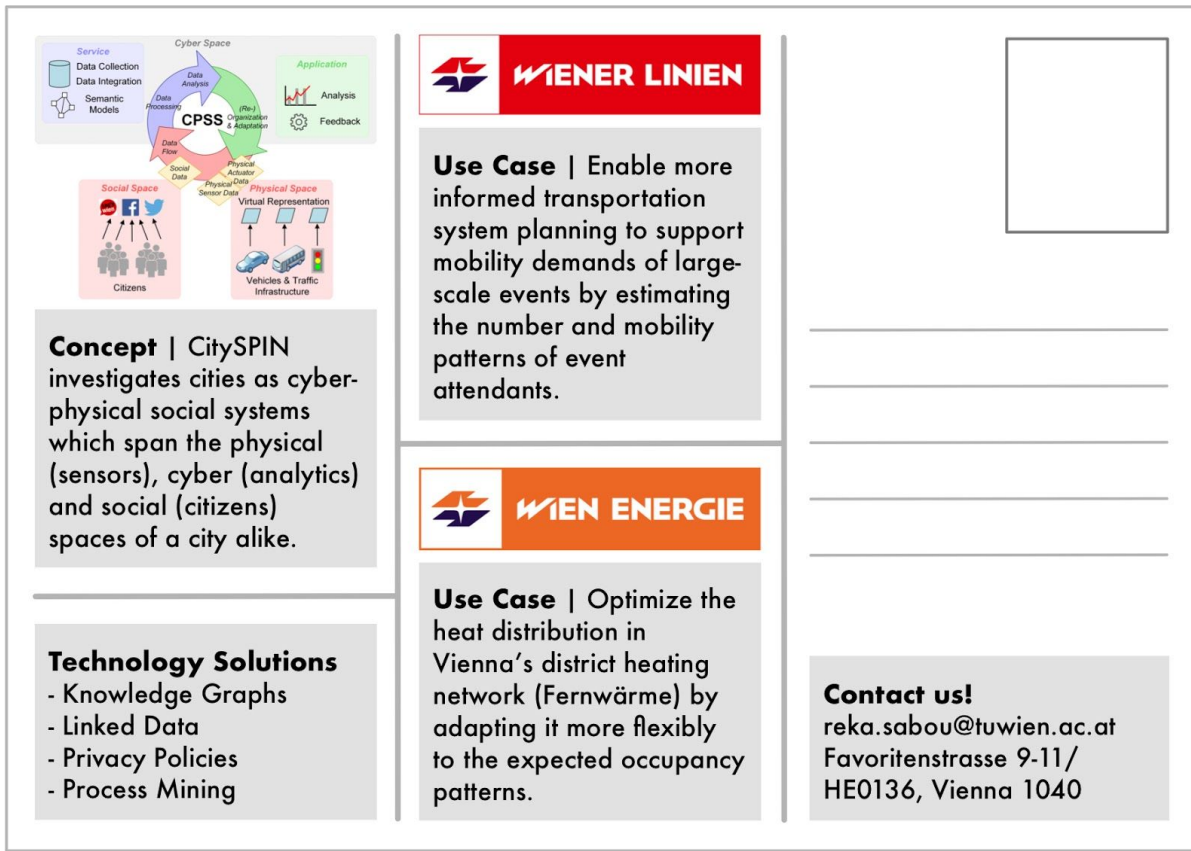


Fig 2: CitySPIN Post-Card, Back View.

2.3 Use Case One-Pager

A one-pager for the mobility use case was created to allow disseminating a detailed description of the use case for the general audience.

CitySPIN Event-Aware Mobility Planning (CaMP)



Events attracting large numbers of participants require changes to the usual mobility planning in terms of adjusting both the number and running interval of the used vehicles. The *CitySPIN Event-Aware Mobility Planner (CaMP)* allows planners at Wiener Linien to estimate mobility demands of such events in order the tailor mobility planning accordingly.

Challenges

Wiener Linien (WL) actively adapts its transportation network to cater for the needs of events attended by large numbers of participants. The type, capacity and frequency of vehicles in service during such events are currently decided by the WL planners based on historic data about the number of attendants to recurring events.

The current approach encounters shortcomings in the following aspects:

- Planning for *new or non-recurring* events is hampered by the lack of historic data about these events. A WL planner would like to have a prediction of attendant numbers also for newly organized events.
- The *journey origin* within the transportation network (e.g., where do most attendants come from?) would help further improve the planning, but is currently not available in historic data.

Criteria for a good solution

1. WL planners must be able to easily access data about attendant numbers and journey origins for large-scale events, even if organized for the first time.
2. The system should allow inspecting mobility needs of concurrent events.
3. It should be easy to alternate between high-level graphical overviews and detailed data inspection.

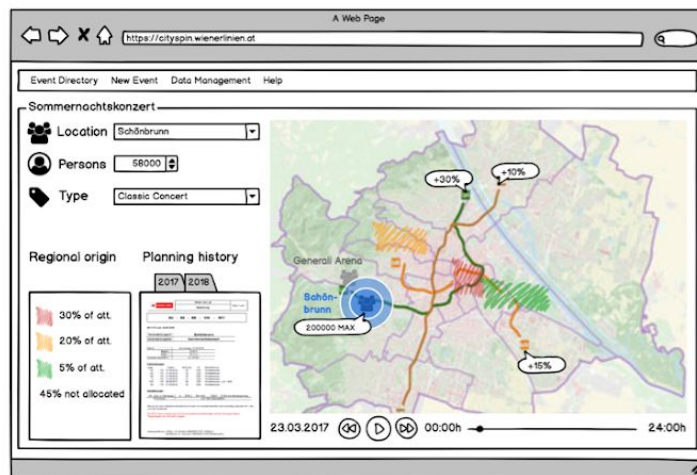
Solution concept

The CitySPIN project addresses this use case with the concept of *Cyber-Physical Social Systems (CPSS)*, where citizens are seen as parts of city-wide infrastructures. Therefore, relevant data is collected from social sensors, or data sources that act as proxies for human behavior (e.g., ticket sales).

The relevant data is collected from a multitude of data sources (e.g., ticket sales, open government data, mobility data) which are semantically integrated and used to fuel an interactive interface. Data is also exchanged with WL projects such as *WOW* or *auto.shuttle*.

Improvements

- Mobility planners can better understand transportation demands during large events.
- Passenger data is also available for new and non-recurring events.
- Better planning is enabled by access to attendant numbers both at the event and major journey origins.



Proof-of-concept

The **CitySPIN Event-Aware Mobility Planner (CaMP) system** enables WL planners to inspect attendance specific information for a large number of events drawn from a variety of data sources. It allows integrated and visual access to attendance data (i) from legacy (historic) sources, (ii) based on predictions according to user behaviour in the days prior to the event and (iii) real-time. Estimated attendant numbers obtained by integrating these data sources are shown both at the event's location and at those points of the transportation networks where most attendants start their journeys.

Technologies

CaMP is based on *Knowledge Graph* and *Linked Data* technologies, which enable flexible and intelligent data integration across diverse data sources. It also investigates Process Mining and Privacy policy verification techniques.

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Fig 3: One Pager for the Wiener Linien Use Case

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2.4 Scientific Dissemination - Publications

In the second year, a number of 6 papers were published by the academic partners involved in the project (TU/WU) based on work performed in CitySPIN, including 2 journal papers, 2 conference papers and 2 poster/workshop papers, as shown in the following table.

Paper Nr.	Reference	Type	Pub. Year	Partner
6	Amr Azzam, Peb Ruswono Aryan, Alessio Cecconi, Claudio Di Ciccio, Fajar J. Ekaputra, Javier Fernández, Sotiris Karampatakis, Elmar Kiesling, Angelika Musil, Marta Sabou, Pujan Shadlau and Thomas Thurner. The CitySPIN Platform: A CPSS Environment for City-Wide Infrastructures - The Story So Far. Cyber-Physical Social Systems Workshop 2019 (Accepted for publication)	Workshop	2019	TU,WU, SWC,W StW
5	M. Sabou, S. Biffel, A. Einfalt, L. Krammer, W. Kastner, F. J. Ekaputra. Semantics for Cyber-Physical Systems: A Cross-Domain Perspective. Semantic Web Journal. Accepted for publication.	Journal	2019	TU
4	Javier D. Fernández, Marta Sabou, Sabrina Kirrane, Elmar Kiesling, Fajar J. Ekaputra, Amr Azzam, Rigo Wenning. User Consent Modeling for Ensuring Transparency and Compliance in Smart Cities. Personal and Ubiquitous Computing Journal (to Appear)	Journal	2019	WU,TU
3	Svitlana Vakulenko, Kate Revoreda, Claudio Di Ciccio, Maarten de Rijke. QRFA: A Data-Driven Model of Information-Seeking Dialogues. In Advances in Information Retrieval – 41st European Conference on IR Research, ECIR, Proceedings (2019): 541-557. <i>Winner of the ECIR 2019 Best User Paper Award</i>	Conf	2019	WU
2	Claudio Di Ciccio, Fajar J. Ekaputra, Alessio Cecconi, Andreas Ekelhart, Elmar Kiesling. Finding Non-compliances with Declarative Process Constraints through Semantic Technologies. In Proceedings of CAiSE Forum 2019.	Conf	2019	WU,TU
1	Javier D. Fernández, Fajar J. Ekaputra, Peb R. Aryan, Elmar Kiesling, Amr Azzam. Privacy-aware Linked Widgets. In Companion Proceedings of the 2019 World Wide Web Conference (WWW'19 Companion). (to appear) [link]	Workshop	2019	WU,TU

2.5 Scientific Dissemination - Teaching

CitySPIN related research was also disseminated among students as part of various teaching activities.

At TU Wien:

- A Bachelor thesis was concluded on a topic relevant to CitySPIN:
 - E. Gruber: “Data Sources In Cyber-Physical-Social Systems: A Case Study For Vienna”, May 2019.
- Started a teaching collaboration on process mining: Dr. Di Ciccio gave a special guest lecture in the course on “Enterprise Modeling”, taught at TU Wien in the winter term 2018.

At WU Vienna:

- Two students are working on a practical application related to the CitySPIN use cases for the course “Data Science Lab” of our SBWL Data Science for Bachelor students.
- One Bachelor thesis on log analysis for GDPR transparency and compliance (related to WP6) is being conducted.
- One Bachelor thesis is currently focused on open data integration and visualization, which can be used as input for our CitySPIN use cases.
- One Master thesis is being focused on the graphical interface for the mining of declarative process constraints (related to WP5).

2.6 Scientific Dissemination - Collaboration with other Researchers and Projects

The CitySPIN consortium also engaged in intense dissemination by collaborating with researchers external to the project as well as national and international projects.

TU Wien performed the following dissemination of this kind:

- As part of WP2 work, our study raised the interest of Prof. Danny Weyns¹, an internationally renowned expert in the software engineering of self-adaptive systems. In order to publish this study in a very high-ranking software engineering journal, he suggested re-running the study and broadening its scope. We followed his recommendation and involved four other experts (including Prof. Weyns) to run the study. None of these experts are paid from CitySPIN funds. During the study over 120 papers were collected and read, and currently the results are being written up.

SWC has customers in both use-case fields: Energy Supply Management and Public Transport. CitySPIN played a substantial role in those customers relations by:

- the reuse of transport ontologies developed in CitySPIN
- the prototypic demonstration of ontology driven data integration for those customers
- the possibilities to show concrete integrations in the sector by the PoCs.

¹ Homepage Danny Weyns: <https://people.cs.kuleuven.be/~danny.weyns/>

WU Vienna

- In the context of the EU H2020 project RISE_BPM², C. Di Ciccio and A. Cecconi have undertaken a research visit of one month at the University of Melbourne. RISE_BPM is a MSCA project aimed at propelling Business Process Management research through staff exchange. During their stay in Melbourne they have set out plans for research collaboration with members of the hosting team of the School of Computing and Information Systems³, and members of the Department of Infrastructure Engineering. The planned research endeavours are centred on the utilisation of declarative process constraints as an information extraction and modelling means for workflows, suitable to manage the flexibility and inner complexity of CPSSs.
- As planned, we are working in close collaboration with the SPECIAL⁴ EU H2020 project. In the context of WP6, we first analyzed and extended the SPECIAL policy language to fit CPSS scenarios and, in particular, our CitySPIN use cases. Thus, this extension would be reflected in future versions of the SPECIAL policy language. In turn, we plan to continue the adaptation of the SPECIAL policy log vocabulary in order to provide further GDPR-based transparency and compliance.
- We presented the CitySPIN project in the Dagstuhl-Seminar on Big Stream Processing Systems⁵ where we established connections with important potential partners in the area. We are currently inspecting the use of existing Big Data frameworks, such as Flink, to support large-scale Linked Data scenarios (related to WP4).
- In order to present the research context of our joint publication with TU Wien (Finding Non-compliances with Declarative Process Constraints through Semantic Technologies), we illustrated the CitySPIN project during the interactive poster session of the 31st Int. Conference on Advanced Information Systems Engineering (3-7 June 2019) held in Rome, Italy.

2.7 Company Specific Dissemination

In the course of the integration of the PoCs, SWC improved the knowledge and praxis of using PoolParty and UnifiedViews. So the implementation drove a cross-department discussion about needed additional features of the software.

WSTW disseminated CitySPIN related information internally to the company as follows:

- As part of the series “Hands on IT” Elmar Kiesling performed a knowledge transfer exercise and talked about Linked Data, Data Science Methods and Knowledge Graphs in front of an audience, consisting of several stakeholders which came from a variety of WSTW-subidiaries.
- WSTW also has an innovation department which hosts a quarterly event called “Innovation Base Meeting”. It’s purpose is to bring together all innovation managers

² <http://www.rise-bpm.eu/>

³ <https://cis.unimelb.edu.au/>

⁴ <https://www.specialprivacy.eu/>

⁵ <https://www.dagstuhl.de/de/programm/kalender/semhp/?semnr=17441>

of WSTW's subsidiaries and report ongoing projects, give insights to new and upcoming topics and present current innovation trends. CitySPIN was part of the Agenda in the last Innovation Base Meeting in September 2018 where we gave an insight to the current activities. CitySPIN-News and Reports will be presented on a regular basis in this recurring meeting. These activities are all still ongoing in 2019.

WSTW identified several topics and internal projects where the dissemination of CitySPIN results should be performed. These include:

- First, there is the data privacy aspect which will be part of the studies and contribute to the GDPR mechanisms currently deployed within the company. There are currently several projects ongoing (Customer 360°, Multi-Channel/Multi-Utility Products, API-Management, etc.) which have many touchpoints with this topic.
- Second, the findings in the studies of Semantic Web technologies and knowledge graphs can have a big benefit in the asset management and asset knowledge in the upcoming IoT-Project which is a WSTW-wide project and will incorporate all our subsidiaries and their future IoT-Assets. This should make our IoT-Infrastructure more manageable and less complex. We had first thoughts and talks on this topic with Elmar Kiesling. The IoT-Project is in the process of go-live as of November 2019. After our first steps we will catch up with this topic in the second half of 2020.
- Third, findings in the field of Linked Data and the IT-infrastructure therefore needed will also deliver applicable knowledge in the Data-Driven Architecture (based on Lambda-Architecture Model) which is also currently being established at our IT-Service Provider Wien IT. This Architecture should deliver Lab- and Factory-Methods for our subsidiaries to support them in their data-science activities.
- Regarding the WE Use Case there will be future projects where the outcome and findings will be integrated. Especially one project, regarding power plant efficiency will profit in the optimization of service staff and the Fernwaerme-Grid. This will also have a positive effect on the predictive maintenance of GUFO stations.
- Regarding the WL Use Case supports the standardisation of the planning activities in the future (for busses or trams, for example, which intervals will be used). The prototype clearly has the benefit of merging multiple data from different sources. Here we can compare the events with past ones which simplifies this know-how to the new events from the future. Furthermore, weather data can also be included, which is very valuable for outdoor events.

The activity of WL planners will also be influenced accordance to the success of the standardization of the prototype. If we see clear improvements in this area, there will be a follow-up project in which we will look at how this process can be further improved. With our planners, only a small percentage is concerned with events; in the future, this standardization could be extended to many more planning activities.

3 Dissemination Plan per Project Partner

This section collects dissemination activities planned by each project partner during the next project year.

3.1 TU Wien

TU's dissemination plan includes the following papers to address several of the communities of interest to CitySPIN.

Paper Topic	Venue	Research Community
CPSS Study (WP2)	Information and Software Technology (Journal)	Software Engineering
CPSS Architecture pattern	EUROPLOP'19	Software Engineering
Data Integration in city-wide infrastructures (Wiener Linien, Wien Energie use cases, LWP + UV, Vocabularies..?)	ISWC (in-use, industry, research?)	Semantic Web
Survey of Vocabularies for CPSS/city-wide infrastructures	Workshop or journal	Smart City, Semantic Web?
LD-centric CPSS architecture	Semantics 2020?	Enterprise Information Systems
Declarative Process Ontology	Extended Semantic Web Conference	Semantic Web
Process mining on Linked Data	TBD	TBD - Process mining?
Process mining with SHACL (with WU Vienna)	Int. Conference on Advanced Information Systems Engineering	Process management

Additionally, we will further pursue dissemination through teaching as well as through collaboration with projects or researchers external to the project.

3.2 WU Vienna

Our dissemination plan at WU includes the following papers:

Paper Topic	Venue	Research Community
Declarative Process Ontology	Extended Semantic Web Conference	Semantic Web

Discovery of Data-Aware Declarative Processes	ACM Trans. on Database Systems, Journal	Databases
Process mining with SHACL (with TU Wien)	Int. Conference on Advanced Information Systems Engineering	Process management
Policy Formalization	International Conference on Cyber-Physical Systems	Cyber Physical Systems
RDF store scalability	Web Conference	Semantic Web
Context in RDF stores	Extended Semantic Web Conference	Semantic Web
Policy and log formalization for transparency and compliance	Privacy and Security (TOPS), Journal	Privacy and Security

3.3 SWC

SWC will continue its activities of internal dissemination as well as liaising with relevant national and international research projects.

PoCs were showcased on several occasions at fairs, conferences and F2F: Semantics 2019, Highlight Conference DMA and others.

3.4 WSTW

Dissemination activities will include WSTW-internal events and will be spread through diverse media-channels, such as 'Corporate TV' or 'Intranet Posts'. There is also an internal Company News-Platform/Newsletter where we plan to publish a feature about the CitySPIN project. This will give an insight about the collaboration with universities to our subsidiaries and promote the ongoing digitization initiatives which are part of the company wide IT-Strategy. It should also animate coworkers to spread their ideas in the existing company networks which have the purpose to drive innovation and new business models.

CitySPIN-News and Reports will be presented on a regular basis in the quarterly event "Innovation Base Meeting".