Contract no.: 611875

Project acronym: SYMPHONY

Project full title: *Orchestrating Information Technologies and Global Systems Science for Policy Design and Regulation of a Resilient and Sustainable Global Economy*

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D8.2

Second Year Report

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Periodic report:	Second
Period covered	From October 1st,2014 to September 30th,2015
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No	Name	Short name	Country
1	UNIVERSITA DEGLI STUDI DI GENOVA	UNIGE	Italy
2	INSTITUTE OF COMMUNICATION AND COMPUTER SYSTEMS	ICCS	Greece
3	PlayGen Ltd	PlayGen	United Kingdom
4	GCF - GLOBAL CLIMATE FORUM EV	GCF	Germany
5	Athens Technology Center	ATC	Greece
6	UNIVERSITA POLITECNICA DELLE MARCHE	UNIVPM	Italy
7	INSTITUT JOZEF STEFAN	JSI	Slovenia
8	Germanwatch Nord-Sued-Initiative e.V.	GW	Germany
9	UNIVERSITAT JAUME I DE CASTELLON	UJI	Spain

Document History

Version	Date	Changes	Author/Affiliation
0.1	30-09-2015	Table of content	UNIGE
0.5	12-10-2015	First draft	All
0.7	27-10-2015	First review	All
0.8	09-11-2015	Finalize financial data	All
0.9	25-11-2015	Final version before CFS	UNIGE
1.0	02-12-2015	Final version after CFS	UNIGE

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1 Publishable summary

The Scientific premises and Project Objectives

So far, adequate tools for exploring and governing the complex global dynamics of the economic and financial system are still missing. Moreover, in order to explore the possibility of broad societal transitions to sustainable patterns of production and consumption, new policy instruments are needed.

SYMPHONY proposes an innovative tool for policy making based on an agent-based macroeconomic engine, and on the idea of collecting and exploiting citizens and stakeholders' expectations. The main goal is to improve the efficacy and the transparency of the decision making process.

SYMPHONY's mission is to orchestrate a set of tools that will be able to collect and analyze relevant information by means of social media mining tools and web-based information markets, and to simulate the complex economic dynamics by means of an agent based model of the global economy, explicitly designed for policy making, and to involve stakeholders (e.g., policy makers, scholars, professionists, and citizens) in the decision making process through a serious game interface.

SYMPHONY's objectives can be considered from a scientific, technological and societal part.

From a scientific point of view, the main goal is to design and study a multi-country agent-based model and simulator, driven by data collected by means of the social media mining and information markets tools. This data can be used to initialize and calibrate the artificial economy and to model agent's expectations.

From a technological point of view, the main efforts are devoted to develop a unified online software platform, supplying several services for citizens and stakeholders. This platform includes a Social Media Mining tool, a Web-based information markets, an agent-based artificial economic simulator and a serious games interface where human agents are able to play a role in the artificial economy.

The societal objective of the project is to support the progress and advancement of the techno-economic-society with a complex and global approach to decision making, considering behavioral and societal aspects when designing economic policies, by collecting and including in the model citizens' sentiments, beliefs and opinions, enhancing the transparency of the policy making process by providing a web based open instrument where stakeholders, including citizens, can actively participate by testing different policy hypothesis and trading in interactive information markets (that provide valuable feedback to policy makers) and by developing appropriate economic policies and regulatory frameworks for preventing and mitigating economic and financial crises and fostering an economically and ecologically sustainable growth path.

The project consortium

| Unit	Country	Role	Research Unit Head	Brief summary of the second year activity
UNIGE	Italy	Coordinator	Silvano Cincotti	Project coordination and management. Early version of the large-scale multi-country agent-based macroeconomic engine. Financial stability and sustainable growth use cases. Dissemination.
ICCS	Greece	Partner	Gregoris Mentzas	Design, development and evaluation of the Information Market Tool. Contribution to the integration of the Information Market with the ABM and SYMPHONY game. Dissemination.
PlayGen	UK	Partner	Kam Star	Design, Development and Implementation of the Symphony game. Contribution and close collaboration with the SYMPHONY dashboard and ABM.
GCF	Germany	Partner	Carlo Jaeger	Contribution to the implementation of the sustainable economy use case. Policy discussions for sustainable economy use case. Contributed content to the Information Market and Social Media Analysis. Development of evaluation plan. Dissemination.
ATC	Greece	Partner	Anna Triantafillou	Implementation of the ABM Engine extensions including APIs and database for storing historical data. Building a service library and configurator for integrating the Game with the ABM. Implementation of the first version of the Symphony platform; Design and deployment of the Dashboard. Dissemination.
UNIVPM	Italy	Partner	Mauro Gallegati	Dissemination activities. Contribution to the development of the Information Market tool. Analysis of the expectations in the ABM model.
JSI	Slovenia	Partner	Dunja Mladenic	Design and development of the Social Media Mining Tool and API and its underlying information extraction systems. Contribution to the integration of the Social Media Mining tool with the SYMPHONY dashboard and ABM. Dissemination.
GW	Germany	Partner	Gerold Kier	Contribution to the implementation of the sustainability use case. Policy and innovation discussions for the sustainability use case. Contribution of content to the Information Market and Social Media Analysis. Development of an evaluation plan and first evaluation activities. Dissemination activities.
UJI	Spain	Partner	Andrea Teglio	Early version of the large-scale multi-country agent-based macroeconomic engine. Multi-country model design. Revision of the financial market model. Dissemination

The Consortium reflects the multidisciplinary nature of the project. Partners of this Consortium are Research Units composed by computer scientists, software engineering and economists. All these competences represent a mandatory requirement for the success of the project. The Table summarizes some information about SYMPHONY participants.

The Work done and results achieved in P2

The second year of the project has been mainly devoted to the development of the initial version of the Symphony components and of the integrated platform. In particular, we have developed the early version of the following ICT tools:

1. **Information Market Tool**: The tool provides functionalities to trade policy contracts with a trading mechanism that uses an automated market maker and provide functionalities for the allocation of rewards. The information market is accessible at the following url: www.policyoracle.org and is endowed with functionalities for contract management that have been used to create a number of future contracts on numerous policy variables (e.g. consumer price index, gross domestic product, energy prices, the unemployment rate, etc..) referred to different European countries or to Europe as whole. The idea is that the contract prices provide nowcasted expectations on policy variables. The Information Market tool has been validated and evaluated in laboratory settings as well as with the project consortium modelers and economists.

2. Social Media Mining Tool: For the purpose to build social media based policy indicators, we have developed appropriate techniques for cross-lingual topic detection, information diffusion and sentiment analysis and the correlate software, which is capable of correlating and predicting (e.g. nowcast) variables based on a wide range of input variables extracted from social media, mainstream media, financial and economic data.

3. Agent-based macroeconomic engine: The modelling of the agent-based macroeconomic engine has been finalized by including modeling features able to address the problem of triggering a sustainability transition towards an economically and ecologically sustainable growth path in energy production. To this purpose, we introduced renewable energy and a feed-in-tariff system for renewable energy producers along with different options to finance this subsidy. Furthermore, we have completed the housing market and securitization models and we have enriched the multi-country design by considering a more general and flexible setting which enables us to create an artificial global economy including different types of unions (e.g. monetary, trade, etc.), as well as with the different number of countries
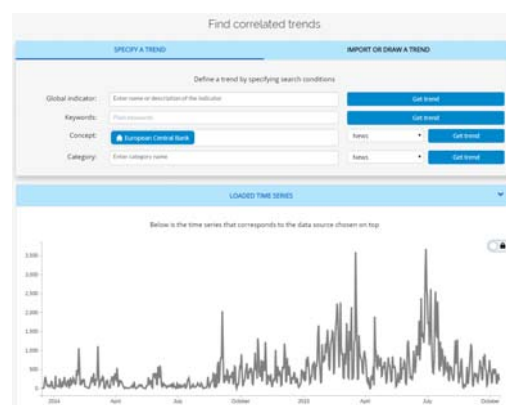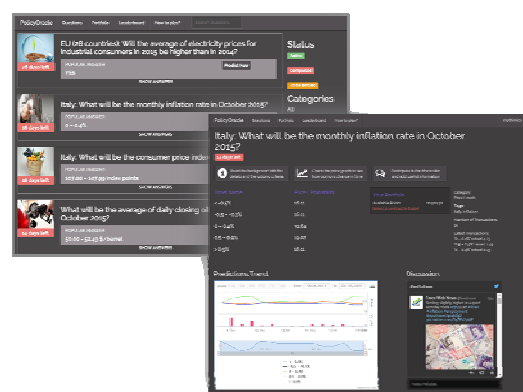
within the unions. Finally, we have implemented the early version of the large-scale multi-country agent-based macroeconomic engine. An important task of the software implementation was also to redesign the data structures of the original Eurace implementation in order to achieve and optimal trade-off between the speed and the memory allocation.

4. **Gamification**: An early version of the game has been successfully developed. To this purpose, particular efforts have been devoted to develop a communication system allowing the game's logic to access and manipulate the data of the agent-based macroeconomic engine via an orchestrator system, as well as to filter and format the data so that they appear in a consistent and readable manner for the user. This has required clear communication with both technical and non-technical partners to ensure that the user experience is meaningful, understandable, and responsive. At this stage in the project, the player types in the game have been limited to the key economic policy makers: Government and Central Bank.
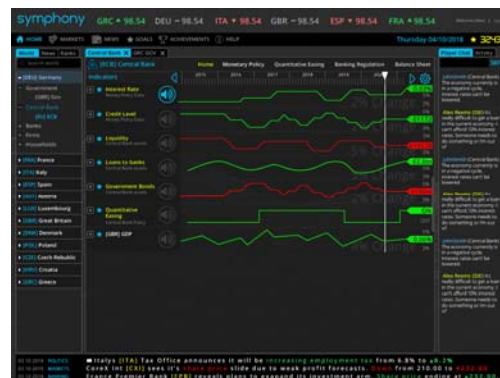
The four components described above have been successfully integrated in the early version of the **SYMPHONY platform prototype.** Based on the system architecture defined in the first year, the initial SYMPHONY platform prototype includes also a dashboard, an access control and identity management system and an orchestrator. In this respect, the main task consisted in the architecture development and in the implementation of the dashboard that contains the widgets and the Administration Panel and constitutes the main access gateway for the end users to the SYMPHONY Platform. The dashboard was designed to provide a unified look & feel to all participants; yet with different interfaces and data presented depending on the user role. The dashboard is accessible at the following url:

http://dashboard.projectsymphony.eu/

Moreover, a first technical evaluation of the system as a whole from the technical point of view has been performed in order to ensure that all mechanisms and services are functioning properly.

In parallel with the implementation of the SYMPHONY prototype, the policy use cases have been developed. In particular, the financial stability use case involves relevant aspects of the SYMPHONY model. The most significant include micro and macro-prudential regulations inspired by the Basel III reforms, the effects of different fiscal and monetary policies especially during recessions, a securitization market for firms' loans and households' mortgages and the housing market, with a particular focus on housing price and credit worthiness of borrowers. Regarding the sustainability use case, several key elements have been identified: fossil vs. renewable energy, energy efficiency investments, a price
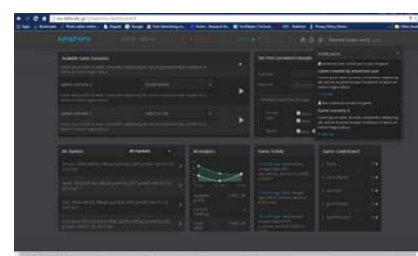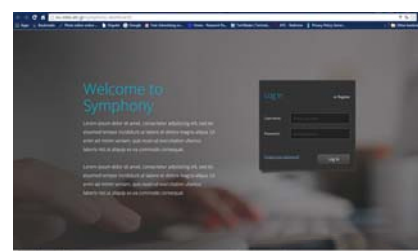
on carbon emissions, endogenous technological progress, an investment program through different mechanisms. The investment program was identified as an important part of a climate policy strategy. Furthermore, it is the element that has strong linkages with the financial stability use case.

Finally, the results of SYMPHONY project during period P2 have been presented in several major conferences by all partners. Moreover, in order to spread out the Symphony concept to the scientific community a huge amount of scientific papers have been published, and the title of these publications uploaded in the Symphony website. The participation of common citizens, scientific community and Policy Makers to public events have been increased. Finally, we improve the communication through the Social Media increasing both the number of followers/like and the number of posts.

2 Project objectives for the period

2.1 Brief overview of the project objectives

The objectives of the project during the second year can be classified as scientific, technologic, and societal objectives. We will therefore stick with these definitions in order to give a brief overview of the project objectives and their fulfillment.

From a scientific point of view, the project objective is to contribute to the current state of the art in economic policy, by proposing an original framework, which aims at giving a more articulated and innovative response, based on the integration of an agent-based model with the nowadays available technology that allows citizens' participation, i.e., a game interface, information markets and social media mining.

In particular, following objective *O4* described in the proposal, we designed an information market tool, called Policy Oracle, which has been integrated in the Symphony dashboard (the main portal of the Symphony on-line platform). An extended set of questions concerning the main economic topics tackled by the Symphony project has also been designed. These questions mainly concern topics related to environment, sustainability, finance and economic policy in general. Citizens and experts participated to the information markets, buying and selling assets related to the proposed questions and contributing to form more realistic expectation about the fundamental value of future economic indicators. As already mentioned, the information market tool has been fully integrated into the dashboard and can serve as an input to the agent-based model, in order to initialize several variables or to set the value of economic parameter. The same can be said about the social media mining tool, that has been developed and integrated into the dashboard, and can be used by Symphony users as an instrument for extracting knowledge from information flows in the social media. Again, this information can be used as an input for the initialization of the model, as described in objective *O5*. We provide in the proper deliverables all the relevant details.

Summarizing, our objective for the second year was to deliver a first operative version of the integrated tool for policy. This is the fundamental requirement to fulfill objective *04* of the proposal, and we believe we have been successful.

This work done in the second year is of course based on the technologic advancement of the project, particularly related to objectives *O1* and *O2* declared in the proposal. The stand-alone tools described in the objectives (IM and SMM) have been designed and implemented, and they are currently available on-line. Moreover, as mentioned before, they have been fully integrated in the Symphony platform.

Objective *O3* represented also a crucial task in the second year of the project. As we declared in the proposal, we aimed to design "an agent-based artificial economic world with human-machine interfaces based on serious games". The work done under this perspective has been a lot, and we can say to have achieved our goal to have a first working release of this "economic world" where human agents and

artificial agents are both present. A big effort during this second year has been done in order to improve the coordination between economists and computer scientists (an effort that has been correctly indicated as urgent by the reviewers) in order to reach this objective. The task has been quite hard, with many technical complications, due to the complexity of the issue, but we can proudly state that we managed to produce a first working and on-line accessible version of the serious game based on the ABM. We therefore think we fulfilled this objective.

All the work, both technical and scientific, done in year 2 has a strong repercussion on the societal part of the project. Our underlying objective, from this perspective, is to include citizens in the decision process about economics matters. This inclusion implies both to consider citizens' opinions and expectations when taking decisions, as described by *O7* of the proposal, and to enhance the transparency of the policy making process by providing a web based open instrument where stakeholders, including citizens, can actively participate, as clearly stated in *O8*. During this second year of the project we laid the foundations of this open instrument, which will allow us next year to pursue the O9 objective, i.e., developing more appropriate economic policies and regulatory frameworks that include citizens and stakeholders.

2.2 Summary of the recommendations from the previous reviews

2.2.1 General remarks

In italic the reviewer recommendations concerning the period P1 and after each recommendation our answer about how these have been taken into account.

1. *The consortium is encouraged for the next period to better collaborate, plan and jointly organize the user requirements and modular demonstrators (scenarios) describing the assumptions, interconnections, inputs and outputs (e.g. interconnecting the enhanced Eurace agent based model with the exact technological inputs and modules required). Collaboration among the non-technical and technical partners needs to be strengthened in order to have a common understanding and provide realistic demonstration scenarios.*

   We agree, and we are aware about the importance of improving the collaboration inside the project. We enhanced the collaboration between economists and computer scientists in the consortium by creating a regularly based weekly conference call on skype that allowed to establish a common language and to address all the major issue of the project. We also stress that nine plenary meetings have been organized since the beginning of the project, where economists and computer scientists worked side by side. In particular, 7 out of 9 meetings have been plenary meetings, involving the whole project consortium, i.e. both technological and economic partners, and 4 plenary meetings have being held during the second year. This intense and constant collaboration has been intense in delivering at the end of the second year the initial platform prototype that has been during a demo session within the GSS conference at the "Festival della scienza" of Genoa, an international and popular event on dissemination of scientific results.

2. *The project needs to define clearly its terminology, hypothesis and set exact boundaries of its work (e.g. which cases will be addressed). The project needs to spell out the boundaries and limits of its research design. There is a strong bias build into social media (Facebook, twitter), excluding older generations, immigrants, rural inhabitants, poor people, and also women. Is the information you gain from these sources representative of the larger society, and if not what does this mean for validating project results. The technical selection bias has to be discussed and taken seriously.*

The work in the second year of the project has been dedicated to better define the cases that will be addressed by the Symphony platform. We developed a policy brief in order to inform about the scope and boundaries of our work. In this last year, we developed an integrated platform where an agent-based model is coupled with information markets and social media mining tools. We believe that this new instrument is the core of the project and that it could provide insights that may go also beyond the proposed use cases.

Concerning the selection bias, we agree that it represents a relevant issue, and needs a serious discussion. This implies a deeper understanding on information flows in modern social systems. However, to a certain extent, the development of an instrument grounded on internet-based innovative technologies incorporates some sort of exclusion, and while we understand the importance of the issue, we feel that a specific analysis on the issue is out of the scope and of the competences of the project.

Therefore, we are aware of the existence of bias in the population represented in social media. Our hypothesis is that social media posts, however unrepresentative, will give us a signals that may be used to nowcast indicators. Since this part of the work is not based on polling and the methodology for proving that a signal (feature, variable) has predictive power is independent of any bias, we consider that bias does not play a role when nowcasting.

In year 2 we expanded the social media tool so that it can be used in automatic polling scenarios, in which cases we cannot be aware in advance of how representative the population of social media is of the total population for which a given experiment will claim results. Under this scenario, the domain experts using our tool must account for any biases in the design of their experiment.

3. *Need to clearly define the Key Performance Indicators (KPIs), assessment criteria, concrete test cases or other metrics that will be used to validate project results (against the SYMPHONY proposed objectives). The KPIs should address efficiently all four dimensions of the project (economic, societal, technological, policy) in a uniform way in order to better measure and evaluate the results of the project from various perspectives.*

In the proposal, we listed the conditions of achievements for the project objectives (section 1.1.2) and several evaluation criteria for individual workpackages (section 1.3.5). Actually, these criteria

are on/off conditions that address separately each different aspect of the project. On the other hand, we think that it is very challenging to determine ex-ante KPIs able to address at the same time all the four dimensions of the project not as on/off conditions but with a performance metric and related thresholds. One reason of this difficulty is that many of these dimensions are related to social sciences which are, in our opinion, not so easy to encapsulate in a metric assessment criterion. Another reason is the innovativeness of the project, this implies the lack of known references to compare the outcomes of the project as a whole in a quantitative manner. Nevertheless, during the reporting period we have given a focus on the technical validation as well as the system acceptance by the end users. To this end, we have performed the following actions:

- Defined the SYMPHONY Testing Framework and the related test cases in order to technically test the 1) Functional Suitability, 2) Performance Efficiency 3) Compatibility. The results of this analysis are presented in the D5.2

- Set-up a questionnaire in order to collect feedback from the end users regarding the initial version of the platform. To this end, we have tried to collect information related to the "Ease of Use", modules suitability and acceptance, system relevance to satisfy project objectives etc.

- Organised a workshop session in Genoa, during the Science Festival, where we collected many questionnaires filled by the visitors of our stand. This input will be analysed and will be taken into consideration during Y3 implementations.

Next Steps:

To set up concrete KPIs regarding the Economic, Societal and policy related objectives of the project in order to be able to evaluate the project as a whole. In this respect, we think that the participation and the feedback of the public as well as of the policy makers about our work should be one key indicator. The Evaluation approach and the related KPIs as well as the overall evaluation results of the project will be presented in detail in the deliverable D6.2 Stakeholders' Evaluation of SYMPHONY Platform, which is due in M36.

4. *Need to contextualize the concepts which are central to the project such as financial stability, a multi-dimensional concept which has undergone changes from focusing on micro-prudential regulations before the crisis to macro-prudential rules after the financial crisis. Also, the term sustainability transition is unclear, and should be replaced with i.e., environmental and economic sustainability.*

In the policy brief, we have contextualized the concept of financial stability along with its key dimensions. Concerning the term "sustainability transition", we could instead rephrase it into "Transition to a sustainable economy - fostering economic, social and environmental progress" The reason for this is that we want to look into how a transition from the current energy-intensive/high-carbon economy (with mainly economic goals) to a more sustainable economy, with

economic-social-environmental goals, can be triggered. Sustainability encompasses economic, social and environmental goals.

5. *Financial (in)stability depends also on geopolitical factors (such as security issues), as the present Ukraine conflict and the economic and financial sanctions demonstrate. Not only are financial markets (particularly currency markets) destabilized, also the impact on the real economy both in Russia and Western export nations is affected. Is there a way to build a stronger link than the present reference to "foreign sector" among the financial stability challenges (which include real housing market, households etc) which seems insufficient to take account of the geopolitical transformations (i.e., the geo-economic pivot to China).*

We agree with the reviewers that geopolitical factors are primary determinants of financial and economic instability, and probably the other way around is also true: that economic instability also affects geopolitical factors. In particular, the reviewers suggest overcoming the proposed structure of a generic "foreign sector" in order to take into account the differences among countries in a more effective way. We took into account this observation by changing the way we model the multi country economy. More details are given in the related deliverables and in the WP3 section of this document. The main deviation from the original setting, where we had a monetary union that could be connected with a generic stylized "foreign sector", is that now we design a more flexible multi-country model where many unions or independent countries can be present. So, foreign countries like China or Russia, can be part directly part of the multi-country model, and do not need to be included in a generic "foreign sector". We can, therefore, include and calibrate these countries in the model. This said, we would like to remark that tackling the geopolitical effects on the economy is a very complex issue to study by means of a quantitative and general economic model, and it is not directly included among the scientific objectives of the project (namely O4, O5, O6, described in the proposal). Nevertheless, we think that in the long term, these problems will be represented and studied within the Symphony platform, and we will devote some effort to already devise some simple way to do it.

6. *A major emphasis in the project is on societal objective, yet the projects lacks expertise in sociology, political science, history, and media. To collect and analyse relevant information by means of social media mining tools and web-based information markets, a wider pool of expert knowledge of the social sciences is central.*

The societal objectives of the project that can be found in the proposal as O7, O8, and 09 are centered on the idea of using new technologies to reach and involve more people into the economic decision process. The social media mining and information market tools will allow including citizens sentiments and expectation as relevant components of the economic decision, while the on-line game will allow citizens to become more aware of the economic mechanisms.

Whereas important in a more general perspective, it is true that the expertise in the fields highlighted by the reviewers is not fully represented in the specific context of our project, which is mostly an ITC project. However, we are getting more insights from the experts in these fields. For

instance, in order to enhance a dialogue with people with expertise in sociology, political science and history, the project has been extensively presented and discussed at the EAEPE 2015 conference, which is the annual meeting of the European Association for Evolutionary Political Economy, gathering economists, social and political scientists from all over Europe. .

7. *Since the project refers to European citizens, you cannot use "citizen" in a global sense, since this smacks of euro-centrism.*

We understand the comment of the reviewers and we agree on it. We have been careful, in this second year, to better contextualize the concepts we use in order to be more rigorous and correct.

8. *Need better communication and integration between the macroeconomists, the modeller and in particular the social media mining. Need to indicate that you are not simulating the exact economy, thus cannot validate the models in the strict sense, but that these agent computational model have the advantage of taking the future into account, rather than the past as is the case in DSGE models.*

We are grateful to the reviewers to raise this point, because it is often a source of misunderstanding when talking about AB models. Actually, due to the higher complexity and completeness of large scale AB models with respect to standard macro models, people's expectations about them are often disproportionate, meaning that they are expecting the modelers to incorporate every detail and therefore to be able to analyze the economic effects of every detail. Needless to say that this is not the case, and also Symphony's models is an extremely simplified representation of the real world which is missing a huge amount of relevant interactions. So, in order to improve the communication, and the consequent understanding about these models, we think that the observation of the reviewers is very appropriate. Therefore we tried to be more precise and concrete when presenting the model in order to avoid any kind of misunderstanding or to generate wrong expectations. In this respect, concerning the social media, during the Berlin meeting in February 2015 we have discussed and identified a set of specific variables that can be tracked and extracted from the social media and can help the initialization/calibration of the model. Among them (they are discussed in the appropriate deliverables) we have for instance people sentiments (trust) towards the central bank policy, or people sensibility to environmental problems.

9. *The enhancements of the X-LIKE tools that will be developed in this project need to be clearly identified and described explicitly technologically and financially (Man power required for the additional development effort).*

While we are not specifically enhancing the tools built in X-LIKE for the purposes that they were built for in the context of X-LIKE, we are building on top of those tools. Namely, Event Registry and, indirectly, Newsfeed. Specifically, we are using Event Registry as an event knowledge base and matching social media messages to those events (which were automatically extracted from mainstream news collected by Newsfeed) in order to provide more context to social media messages. The main tool we are developing in the Symphony project, "Correlate" uses signals extracted from traditional and social media to find correlations, nowcast, perform automatic polling and provide the API access to these features and their data to the Symphony integrated platform (or other third parties) is built directly on top of Event Registry. The description this work can be found in Deliverable D2.2 and further work done after will be detailed in a future deliverable.

10. *The project needs to identify its exact direct and peripheral outcomes and which of the outcomes are innovative; distinguish which outcomes will become exploitable products.*

From the technological and scientific perspectives, the core outcome of the project the integrated platform while the peripheral outcomes are the components of the platform, namely the social data mining and information markets tools as well as the agent-based macroeconomic engine. It is worth noting that while the crucial advancements expected in economic modeling and policy will be provided by the integrated platform, the peripheral outcomes could have however independent and stand-alone applications.

11. *In order to disseminate the results of the project to a wider audience, short Policy Briefs should be prepared (among other dissemination material) and hard copies distributed at conferences, and an electronic version put on the Website of the project.*

We prepared several documents to distribute at conferences in order to improve the communication with the audience and the awareness about the Symphony project. Among this material, there is a policy brief, an informative triptych, and a video. In these days, we are distributing and showing them at the "Festival della scienza", an international and popular event on the dissemination of relevant scientific outcomes which isrganized in Genova.

12. *Should make sure that the project includes and trains younger scholars both in macroeconomics and modelling, and in particular to train younger women.*

We include, indeed, a large number of young scholars in the project, and among them numerous young women researchers.

2.2.2 Recommendations in individual work packages

In the following table, the detailed recommendations for each workpackage and the relative actions are underlined.

WP	Recommendation	Actions
2	Define Terminology	In our work the terms *variable*, *feature* and *signal* are equivalent. The word *model* is used to describe a statistical or machine learning model. The use of the word *predict* and its variations means that the value of a variable was arrived at by a model **without** the model having seen that particular value. This means that the model was fitted without that value - sometimes called out of sample forecasting. This is the common procedure and usage of the word in computer science and engineering. We make this point since in other fields, in-sample forecasting is common, as is fitting a particular curve to in-sample data and stating that the curve predicts the variable. We also use the term predict instead of nowcast, since from the point of view of the algorithm, this is effectively a prediction in the sense we just described. These definitions have been provided and used in Deliverable D2.2.
	Bias In Nowcasting	We are aware of the existence of bias in the population represented in social media. Our hypothesis is that social media posts, however unrepresentative, will give us a signals that may be used to nowcast indicators. Since this part of the work is not based on polling and the methodology for proving that a signal (feature, variable) has predictive power is independent of any bias, we consider that bias does not play a role when nowcasting.
	Bias in Automatic Polling	In year 2 we expanded our platform so that it can be used in automatic polling scenarios, in which cases we can not be aware in advance of how representative the population of social media is of the total population for which a given experiment will claim results. Under this scenario, the domain experts using our tool must account for any biases in the design of their experiment.
	Enhancements	While we are not specifically enhancing the tools built in X-LIKE for

		the purposes that they were built for in the context of X-LIKE, we are building on top of those tools. Namely, Event Registry and, indirectly, Newsfeed. Specifically, we are using Event Registry as a event knowledge base and matching social media messages to those events (which were automatically extracted from mainstream news collected by Newsfeed) in order to provide more context to social media messages. Description of this work can be found in Deliverable D2.2 We consider no enhancements to have been made to the X-LIKE tools as part of SYMPHONY.
	New Parts	The main tool we are developing in the Symphony project, "Correlate" uses signals extracted from traditional and social media to find correlations, nowcast, perform automatic polling and provide the API access to these features and their data to the SYMPHONY integrated platform (or other third parties). While this built directly on top of Event Registry, this part is entirely new. The description this work can be found in Deliverable D2.2 and further work done after will be detailed in a future deliverable.
3	NEW parts of EURACE	We clearly described in the new deliverable D3.2 which are the new parts of the model designed for the Symphony project.
	Validation of the model	We validate the model according to standard techniques used in ABM modeling, as: calibration of realistic parameters and economic ratios, reproduction of stylized facts and distributional properties.
	Grouping EU country – missing power of Germany	We revised the design of the model to consider a general multi-country framework, where we will be able to initialize countries with different characteristics. The political sphere is not currently modeled but could be added in future work.
	Consult with political scientist, institutionalists, European integrationist	We presented the model at the EAPE conference in order to have a feedback. However, we prioritize having a working version of the currently designed model. Then it will be possible to improve it by taking into account the contributions suggested by the referees.
	Demographic changes	We don't consider demographic changes in the total population of the model. We consider migration of the labor force from one country to another. This part of the model has been designed in D3.1 and D3.2 but will be implemented during the third year.
4	Build more common understanding of	The interface has been adjusted to support a control panel for each agent. Each control panel (for individual agents) will provide the

	players and the role within the ABM	player with the necessary tools and information about individual variables which can be changed in the ABM.
5	Data sources listed in D2.1 (p.28) need to be enhanced and a complete list needs to be provided accompanied with SYMPHONY open data policies that will be adopted; Security and privacy requirements are expected to be addressed. For the SYMPHONY components, software/tools/services (you should distinguish which ones are existing, enhanced, new)	Updated list of Data sources together with the Open data policies is already presented in the D5.2 Security and private requirements have been addressed in D5.2 An overview of the SYMPHONY components is provided in the D5.2 including the TRL (Technology Readiness Level) per component before project Start, in Y2 and in Y3.
	Rephrase "sustainability transition"	We rephrased the term "sustainability transition" into "Transition to a sustainable economy - fostering economic, social and environmental progress" The reason for this is that we want to look into how a transition from the current energy-intensive/high-carbon economy (with mainly economic goals) to a more sustainable economy, with economic-social-environmental goals, can be triggered. Sustainability encompasses economic, social and environmental goals.
	Contextualize "financial stability"	Regarded in the context of the European economic crisis in the aftermath of the financial crisis and the consequences of austerity policies implemented in the EU. Fokus is the interrelations between financial market dynamics and the rest of the economy
6	Technological choices in light of the two use cases	The main policy makers implemented in the game are the government and the central bank, which are important for both policy cases. The government is important for fiscal policies (standard or green) and the central bank is important for monetary policies (quantitiatvie easing or "green" quantitiative easing). The questions implemented in the Information market, e.g. energy prices or

		unemployment rate) are relevant for both policy cases. We also included current policy issues such as the international climate negotiations in Paris (COP21).
	Geopolitical issues	Geopolitical questions are not the focus of the policy cases. However, geopolitical changes can be integrated into the model via key parameters such as energy prices (e.g. oil and gas price)
	Wider pool of expert knowledge of the social sciences	We will invite a mix of experts from different disciplines, including social sciences, to the focus group meetings within the qualitative evaluation.
7	Policy Briefs should be prepared	The Policy Brief has been prepared and distributed
	Dissemination activities should be targeted with measurable outcomes	In the final report there is the list of the all the dissemination activities with the relative audience
	What is the role of the Focus Groups?	The Focus Group in the dissemination context was useful to promote the existence of the project. The main suggestions derived from this pilot operation have been taken into account in the project (see for example how the game has been improved)
	Exploitation efforts need to be carefully worked out by all partners	All the partners take part to the dissemination activities. They exploit both the project as a whole and their contribution to specific audience.
	Clustering activities with related GSS projects need to be drawn concretely	The GSS Conference has been organized and the exploitation of the main result of the project has been done in the "Festival della Scienza"
	Distinguish which outcomes will become exploitable products	We distinguish two different categories of the exploitable assets of SYMPHONY: 1) **Individual modules,** which can be exploited as open source software or as add-on functionalities to existing commercial systems. These could be marketed by individual partners, or through bilateral cooperation between partners who share the rights of a specific module & 2) **Integrated system.** Here we foresee the SYMPHONY end system as a whole that can be exploited after the end of the project. The work related to Exploitation starts in M25 as per DoW. The

		Assets from both categories will be presented in detail as part of the deliverable D7.4 Exploitation Plan, which is planned to be delivered in M36.

3 Work progress and achievements during the period

This section provides an overview of the progress of the work carried out in the Project Period P1, based on the Workpackages which are active or planned to be active in this period. The involved Workpackages are WP2, WP3, WP4, WP5, WP6, WP7, WP8.

WP8, which is Project Management, will be reported in section 3.5.

For each WP information is presented under the following headings:

• A summary of progress towards objectives and details for each task;

• Highlight clearly significant results;

• Explanation of reasons for deviations from Annex 1 and their impact on other tasks;

3.1 Workpackage WP2

WP 2	Collective Intelligence for Nowcasting								
WP leader	JSI								
Start to End month:	Planned 4 to 30 Actual 13 to 24								
Partner name:	UNIGE	ICCS	PlayGen	GCF	ATC	UNIVPM	JSI	GW	UJI
Man-months actual:	3.40	15.61	0.40	4.30	4.28	1.67	31.41	2.00	1.67
Man-months planned:	4.00	28.00	1.00	4.00	6.00	3.00	31.00	2.00	6.00

3.1.1 Summary of progress towards objectives and details for each task

Task 2.2 Tracking Cross-Lingual Information and Opinion Diffusion

The objectives outlined for this task were Cross-Lingual Topic Detection, Information Diffusion and Opinion (sentiment) analysis. They have all been successfully completed. Work done regarding these task is outlined in Deliverable D2.2 Early version of social media based policy indicators. Work done on these tasks after this deliverable will be described in the initial part of Deliverable D2.4 Final version of social media based policy indicators.

Task 2.3 Definition and Development of the SYMPHONY social media based expectations' indicators

The result of this task is the Correlate software which is capable of correlating and predicting (e.g. nowcast) variables based on a wide range of input variables extracted from social media, mainstream media, financial and economic data. It also provides the ability to perform automatic polling and provides the API that integrates into T5.4 SYMPHONY integrated dashboard (M10-M33) whose initial prototype is reported on in Delivarable D5.2. The Correlate software built for T2.3 has been developed and is being improved and we will proceed with validation and calibration of this software in Task 2.5 - Validation and Calibration (M19-M30). Report on the work until month 18 was written in D2.2 Early version of social media based policy indicators. Further work will be reported on in D2.4 Final version of social media based policy indicators.

Task 2.4 Information Market

Within Task 2.4 we have concluded the implementation of the first version of the SYMPHONY Information Market tool. The tool encompasses state of the art functionalities and technologies and is developed with

the use of the Ruby on Rails (RoR) web application development framework. The tool provides functionalities to trade policy contracts with a trading mechanism that uses an automated market maker, functionalities for contract management (Create / Update/ Delete) and functionalities for rewards' allocation. The information market is accessible at the following url: www.policyoracle.org.

Together with the policy modelers and economists in the partner organizations GCF, GW, UNIGE, UJI and UNVPM we defined a number of future contracts which provide nowcasted expectations on policy variables, including: the consumer price index, inflation rates, the gross domestic product, energy prices, the unemployment rate, electricity prices, Emissions Trading System prices of carbon, particulate matter concentrations. The variables refer to the countries of partner organizations (Italy, Spain, Greece, Germany) and, where relevant, to Europe as whole.

Moreover, we have initiated research on a novel approach for improving the aggregation of expectations with the use probabilistic graphical models and Information Markets. Our idea is to model complex policy variables as a probabilistic network of random variables. The Information Market aggregates expectations on the random variables and provides the probability of the dependent and complex policy variables.

Task 2.5 Information Market view

The Information Market tool has been validated and evaluated in laboratory settings as well as with the policy modelers in the partner organization within Task 2.5. The results of the evaluation and related feedback have been used to calibrate the software, correct software errors and improve its usability.

3.1.2 Highlight clearly significant results

- The early version of the Information Market tool (called PolicyOracle) has been developed and thoroughly tested;

- Policy indices relevant for policy makers have been identified and related questions have been defined and configured in PolicyOracle;

- The correlate software and its API has been implemented and integrated into the SYMPHONY Integrated dashboard.

- The Deliverable D2.3 "Early version of the information market tool" was successfully submitted on time, as part of WP2 during P2 reporting period;

- The Deliverable D2.2 "Early version of social media based policy indicators" was successfully submitted on time, as part of WP2 during P2 reporting period;

3.1.3 Explanation of reasons for deviations from Annex 1 and their impact on other tasks

No deviations from the planned activities

3.2 Workpackage WP3

WP 3	Agent-based Macroeconomic Engine								
WP leader	UNIGE								
Start to End month:	Planned 4 to 30 Actual 13 to 24								
Partner name:	UNIGE	ICCS	PlayGen	GCF	ATC	UNIVPM	JSI	GW	UJI
Man-months actual:	31.70	1.12	2.25	9.50	5.27	19.01	1.30	0.70	24.70
Man-months planned:	38.00	4.00	2.00	13.00	6.00	23.00	1.00	1.00	28.00

3.2.1 Summary of progress towards objectives and details for each task

Modelling agents' behavior, expectations and preferences (Task 3.1) and modelling agents' balance sheets and interactions (Task 3.2) have been successfully developed and tested ending with the 12th month of the project. The early version of the large-scale multi-country agent-based macroeconomic engine has been implemented, as reported in deliverable D 3.2, and the objectives of the second year reached. The design of the stustainability transition has been completed and the implementation is in an advanced state. WP3 is progressing in line with our expectations and what declared in the proposal. In particular, we summarize the work done in each task.

Task 3.3 Modelling a sustainability transition in agent-based macroeconomics

After having analyzed the policy area and relevant policy questions, the necessary modeling features for addressing the problem of triggering a sustainability transition towards an economically and ecologically sustainable growth path have been finalized. In the first project year, energy and a tax on energy have been introduced. In the second project year, the renewable energy and a feed-in-tariff system for renewable energy have been introduced. In order to finance this subsidy, different options have been modeled. One is to finance it by an increase of the energy consumption tax, another is to finance it via general taxation or, in the case of quantitative easing, by issuing government bonds which the Central Banks can buy. There has been a constant dialogue, mainly among UNIGE, UJI and GCF, and many outcomes of this discussion have been already incorporated into the model and implemented. The design of the sustainability transition is described in detail in deliverable D 3.2.

Task 3.4 Software implementation

The software implementation of the early version of the agent-based economic model of the economy designed according to tasks 3.1, 3.2 and 3.3 has been developed. In particular, we use the modular approach implementing in parallel the tasks (modules) that have been previously developed. Using this approach, we are able to achieve the flexibility of the model which is especially important for the multi-country framework.

We design a more general and flexible multi-country setting which enables us to create an artificial global economy including the different types of unions (e.g. monetary, trade, etc.), as well as with the different number of countries within the unions.

However, this kind of scenario requires several modifications of the current design in order to have desired efficiency in terms of memory allocation and the speed of simulations. The optimization requirements are needed especially for the implementation of the monetary union. The central monetary authority (ECB), which interacts simultaneously with many countries within the union, requires the processing and the storage of the great amount of data. Therefore, the important task within the software implementation task was to redesign the data structures and achieve the optimal trade-off between the speed and the memory allocation. Hence we develop new 3D data structures which enable the storage of the huge amount of data with the optimized processing time.

Concerning the specific implementation of the investments in energy transition we introduced new agents in order to model the production of electricity by renewable energy source, like sun, and by non renewable energy source, like fossil fuel. The next steps will be to include GHG emissions and a price on these emissions as well as learning-by-doing and expectation dynamics.

Within the implementation stage we managed to perform experiments within the multi-country framework. We also tested the stability and efficiency of the system as well as started the calibration and the validation of the model.

Task 3.5 Validation and calibration

Connecting calibration and validation, the economies have been initialized with respect to the empirical findings. Therefore, first we set the number of agents with respect to the German and Spanish economies (the ratio of the number of firms, banks, household, etc.). Moreover, we consider different technology levels as well as the different levels of education and skills of the households. Finally, we analyze the outcomes in terms of the main aggregates such as GDP, the price level and the unemployment rate.

3.2.2 Highlight clearly significant results

- The modelling of the sustainability transition towards an economically and ecologically sustainable growth was successful achieved.

- The early version of the large-scale multi country agent-based model of macroeconomy was implemented and validated.

- Deliverable D 3.2, "Early version of the large-scale multi-country agent-based macroeconomic engine" was successfully submitted on time, both the report and the prototype, as part of WP3 during P2 reporting period.

3.2.3 Explanation of reasons for deviations from Annex 1 and their impact on other tasks

No deviations from the planned activities

3.3 Workpackage WP4

WP 4	SYMPHONY Gamification							
WP leader	**PlayGen**							
Start to End month:	Planned 4 to 30 Actual 13 to 24							
Partner name:	UNIGE	ICCS	PlayGen	GCF	ATC	UNIVPM	JSI	GW	UJI
Man-months actual:	3.40	1.14	20.80	1.50	10.85	2.12	1.35	1.70	2.02
Man-months planned:	4.00	5.00	30.00	3.00	17.00	3.00	1.00	3.00	7.00

3.3.1 Summary of progress towards objectives and details for each task

WP4 runs until M30. The efforts in this period were focused on T4.2, T4.3 and T4.4. D4.2 was submitted on time in M18, as well a contributing user guide as part of D5.2 in M24.

Task 4.2 Game interfaces

During this period our objectives were to continue the development of the early version game design and user experience for policy modelling and simulation, focusing on the collation of various components and correct data access to enable accessibility for end-users with the project's simulation engine. PlayGen have also been working hard to communicate effectively with all project partners to ensure a collaborative design and development process.

Task 4.3 Game implementation

At this stage in the project, the player types have been limited to the key economic players: Governments and Central Banks.

A focal point of our efforts towards WP4 has been implementing the ABM data effectively within the game. We have developed a system of communication that allows the game's logic to control, access, and manipulate ABM cycle data via the Orchestrator system, as well as validating, filtering and formatting the data so that it appears in a consistent and readable manner for the user. This has required clear communication with both technical and non-technical partners to ensure that the user experience is meaningful, understandable, and responsive.

Task 4.4 Validation and Calibration

We will highlight and target user case scenarios spread across a large spectrum of expertise and gaming experience. We will use these case scenarios to validate the dynamics of the game that promote the incorporation of new users, such as the introduction tutorial.

3.3.2 Highlight clearly significant results

- Early stage game mechanics have been applied; scoring, goal logic and achievements as well as a complimentary news generation system which will provide the player a more granular experience.

- Successful development and production of the Alpha version the game

- Submission of deliverable D4.2 on time

3.3.3 Explanation of reasons for deviations from Annex 1 and their impact on other tasks
No deviations from the planned activities

3.4 Workpackage WP5

WP 5	SYMPHONY Platform Integration								
WP leader	ATC								
Start to End month:	Planned 4 to 30 Actual 13 to 24								
Partner name:	UNIGE	ICCS	PlayGen	GCF	ATC	UNIVPM	JSI	GW	UJI
Man-months actual:	5.40	0.00	4.10	0.67	21.91	1.86	2.00	0.71	0.64
Man-months planned:	7.00	6.00	6.00	2.00	42.00	4.00	2.00	1.00	5.00

3.4.1 Summary of progress towards objectives and details for each task

The focus of WP5 in the second year of the project was to proceed with the implementation of the early version of the SYMPHONY integrated platform (as per the related milestone MS5). ATC, as WP leader, coordinated the activities of the WP5 as well as the communication between the technical and research partners through technical meetings, emails and weekly calls. The work during the period was focused on the status of the integration of the modules. The main task was the architecture development and the dashboard implementation after the initial design of the SYMPHONY platform that was derived according to established design principles and in direct correspondence with the identified system specifications (described in D5.1). Moreover, a first technical evaluation of the system as a whole from the technical point of view has been performed in order to ensure that all mechanisms and services are functioning properly. During the reporting period the tasks T5.2, T5.3 & T5.4 were active. The related progress and outcomes are presented in brief as follows.

Task 5.1: System Architecture

The task has been completed in M12. Thus, it was not active during the reporting period.

Task 5.2: Architecture development & implementation

Based on the system architecture defined in Task 5.1, all T5.2 activities in the reporting period focused on reaching the successful deployment of the initial SYMPHONY platform prototype. ATC together with the technology and research partners worked on setting up and integrating the initial SYMPHONY prototype that consists of the following components:

i.   Dashboard
ii.   Access Control and the Identity Management
iii.   ABM Engine
iv.   Gamification
v.   Information Market
vi.   Social Media Mining
vii.   Orchestrator

The internal software component communication is handled using RESTful web services that have been set up and deployed as part of the SYMPHONY platform. The Service Orchestrator implemented in order to handle effectively the communication among the various modules. The first prototype is a proof of concept to the SYMPHONY end users. It encapsulates all the underlying technologies and gives a clear and easy to use graphical interface, exposing every available feature so far. The benefit of the current architecture is that any additional functionality can be wrapped into a separate component and be added to the platform, provided that it abides by the basic communication standards exposed by the SYMPHONY platform architecture.

After the first development phase (first version of SYMPHONY system), modifications continued in the platform. The initial technical testing highlighted those issues that needed to be addressed by the technical partners in order to improve system performance & scalability. The prototype is accompanied by a technical report (D5.2) that presents the platform architectural structure, including the system components and the updated data description. It also presents the testing framework as well as the User Guide with the main functionality of SYMPHONY Dashboard and Gamification. The document also addresses the security and the privacy requirements that have been adopted by the project.

Task 5.3: Technical Evaluation of SYMPHONY Platform (M19-M33)

During this task a first technical testing of the initial version of the platform was performed. In this context, the software quality model of the BS ISO/IEC 25010:2011 standard has been adapted to the needs of the SYMPHONY platform, in order to define appropriate metrics and to be able to evaluate the platform technical capabilities such as the 1) the functional suitability, 2) Performance Efficiency and 3) Compatibility. The functional appropriateness has been tested through iterative test cases performed in 20 cycles and for a period of time of one week. In order to test the performance of the services used in the SYMPHONY Initial platform prototype, the popular open source tool JMeter was used. The conducted tests included the creation of indicative test scenarios with 5, 10 & 20 concurrent users that send http requests (service calls) to the server and run this test for several times (up to 4 times). The results of the initial technical testing are presented in the deliverable D5.2.

On top of the above, the system is continuously tested as a whole from the technical point of view in order to ensure that all mechanisms and services are functioning in the way specified by the user requirements.

Task 5.4: SYMPHONY integrated dashboard

The task started with the analysis of existing UI environments, which could fit the requirements of the SYMPHONY tool for exposing specific functionalities to the target end users. Initially, the work focused on

the specifications of the graphical user interfaces, through mock-up implementation of the SYMPHONY front end. Although the project is envisioning various end user functionalities, this task has studied and selected the appropriate technologies for integrating different UI views into a single user interface container.
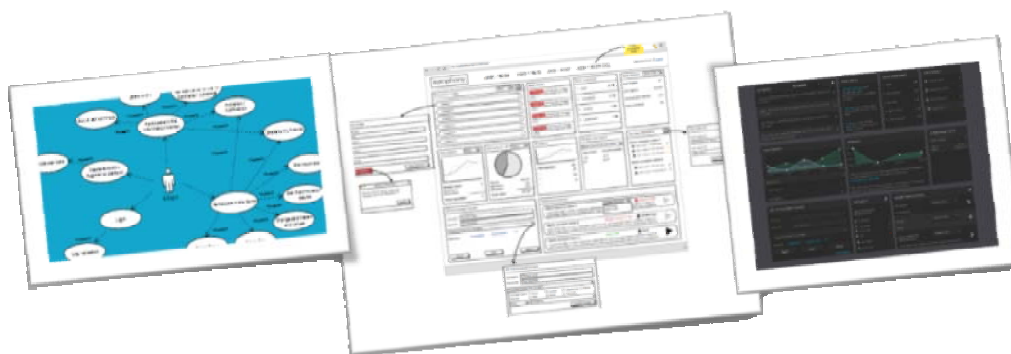
Figure 1: Design Approach – From Use cases to GUI
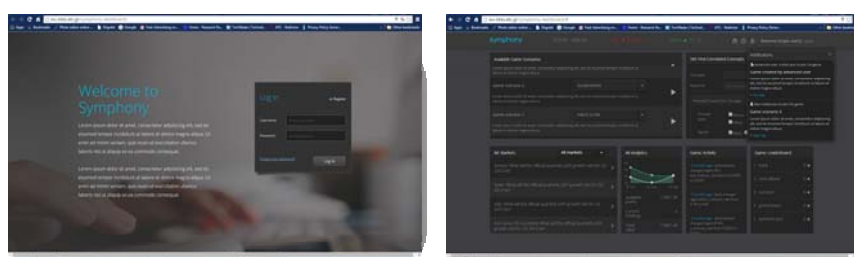
Figure 2: SYMPHONY Dashboard

For the period M18 – M24, the work was mainly focused on the implementation of the SYMPHONY Dashboard that contains the widgets and the Administration Panel. The SYMPHONY Dashboard constitutes the main access gateway for the end users to the SYMPHONY Platform. The Dashboard is designed to provide a unified look & feel to all participants however, the interfaces and the data presented vary, depending on the role each participant has in the SYMPHONY platform. Overall, 12 widgets have been implemented using HTML 5 and are enriched with live data using AJAX calls to data providers (Information Market [IM], Social Media Mining [SMM], ABM Engine [ABM], Gamification engine). The initial version of the platform is accessible by the following URL: http://dashboard.projectsymphony.eu. An overview of the Dashboard in the form of a User Guide is provided as part of the D5.2 deliverable.

3.4.2 Highlight clearly significant results

• Finalization of the system GUI based on mock-ups;

• Implementation of the architecture to integrate all modules under a common platform;

• Deployment of the initial integrated dashboard demonstrating all aspects of the SYMPHONY solution

• Validation of the initial integrated platform functionalities & performance by technical testing;

• Submission of the Deliverable D5.2 "Initial Platform Prototype" by M24, as part of WP5 results;

3.4.3 Explanation of reasons for deviations from Annex 1 and their impact on other tasks

There have been no deviations from the planned activities

3.5 Workpackage WP6

WP 6	Stakeholder Use-cases and Evaluation								
WP leader	GCF								
Start to End month:	Planned 4 to 30 Actual 13 to 24								
Partner name:	UNIGE	ICCS	PlayGen	GCF	ATC	UNIVPM	JSI	GW	UJI
Man-months actual:	10.90	0.00	2.80	12.25	1.06	3.47	0.75	8.50	3.14
Man-months planned:	16.00	1.00	4.00	14.00	4.00	4.00	1.00	9.00	8.00

3.5.1 Summary of progress towards objectives and details for each task

The focus of the third year was to further develop the policy use cases and to prepare the evaluation of the SYMPHONY platform (WP6) and the related model requirements (WP3), which are described here:

Task 6.1 Financial stability and resilience use case

The financial stability use case involves relevant aspects of the SYMPHONY model: micro and macro-prudential regulation, fiscal and monetary policy, mortgages and loans securitisation and housing market.

In this respect, we analyse a set of regulations both at micro and macro level. For instance, the level of laverage that the single bank can reach and/or the capital requirements following Basel III regulations.

Moreover, a set of monetary and fiscal policies are proposed, in order to replicate the main policies adopted in Europe so far, such as stability and growth pact, fiscal compact and quantitative easing. Fiscal and monetary policies can be activated during recovery periods or recessions. This is an useful tool that enables to observe the influence of the public policies to financial stability distress.

Regarding the securitisation market, the main concern for the financial system is given by the regulatory arbitrage carried out by the banks, i.e. the possibility to avoid the capital requirement by sales of firms' loans and households' mortgages.

Finally, the housing market provide important elements that influence the financial instability. In particular, the possibility to observe the reaction of the financial system to the housing price and credit worthiness of borrowers.

Task 6.2 Sustainability transition use case:

The step-by-step approach of implementing different important elements for the sustainability case has been implemented: So far a feed-in-tariff mechanism has been introduced, along with renewable energy as a new type of electricity as well as the possibility for making investments into energy efficiency. The next step will be to introduce carbon emissions, as well as a price on carbon emissions, as this is the main policy instrument at EU level but also highly discussed at international level. This will serve to be able to make a judgement on the three EU climate and energy policy targets, the GHG emission target, the renewable energy target as well as the energy efficiency target. In order to find out which mechanisms can lead to positive economic effects of climate policy, some important mechanisms have been identified in parallel work by GCF. These are endogenous technical progress, expectation dynamics and an investment program, and especially the combination of these mechanisms. The advantage of the EURACE model over classical models used for climate policy evaluation is that it includes financial market dynamics and is therefore suited for evaluating new types of climate policy, such as green fiscal stimulus, green quantitative easing and green financial market regulation.

Task 6.3 SYMPHONY Platform Evaluation

The initial proposal of dividing the evaluation into 1) a quantitative part, with questionnaires for each user group and each tool of the platform and 2) a qualitative part with selected focus groups, remains a useful approach. A questionnaire was designed and used to interview users at the first presentation of the game prototype at the GSS conference in Genoa. In the third year, the questionnaire will be used for other occasions as well. The qualitative part of the evaluation will be the focus of the third year, with different focus group meetings (with citizens, as done in the first year by all project partners; with researchers and NGO representatives; and at a later stage also with policy makers).

3.5.2   Highlight clearly significant results
- Identification of important policy questions needed for the information market tool and social data mining tool
- Final definition of modelling requirements
- Identification of the variables related to the two use cases that are analysed with social media mining and information markets for the initial setting of the game
- Identification of important policy proposals at the intersection of climate and financial policy, such as green quantitative easing, green fiscal programs and financial market regulation.
- Implementation of a feed-in-tariff system that leads to higher shares of renewable energy
- Identification of important mechanisms for positive economic effects: endogenous technical progress, investment program and expectation dynamics.

3.5.3   Explanation of reasons for deviations from Annex 1 and their impact on other tasks
There have been no deviations from the planned activities

3.6   Workpackage WP7

WP 7	Dissemination and Exploitation Plan								
WP leader	UNIVPM								
Start to End month:	Planned 1 to 36 Actual 13 to 24								
Partner name:	UNIGE	ICCS	PlayGen	GCF	ATC	UNIVPM	JSI	GW	UJI
Man-months actual:	1.20	0.00	0.75	1.15	2.51	4.47	0.65	0.30	0.42
Man-months planned:	5.00	1.00	2.00	2.00	3.00	6.00	1.00	0.50	1.00

3.6.1   Summary of progress towards objectives and details for each task

The main goal of the Dissemination activities during the second year is to increase the awareness of the Symphony project as a whole and to promote the tools used in the integrated dashboard, i.e. Information Market, Serious Game. Since the target audience is very heterogeneous, we use different device to promote the Symphony activities. Indeed, according to the Symphony Document of Work, the suggested dissemination tools are: Deliverables, Publications, Conference and social media. The package 7 is composed by three different task and the only one active during the second year is:

Task 7.2 Dissemination activities:

the activities in this task should be performed between the 4th and the 36th month. The activities that could performed are: the Symphony project book, the use of Social Media to spread the main results, Symphony publication in scientific journals. The aim of these activities is to disseminate to different target groups the main results of the project.

The main achievement according to what required in Task 7.2 are:

- Symphony user community: Since the creation of the Symphony user community refers to Task 7.1, we increase this community and so, in turn, the awareness of the Symphony project participating in different conference/workshop with different audience. Some of the most important events are summarized in the Table above:

UNIGE	UNIVPM	ICCS	PLAYGEN	UJI	GW & GCF

Workshop on the Economic Science with Heterogeneous Interacting Agents	Workshop on the Economic Science with Heterogeneous Interacting Agents	COLLECTIVE INTELLIGENCE	Gaminomics	Workshop on the Economic Science with Heterogeneous Interacting Agents	Investment-oriented climate policy - workshop
Agent-Based Economic Modelling (Summer school)	10th International Conference on Signal-Image Technology and Internet-Based Systems	14th IFIP Electronic Government (EGOV) and 7th Electronic Participation (ePart)	Digital Shoreditch	EAEPE Conference 2015	Annual Conference Research for the Energy Transition
EAEPE Conference 2015	Agent-Based Economic Modelling (Summer school)	ACM womENcourage	Digital Economy Research Showcase		Stakeholder Conference "Dialogues between Science and Practice"
Debunking Austerity - Towards Alternative Economic Policy Scenarios	Conference on Experimental Finance				Expert discussion Energy Transition Fonds
5th edition of the International Workshop on Service Orientation in Holonic and Multi-Agent Manufacturing	EAEPE Conference 2015				Expert discussion on the European Energy Union
Global Cleaner Production & Sustainable Consumption Conference					

- Social Media: Accounts in social media that are used to advertise the main activities of the Symphony consortium. During the second year we increase the visibility of the project and we advertise the preliminary results using the Social Media. Indeed, the number of like in the Facebook page (https://www.facebook.com/symphonyproject) increases by 32% and the number or followers in Twitter (https://twitter.com/SymphonyEu) registers an increase of more than 100%.

- Symphony publications: the summary of the publications from the Symphony consortium are in the table below:

UNIGE	UNIVPM	ICCS	UJI	GCF	GW	JSI
"Fiscal consolidation and sovereign debt risk in balance-sheet recessions. An agent-based approach"	"Unbiased Adaptive Expectation Schemes "	"PolicyOracle: Nowcasting Expectations on Policy Indices."	"Fiscal consolidation and sovereign debt risk in balance-sheet recessions. An agent-based approach"	"Orchestrating Global Systems Science and Information Technologies for Policy Modelling: The SYMPHONY approach."	"Orchestrating Global Systems Science and Information Technologies for Policy Modelling: The SYMPHONY	"Toward Social Media Mining: Twitter observatory"

					"approach."	
"Orchestrating Global Systems Science and Information Technologies for Policy Modelling: The SYMPHONY approach."	"Adaptive expectations with correction bias: evidence from the Lab"	"Aggregating Expectations to Predict Policy Indices with Information Markets."	"Orchestrating Global Systems Science and Information Technologies for Policy Modelling: The SYMPHONY approach."	"Investment-oriented climate policy – an opportunity for Europe"		"Orchestrating Global Systems Science and Information Technologies for Policy Modelling: The SYMPHONY approach."
Budgetary rigour with stimulus in lean times: Policy advices from an agent-based model	"Network Approach for Detecting Macroeconomic Instability."	"Orchestrating Global Systems Science and Information Technologies for Policy Modelling: The SYMPHONY approach."		"The Possibility of Green Growth in Climate and Environmental Policy Analysis Models - a Survey"		"Event Detection in Social Media With an Event Database"
	"Stock Market Dynamics, Leveraged Network-Based Financial Accelerator and Monetary Policy."					

3.6.2 Highlight clearly significant results

- The participation of common citizens, scientific community and Policy Makers to public events has been increased.
- The communication through the Social Media, increasing both the number of followers/like and the number of posts, has been improved.
- A huge amount of scientific papers has been published
- Deliverable D7.2 "Second year report on dissemination activities" was successfully submitted on time, as part of WP7 during P2 reporting period.

3.6.3 Explanation of reasons for deviations from Annex 1 and their impact on other tasks

There have been no deviations from the planned activities

4 Deliverables and milestones tables (excluding the periodic and final reports)

Deliverables (excluding the periodic and final reports)

<table>
<tr><td colspan="10" align="center">Table 1. Deliverables1</td></tr>
<tr>
<th>Del. no.</th>
<th>Deliverable name</th>
<th>WP no.</th>
<th>Lead beneficiary</th>
<th>Nature</th>
<th>Dissemination level</th>
<th>Delivery date from Annex I (proj month)</th>
<th>Delivered Yes/No</th>
<th>Actual / Forecast delivery date</th>
<th>Comments</th>
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<tr>
<td>D1.1</td>
<td>SYMPHONY conceptual architecture</td>
<td>1</td>
<td>ICCS</td>
<td>R</td>
<td>PU</td>
<td>9</td>
<td>Yes</td>
<td>9</td>
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<tr>
<td>D2.1</td>
<td>Social media streams processing infrastructure</td>
<td>2</td>
<td>JSI</td>
<td>P</td>
<td>PU</td>
<td>12</td>
<td>Yes</td>
<td>12</td>
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<tr>
<td>D3.1</td>
<td>Large-scale multi-country agent-based model of the macroeconomy</td>
<td>3</td>
<td>UNIGE</td>
<td>R</td>
<td>PU</td>
<td>12</td>
<td>Yes</td>
<td>12</td>
<td>None</td>
</tr>
<tr>
<td>D4.1</td>
<td>Serious Game Design</td>
<td>4</td>
<td>PlayGen</td>
<td>R</td>
<td>PU</td>
<td>12</td>
<td>Yes</td>
<td>12</td>
<td>None</td>
</tr>
<tr>
<td>D5.1</td>
<td>Definition of System Architecture</td>
<td>5</td>
<td>ATC</td>
<td>R</td>
<td>PU</td>
<td>12</td>
<td>Yes</td>
<td>12</td>
<td>None</td>
</tr>
</table>

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[1] For Security Projects the template for the deliverables list in Annex A1 has to be used.

D6.1	Design of use cases	6	GCF	R	PU	12	Yes	12	None
D7.1	First year report on dissemination plan and activities	7	UNIVPM	R	PU	12	Yes	12	None
D2.2	Early version of social media based policy indicators	2	JSI	Report & Prototype	PU	18	Yes	18	None
D2.3	Early version of the information market tool	2	ICCS	Report & Prototype	PU	18	Yes	18	None
D3.2	Early version of the large-scale Multi-country Agent-based Model of the Mtacroeconomy	3	UNIGE	Report & Prototype	PU	18	Yes	18	None
D4.2	Early version of the SYMPHONY Serious Game	4	PlayGen	Report & Prototype	PU	18	Yes	18	None
D5.2	Initial Platform Prototype	5	ATC	Report & Prototype	PU	24	Yes	24	None
D7.2	Second year report on dissemination activities	7	UNIVPM	Report	PU	24	Yes	24	None

	Table 2. Milestones				
Milestone. no.	**Milestone name**	**WP**	**Date due**	**Actual/forecast delivery date**	**Lead beneficiary**
MS4	Early versions of the tools, engines and frameworks	2, 3, 4	18	18	ICCS
MS5	Early version of the SYMPHONY integrated platform	5	24	24	ATC

5 Project management

5.1 Consortium management task and their achievement

WP 8	Project Management and Coordination								
WP leader	UNIGE								
Start to End month:	Planned 1 to 36 Actual 1 to 24								
Partner name:	UNIGE	ICCS	PlayGen	GCF	ATC	UNIVPM	JSI	GW	UJI
Man-months actual:	4.70	0.37	0.65	0.60	0.72	0.80	0.70	0.52	0.59
Man-months planned:	19.00	1.00	1.00	1.00	1.00	1.00	1.00	0.50	1.00

Progress towards objectives

The management of the consortium has been a keen and effective task. By a constant and huge use of IT facilities and services (e-mail, repository, discussion groups, web conferences, chat), we've achieved a common language in the consortium. Furthermore, a continuous interaction, testified by the frequent technical and management meetings and reciprocal visits that supported and integrated the usual utilization of standard IT instruments, has been necessary to coordinate the development and integration of the Symphony components and to reach the objectives that we had as a goal. It is worth remarking that Y2 has been a characterized by the integrations of the Symphony components. In this respect, the first main objective of the management has been to make every unit able to contribute to effectively contribute to the development of the project and to facilitate interaction and cooperation among the partners of the Symphony consortium. All the activity of the consortium has been constantly monitored by the steering board.

Problems which have occurred and how they were solved

None

List of deliverables for project management

Table 3. Deliverable [2]									
Del. no.	Deliverable name	WP no.	Lead beneficiary	Nature	Dissemination level	Delivery date from Annex I	Delivered Yes/No	Actual / Forecast delivery date	Comments

---

[2]   For Security Projects the template for the deliverables list in Annex A1 has to be used.

					(proj month)			
D8.2	First year report	8	UNIGE	R	PU	24	Yes	24	None

5.2 Project timetable and status

Project timetable and status remain unchanged.

5.3 Coordination

The project internet site has been constantly updated with information useful to the promotion of the project activities and to the creation of a general discussion. Moreover, we used week-based skype confcall for the coordination and the interaction among partners supported by dropbox folder, googlegroup distribution list and github for software development. All these instruments have a restricted access which is reserved to the consortium partners and allowed us to proceed quickly and to exploit better the technical and management meetings as well as the reciprocal visits.

Overview of the project meetings and visits during P2.

The following table describes the official meetings from the beginning of the project.

Event	Dates/ Duration	Location	Purpose/Justification/Major Outcome (this section should be detailed, if appropriate)	Project Participants
Q5 General and Technical Meeting	29/10/2014-01/11/2014	Bled (Slovenia)	Workgroup on Symphony integration platform specifications	UNIGE, ICCS, PLAYGEN, GCF, ATC, UNIVPM JSI, GW, UJI
Q6 General and Technical Meeting	22-26/02/2015	Berlin (Germany)	Workgroup concerning integration/gamification of the Symphony components and policy design, experiments and analysis	UNIGE, ICCS, PLAYGEN, GCF, ATC, UNIVPM JSI, GW, UJI
Q7 General and Technical Meeting	07 - 11/06/2015	Castellon (Spain)	Workgroup on Symphony orchestrator and facilities and services for the integration/gamification of the Symphony components	UNIGE, ICCS, PLAYGEN, GCF, ATC, UNIVPM JSI, GW, UJI

Changes in the consortium

No changes in the consortium

5.4 Use of foreground and dissemination activities during this period:

5.4.1 Use of foreground

Not Applicable

5.4.2 Dissemination activities

The project website is online at the URL: projectsymphony.eu. It is periodically updated and implemented.

The dissemination has been performed through the use of social networks, (namely facebook and twitter), the communication on Symphony website and the organization of meetings and workshop.

Summary of the first year (P2) dissemination activity:

Planned / actual Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
2015	Workshop on the Economic Science with Heterogeneous Interacting Agents	Research, public body, policy makers and advisors as well as general public	International	200	UNIGE, UJI, UNIVPM
2015	Agent-Based Economic Modelling (Summer school)	Research, public body, policy makers and advisors as well as general public	International	50	UNIGE, UNIVPM
2015	EAEPE Conference 2015	Research, public body, policy makers and advisors as well as general public	International	260	UNIGE, UJI, UNIVPM
2014	Debunking Austerity - Towards Alternative Economic Policy Scenarios	Research, public body, policy makers and advisors as well as general public	International	50	UNIGE

2015	5th edition of the International Workshop on Service Orientation in Holonic and Multi-Agent Manufacturing	Research, public body, policy makers and advisors as well as general public	International	150	UNIGE, UJI
2015	Global Cleaner Production & Sustainable Consumption Conference	Research, public body, policy makers and advisors as well as general public	International	100	UNIGE
2015	10th International Conference on Signal-Image Technology and Internet-Based Systems	Research, public body, policy makers and advisors as well as general public advisors as well as general public	International	100	UNIVPM
2015	Conference on Experimental Finance	Research, public body, policy makers and advisors as well as general public	International	100	UNIVPM
2015	COLLECTIVE INTELLIGENCE	Research, public body, policy makers and advisors as well as general public	International	70	ICCS
2015	14th IFIP Electronic Government (EGOV) and 7th Electronic Participation (ePart)	Research, public body, policy makers and advisors as well as general public	International	90	ICCS
2015	ACM womENcourage	Research, public body, policy makers and advisors as well	International	90	ICCS

		as general public			
2015	Gaminomics	Research, public body, policy makers and advisors as well as general public	International	250	PLAYGEN
2015	Digital Shoreditch	Research, public body, policy makers and advisors as well as general public	International	300	PLAYGEN
2015	Digital Economy Research Showcase	Research, public body, policy makers and advisors as well as general public	International	50	PLAYGEN
2015	Investment-oriented climate policy - workshop	Research, public body, policy makers and advisors as well as general public	International	50	GW, GCF
2015	Annual Conference Research for the Energy Transition	Research, public body, policy makers and advisors as well as general public	International	100	GW, GCF
2015	Stakeholder Conference "Dialogues between Science and Practice"	Research, public body, policy makers and advisors as well as general public	International	50	GW, GCF

First year (P2) dissemination activity (per Unit).

UNIGE

Publications:

1. Andrea Teglio, Andrea Mazzocchetti, Linda Ponta, Marco Raberto, Silvano Cincotti (2015), "Budgetary rigour with stimulus in lean times: Policy advices from an agent-based model", https://ideas.repec.org/p/jau/wpaper/2015-07.html

Presentation:

1. S. Cincotti, Final conference of COST Action IS0 902 System Risk, Financial Crisis and Credit The Financial Crisis – Failing to Learn and Learning to Fail?, "The Symphony Project", Harokopio University, Athens 13-15 March 2014

2. A. Teglio, A. Mazzocchetti, L.Ponta, M.Raberto, S. Cincotti, "The Contractionary Effects of Fiscal Austerity in Agent-Based Macro-Model", Debunking Austerity - Towards Alternative Economic Policy Scenarios, Pisa, 17-18 Novembre 2014

3. A. Mazzocchetti, M.Raberto, S. Cincotti, "Structured Finance Impact on Credit Cycles: an Agent-Based Model Perspective", The 27th Annual EAEPE conference, Genova, 17-19 September 2015

4. G. Fadiran**,** M. Raberto., S. Cincotti and F. Tonelli, "Investigating resource efficiency, environmental tax and subsidy effect in an agent based macroeconomic framework (EURACE)." The 27th Annual *EAEPE* Conference, 17-19 September 2015, Genoa, Italy

5. A. Teglio, A. Mazzocchetti, M. Raberto, S. Cincotti, "Fiscal policies in an agent-based macro model", The 20th Annual Workshop on the Economic Science with Heterogeneous Interacting Agents (WEHIA), Sophia Antipolis, May 21-23 May 2015

6. S. Cincotti "Roundtable: financing innovation and the sustainability transition: results from eu-funded research", The 27th Annual EAEPE conference, Genova, 17-19 September 2015.

7. S. Cincotti "Agent-based macroeconomics", Seminar, Tokyo, Chuo University, 25 – 28 Novembre 2014

8. S. Cincotti "Agent-based macroeconomics", Financial Resilience Cluster Launch Event, University of Birmingham, Birmingham ,25 – 26 March 2015

9. S. Cincotti "Agent-based macroeconomics", Seminar, Tianjin University, Tianjin, 14 January 2015

ICCS

Publications:

None

Presentations:

1. Nikolakakou, Niki, Efthimios Bothos, and Gregoris Mentzas. "PolicyOracle: Nowcasting Expectations on Policy Indices." Collective Intelligence 2015, Santa Clara, US.

2. Nikolakakou, N., Bothos, E., & Mentzas, G. (2015, August). Aggregating Expectations to Predict Policy Indices with Information Markets. In Electronic Government and Electronic Participation: Joint Proceedings of Ongoing Research, PhD Papers, Posters and Workshops of IFIP EGOV and EPart 2015 (Vol. 22, p. 63). IOS Press.

3. Efthimios Bothos, Niki Nikolakakou, Gregoris Metnzas, Marko Raberto, Andrea Teglio, Silvano Cincotti, Franziska Schütze, Hendrik Zimmermann, Marko Grobelnik, Anna Triantafillou. (2015) Orchestrating Global Systems Science and Information Technologies for Policy Modelling: The SYMPHONY approach. Forthcoming. In EGOV Workshop "Enabling Effective Policy Making - Coupling the Power of the Data with the Wisdom of the Crowd"

4. Niki Nikolakakou. Nowcasting Policy Indices with Information Markets and Belief Networks. ACM womENcourage 2015, Uppsala, Sweden.

PlayGen

Publications:

None

Presentations:

1. K. Star, Presentation of project to various stakeholders across industries, Digital Shoreditch 2015, London, UK, May 2015
2. J. Allsopp, Presentation of the Symphony approach, Digital Economy Research Showcase, London, UK, October 2014
3. K. Star, Presentation of Symphony project outcomes to stakeholders from games industry, Gaminomics, London, UK, June 2015

GCF

Publications:

1. Carlo C. Jaeger, Franziska Schütze, Jahel Mielke, Gesine Steudle, Sarah Wolf, Steffen Fürst, Diana Mangalagiu, Frank Meißner, Leonidas Paroussos**,** Policy study: "Investment-oriented climate policy – an opportunity for Europe" SYMPHONY work is explained and mentioned as a promising new modeling approach for climate and economic policy analysis

2. Sarah Wolf, Franziska Schütze, and Carlo C. Jaeger, "The Possibility of Green Growth in Climate and Environmental Policy Analysis Models - a Survey"

Presentations:

1. Investment-oriented climate policy – workshop, February and march 2015

ATC

Publications:

None

Presentations:

1. Presentation of project outcomes to CONSENSUS and SENSE4US and plan activities for liaison actions;

2. Presentation of the project to various stakeholders in Greece: Greek Parliament, Ministry of Interior, Municipality of Athens.

UNIVPM

Publications:

1. Palestrini, M. gallegati, "Unbiased Adaptive Expectation Schemes." Economics Bulletin, 35.2 (2015): 1185-1190.

2. Colasante, A. Palestrini, A. Russo and M. Gallegati "Adaptive expectations with correction bias: evidence from the Lab". Working Papers N. 409, (2015) Universita' Politecnica delle Marche, Dipartimento di Scienze Economiche e Sociali.

3. R. Grilli, G. Tedeschi and M. Gallegati. "Network Approach for Detecting Macroeconomic Instability.", Signal-Image Technology and Internet-Based Systems (SITIS), 2014 Tenth International Conference on, (2014): 440-446.

4. L. Riccetti, A. Russo and M. Gallegati, "Stock Market Dynamics, Leveraged Network-Based Financial Accelerator and Monetary Policy.". (2015) MPRA Paper No. 63622

Presentations:

1. 20th Workshop on the Economic Science with Heterogeneous Interacting Agents (WEHIA)

2. 10th International Conference on Signal-Image Technology and Internet-Based Systems Agent-Based Economic Modelling (Summer school) Conference on Experimental Finance

3. EAEPE Conference 2015

4. Your Future Festival 2015

JSI

Publications:

1. Luis Rei, Marko Grobelnik and Dunja Mladenic, "Event Detection in Social Media With an Event Database", Proceedings of the 18th International Multiconference on Information Society, siKDD 2015

Presentations:

None

GW

Publications:

None

Presentations:

1. Annual Conference Research for the Energy Transition

2. Stakeholder Conference "Dialogues between Science and Practice

3. Expert discussion Energy Transition Fonds

4. Climate Change for Coal

5. A roadmap for strengthening the interface between EU climate and energy modelling, politics, and policy-making

6. Investment Oriented Climate Policy

7. Expert discussion on the European Energy Union

8. Climate Policy in Europe - How does an efficient policy mix look like?

UJI

Publications:

1. Andrea Teglio, Andrea Mazzocchetti, Linda Ponta, Marco Raberto, Silvano Cincotti (2015), "Budgetary rigour with stimulus in lean times: Policy advices from an agent-based model", https://ideas.repec.org/p/jau/wpaper/2015-07.html

Presentation:

1. Andrea Teglio Bulent Ozel Reynold C. Nathanael Marco Raberto Silvano Cincotti, "Real Estate Market in EURACE Model: Stock Control vs Flow Control as Risk Measures Criteria", WEHIA 2015 (Nice)

2. Marko Petrovic, Andrea Teglio and Simone Alfarano, "Access to Credit and Firms' Size Distribution: A Dangerous Liaison?", WEHIA2015 (Nice)

3. Andrea Teglio Andrea Mazzocchetti Linda Ponta Marco Raberto Silvano Cincotti, "Large-scale Multi-country Agent-based Model of the Macroeconomy", EAEPE 2015

4. Marko Petrovic, Andrea Teglio and Simone Alfarano, "Firm Size and Firm's Debt with Banks: A Dangerous Liaison?" Ifabs 2015 (Oxford)

6 Explanation of the use of the resources

Table 3.1 Personnel, subcontracting and other major Direct cost items for Beneficiary 1 UNIGE for the period Oct.2014 - Sept.2015			
Work Package	Explanations	Amount	Free Text
WP2, WP3, WP4, WP5, WP6	Staff travel & subsistence costs for RTD	6,714.45 €	*Staff missions: Scuola Superiore Sant'Anna Pisa (17-18/11/2014),* Workshop*; Bled (Slovenia) 29/10/2014-01/11/2014: Symphony Q5 Meeting; Ciprus, 04-09/11/2015 EAEPE Conference; Berlin, 22-26/02/2015: Symphony Q6 Meeting; Nice (France), 20-23/05/2015: WEHIA; Castellon, Spain 07 - 11/06/2015: Symphony Q7 Meeting;*
WP2, WP3, WP4, WP5, WP6	Personnel Cost for RTD (PM 32,60)	128,319.50 €	*2 Full Professors, 1 Associate Professor, 2 Assistant Professor, 1 Researcher Fellow and 1 PHD students.*
WP7, WP8	Personnel Cost for MNGT (PMs 2,30)	19,930.29 €	Senior Project Manager
WP7, WP8	Staff travel & subsistence costs for MNGT	1,398.96 €	*Staff missions: Bruxelles, 18-20/11/14: GSS Cluster Meeting and Symphony Y1 Project Review Meeting*
WP7, WP8	Other direct costs	15,095.73 €	Inhouse Consultant for Project Management Support
TOTAL DIRECT COSTS		172,458.94 €	

Table 3.1 Personnel, subcontracting and other major Direct cost items for Beneficiary 2 ICCS for the period Oct.2014 - Sept.2015

Work Package	Item description	Amount	Explanations
2	Personnel costs (RTD)	50,898.62 €	*Cost of 1 Professor (G.Mentzas 0,69 PM), 1 Assistant Professor (D.Apostolou 0,17PM), 1 Researcher (E.Bothos 5,68 PM), 1 Assistant Researcher (E.-Ch. Papageorgiou 0,46 PM), 1 Junior Researcher (N.Nikolakakou 4,73 PM) and 1 Technician (Th.Mavrodopoulou 0,72 PM). Total PMs 12,45.*
3	Personnel costs (RTD)	4,470.00 €	*Cost of 1 Researcher (E.Bothos 0,67 PM) and 1 Junior Researcher (N.Nikolakakou 0,45 PM). Total PMs 1,12.*
4	Personnel costs (RTD)	4,575.00 €	*Cost of 1 Researcher (E.Bothos 0,69 PM) and 1 Junior Researcher (N.Nikolakakou 0,45 PM). Total PMs 1,14.*
8	Personnel costs (MGT)	2,635.50 €	*Cost of 1 Professor (G.Mentzas 0,37 PM). Total PMs 0,37*
2	Travel & Subsistence Costs	13,073.01 €	*Plenary meeting in Bled, 29-31 October 2014, E.Bothos and N.Nikolakakou;* *Review meeting in Brussels, 18-20 November 2014, E.Bothos and N.Nikolakakou;* *Plenary meeitng in Berlin 22-25 February 2015, G.Mentzas and E. Bothos;* *Plenary meeting in Castellon 7-10 June 2015, E.Bothos and N. Nikolakakou;* *Collective intelligent 2015 Conference in Santa Clara, USA, 31 May to 2 June 2015, E. Bothos;* *EGOV 2015 Conference in Thessaloniki 30 August to 2 September 2015, G.Mentzas and E.Bothos.*
8	Travel & Subsistence Costs	2,222.61 €	*Plenary meeting in Bled, 29-31 October 2014, G.Mentzas;* *Review meeting in Brussels, 18-20 November 2014, G.Mentzas.*
TOTAL DIRECT COSTS3		77,874.74 €	

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[3] Total direct costs have to be coherent with the directs costs claimed in Form C

Table 3.2 Personnel, subcontracting and other major Direct cost items for Beneficiary 3 PlayGen for the period Oct.2014 - Sept.2015			
Work Package	Item description	Amount	Explanations
1,3,4,5,6	Personnel costs	181,329 €	salaries for senior and lead developers and designers
7,8	Personnel costs	5,982 €	project management, dissemination activities
3,4,5	Other direct costs	462 €	Software databases
3,4,5,8	Other direct costs	3,828 €	Costs for travel, accommodation and subsistence for 4 project meetings
3,4,5,8	Other direct costs	4,104 €	Costs for travel, accommodation, subsistence and fees in participating, hosting and exhibiting for dissemination and exploitation activities
3,4,5	Other direct costs	222 €	Software subscription
TOTAL DIRECT COSTS		195,924 €	

Table 3.2 Personnel, subcontracting and other major Direct cost items for Beneficiary 4 GCF for the period Oct.2014 - Sept.2015			
Work Package	Item description	Amount	Explanations
1,2,3,4,5,6	Personnel costs	67,186.30 €	*RTD: Salaries for project manager, 3 scientific staff members, 2 research assistants*
3,6	Personnel costs	10,007.30 €	*RTD: 1 Senior Project Manager (using the SME flat rate option)*
7,8	Personnel costs	5,412.97 €	*MNG: 1 scientific staff member*
	Other Direct costs	6,046.53 €	*Travel costs, project meeting Berlin,*
TOTAL DIRECT COSTS		88,652,83 €	

Table 3.2 Personnel, subcontracting and other major Direct cost items for Beneficiary 5 ATC for the period Oct.2014 - Sept.2015				
Work Package	**Activity**	**Item description**	**Amount**	**Explanations**
WP 7,8	MAN	Personnel	10,540.79 €	*(1,43 PMS) - Salaries for 1 Senior Project Manager (0,04 pms), 1 Project manager (0,26 pms), 2 senior consultants (0,92 pms), 1 designer (0,11 pms) and 1 admin manager (0,10 pms)*
WP1,2,3,4,5,6	RTD		139,233.47 €	*(34,34 PMS) - Salaries for 1 Senior Project Manager (2,36 pms), 1 Project manager (2,27 pms), 3 senior software engineer (4,94 pms), 3 software engineers (12,49 pms), 3 senior consultants (6,57 pms), 1 designer (1,20 pms) and 1 technical (4,51 pms)*
WP 7,8	MAN	Meetings	1,178.72 €	*Participation of Mr. Brown and Ms. Triantafillou to 1st Review Meeting in Brussels (19-20/11/14)*
WP1,2,3,4,5,6	RTD	Meetings	4,960.05 €	*Participation of :* *1) Mr. Brown and Ms. Triantafillou to plenary meeting in Bled (29-31/10/14)* *2) Mr. Brown and Ms. Triantafillou to plenary meeting in Berlin (24-25/02/15)* *3) Mr. Brown and Mr. Kokkinakis to plenary meeting in Castellon (7-10/06/15)*
WP1,2,3,4,5,6	RTD	Meetings	1,200.00 €	*Organization of Project meeting in Athens 1-2/10/15 (Room rental, Coffee and Lunch break)*
Total direct costs			157,113.03 €	
Adjustment to Personnel, subcontracting and other major cost items for the period 1				
Work Package	**Activity**	**Item description**	**Amount**	**Explanations**
WP7,8	MAN	Personnel	187.32 €	*Adjustment due to use of labor rates 2014 for months in 2014 of 1st reporting period (for which provisional rates of 2013 had been used)*
WP1,2,3,4,5,6	RTD		919.02 €	*Adjustment due to use of labor rates 2014 for months in 2014 of 1st reporting period (for which provisional rates of 2013 had been used)*
Total direct costs Form C			1,106.34 €	
MAN indirect costs			56.20 €	
RTD indirect costs			275.71 €	
Total claimed costs			1,438,24 €	

Table 3.2 Personnel, subcontracting and other major Direct cost items for Beneficiary 6 UNIVPM for the period Oct.2014 - Sept.2015			
Work Package	Item description	Amount	Explanations
2,3,4,5,6,7,8	Personnel costs	€ 61.491,35	*€ 46.689,31 WP 2,3,4,5,6* *€ 14.802,04 WP 7,8* *Cost of project participants:* *Full professors (co-financing):* *prof. Mauro Gallegati, Prof. Antonio Palestrini, Dr. Alberto Russo, Dr. Marco GiulianI* *Post-Doc* *Dr.ssa Annarita Colasante* *Ruggero Grilli*
3, 7	Other Costs: Travel	€ 10.945,86	
TOTAL DIRECT COSTS		€ 72.437,21	

Table 3.2 Personnel, subcontracting and other major Direct cost items for Beneficiary 7 JSI for the period Oct.2014 - Sept.2015

Work Package	Item description	Amount	Explanations
2,3,4,5,6,7	Personnel costs	46,316.49 €	*Senior researchers RTD 8,98 PMs*
2,3,4,5,6,7	Personnel costs	23,129.53 €	*Researcher RTD, 7,71PMs*
2,3,4,5,6,7	Personnel costs	4,015.70 €	*Young researchers, RTD, 2,81PMs*
8	Personnel costs	2,374.74 €	*Senior researcher, MNG, 0,4 PMs*
2,3,4,5,6,7,8	Travel costs	709.79 €	*Bled, Slovenia, 29.10.-1.11.2014, project meeting (7 attendees)*
2,3,4,5,6,7,8	Travel costs	1,104.34 €	*Brusseles, Belgium, review meeting, 16.-20.11.2014 (1 attendee)*
7	Travel costs	1,440.62 €	*attending NIPS conference, Montreal, Canada (presenting project related demo paper QMiner: Data Analytics Platform for Processing Streams of Structured and Unstructured Data), 7.-15.12.2015 (a attendee)*
6,7	Travel costs	517.72 €	*attending Edx - partially, Boston, USA, 4.-7.2.2015 (1 attendee9*
2,3,4,5,6,7,8	Travel costs	1,983.63 €	*Berlin, Germany, project meeting, 22.2.-1.3.2015, (2 attendees)*
2,3,4,5,6,7	Travel costs	3,801.07 €	*NY, USA, meeting at Bloomberg, 15.-22.3.2015, (1 attendee)*
7	Travel costs	2,568.61 €	*Firenze, Italy, attending WWW conference, 17.-23.5.2015, (1 attendee)*
6,7	Travel costs	1,443.29 €	*NY, USA, meeting at Bloomberg, 3.-13.5.2015, (1 attendee)*
2,3,4,5,6,7,8	Travel costs	569.78 €	*Castellon, Spain, project meeting, 7.-10.6.2015 (1 attendee)*
2,3,4,5,6,7,8	Travel costs	185.82 €	*Stefano Pacifico - accomodation costs for attending Symphony project meeting*
	Travel costs	365.32 €	*travel costs for Wray Buntine (tutorial on topic - modeling for Document clasification)*
	other	1,807.86 €	*licences, fees (Github, SharedCount, Dropbox, STI…)*
	Other	16,115.16 €	*payment for students working on the project (Mario Karlovcec, Luis Rei, Stefano Pacifico)*
	Other	2,875.50 €	*costs for project meeting Bled, Slovenia*
TOTAL DIRECT COSTS		111,324.97 €	

Table 3.2 Personnel, subcontracting and other major Direct cost items for Beneficiary 8 GW for the Period Oct 2014 – Sept 2015			
Work Package	Item description	Amount	Explanations
2,3,4,5,6,7,8	Personnel costs	34,519.71 €	*salaries of 1 Policy Officer for 9 months (Gerold Kier) and 2 Policy Officers for 12 months (Hendrik Zimmermann and Jan Burck)*
2,3,4,5,6,7,8	Remaining direct costs	2,819.13 €	*Travel costs for:* *a)project meetings in Bled-Slowenien (28.10.14-02.11.14 Hendrik Zimmermann) and Castellon (05.06.15-10.06.15 Hendrik Zimmermann)* *b)review meeting in Brüssel (19.11.-20.11.14 Hendrik Zimmermann) and* *c)internal project meeting:* *02.06.15-03.06.15 Berlin, Gerold Kier* *23.06.15-24.6.15 Berlin, Jan Burck* *26.8.15-28.08.15 Essen, Hendrik Zimmermann* *03.09.15-13.09.15 Bonn, Hendrik Zimmerman*
TOTAL DIRECT COSTS		37,338.84 €	

Table 3.9 Personnel, subcontracting and other major Direct cost items for Beneficiary 9 UJI for the period Oct 2014 – Sept 2015			
Work Package	Item description	Amount	Explanations
2, 3, 4, 5, 6, 7 & 8	Personnel	72,506.10 €	*Salaries of 5 permanent professors carrying out 5,14 person-months, 3 hired PhD students performing 10,28 person-months and a hired researcher carrying out 2,78 person-months.*
3 & 7	Travel	5,056.00 €	*SYMPHONY Q5 Plenary meeting in Bled (Slovenia), 29 Oct-3 Nov 2014, B.Ozel* *SYMPHONY Q5 Plenary meeting in Bled (Slovenia), 29 Oct-1 Nov 2014, A.Teglio* *1st Review meeting & GSS Cluster meeting in Brussels (Belgium), 18-21 Nov 2014, A.Teglio* *Workshop on Sustainability and Agent-based Model in Berlin (Germany), 21-25 Feb 2015, B.Ozel* *Workshop on Sustainability and Agent-based Model in Berlin (Germany), 22-25 Feb 2015, A.Teglio* *27th Annual EAEPE Conference in Genoa (Italy), 17-20 Sep 2015, A.Teglio* *Registration fees "IFABS 2015 Conference in Oxford (Sep 2015)" - M.Petrovic*
3	Consumables	3.42 €	*HDMI Cable*
3	Others	1,411.04 €	*Submission fee for "Journal of Economic Dynamics and Control"* *SYMPHONY Q7 Plenary meeting organised in Castellón (Spain). Catering & meals.*
3	Travel (adjustment to 1st Form C)	159.19 €	*Research stay at University of Kiel (Germany), 24 Apr-23 Jul 2014, A.Erdemir*
TOTAL DIRECT COSTS		79,135.75 €	