

# **XI JORNADAS DE CIENCIA E INGENIERÍA DE SERVICIOS**

*Santander, del 15 al 17 de Septiembre  
de 2015*

# PRESENTACIÓN

*Los servicios software se están convirtiendo en un factor clave en el crecimiento de cualquier economía. Este hecho ha motivado en los últimos tiempos el interés de los distintos actores económicos por desarrollar lo que ha denominado la "Ciencia de los Servicios", también conocida desde una perspectiva más amplia como "Ciencia de la Gestión e Ingeniería de los Servicios" (SSME). Se trata de una llamada a la acción dirigida principalmente a la Universidad, la Industria informática y la Administración pública, con el propósito final de crear principios, conocimientos, métodos y técnicas para articular sus respectivas responsabilidades y actividades en torno al concepto de servicio.*

*En este nuevo marco, las Jornadas de Ciencia e Ingeniería de Servicios (JCIS) surgen como un foro de discusión e intercambio de conocimiento y experiencias abierto a los distintos actores implicados. El interés no sólo se centra en los nuevos avances científicos, sino también en las tecnologías existentes en torno a la computación orientada a servicios y los procesos de negocio, las nuevas prácticas de ingeniería de servicios y las lecciones aprendidas a través de experiencias reales. Desde sus inicios JCIS proporciona un foro donde puedan darse encuentro todas las comunidades relacionadas con el ámbito de la Ingeniería de Servicios incluyendo los Servicios Web, SOA, BPM, Procesos de Negocio, etc. Con este enfoque pretendemos mantener e incrementar la participación de los profesionales de la Industria, la Administración Pública y los investigadores más relevantes en las áreas involucradas.*

*En esta nueva edición de JCIS se quiere potenciar el valor de las jornadas como foro para el encuentro, discusión y generación de sinergias tanto entre investigadores como entre empresas e investigadores. Para ello se anima al envío de artículos no solo que recojan trabajos técnicos sino que presenten reflexiones en torno a la Ciencia de la Ingeniería de Servicios.*

**JCIS 2015 es una conferencia organizada bajo los auspicios de Sistedes (<http://www.sistedes.es>) (Sociedad de Ingeniería del Software y Tecnologías de Desarrollo de Software).**



## **X Jornadas de Ciencia e Ingeniería de Servicios**

# **PROGRAMA**

*Programas de las Jornadas*

*Descargar el programa completo (Programa\_JCIS.pdf)*



# ACTAS

## KEYNOTE

**New Generation Service Systems & Applications: The Road Ahead** (Actas\JCIS

\abstractMichaelPapazoglou.pdf)

Michael P. Papazoglou.

## SESIÓN 1.1: SERVICIOS EN ACCIÓN

**Conservación de una Reserva Natural con un Enfoque Orientado a Servicios y Dirigido por Evento**

(Actas\JCIS\JCIS\_2015\_submission\_1.pdf)

Antonio J. Arjona-Rodríguez, Juan Boubeta-Puig and Guadalupe Ortiz.

**Algoritmo Híbrido de Composición Automática de Servicios con QoS.** (Actas\JCIS

\JCIS\_2015\_submission\_5.pdf)

Pablo Rodríguez-Mier, Manuel Mucientes and Manuel Lama.

**Towards Assessing Open Source Communities' Health using SOC Concepts** (Actas\JCIS

\JCIS\_2015\_submission\_7.pdf)

Oscar Franco-Bedoya, Marc Oriol Hilari, Carlos Müller, Jordi Marco, Pablo Fernández, Manuel Resinas, Xavier Franch and Antonio Ruiz-Cortés.

**Propuesta de una arquitectura de dispositivos como servicios con procesamiento de eventos** (Actas\

\JCIS\_2015\_submission\_16.pdf)

Juan Boubeta-Puig, Javier Cubo, Adrián Nieto Pérez, Guadalupe Ortiz and Ernesto Pimentel

## SESIÓN 1.2: NUEVAS ARQUITECTURAS PARA SERVICIOS

**Towards Collaborative Human-Centric CPS** (Actas\JCIS\JCIS\_2015\_submission\_8.pdf)

Javier Berrocal, Carlos Canal, Jose García-Alonso, Juan Hernández, Niko Mäkitalo, Tommi Mikkonen and J Manuel Murillo Rodríguez.

**IoT Compositions by and for the Crowd** (Actas\JCIS\JCIS\_2015\_submission\_10.pdf)

Ignacio Mansanet, Victoria Torres, Pedro Valderas and Vicente Pelechano.

## SESIÓN 1.3: PROYECTOS EUROPEOS EN SERVICIOS

**BETaaS: A Distributed Platform for Things as a Service** (Actas\JCIS\JCIS\_2015\_submission\_E1.pdf)

Francisco Javier Nieto.

**CloudWave: Agile Service Engineering for the Future Internet** (Actas\JCIS\JCIS\_2015\_submission\_E2.)  
Francisco Javier Nieto, James Ahtes

**SeaClouds: An Application Management System over the Clouds** (Actas\JCIS\JCIS\_2015\_submission\_E:  
Miguel Barrientos, Leonardo Bartoloni, Antonio Brogi, Mattia Buccarella, Jose Carrasco, Javier Cubo, France  
D'Andria, Elisabetta Di Nitto, Adrian Nieto, Marc Oriol, Ernesto Pimentel, and Simone Zenzaro

## SESIÓN 2.1: SERVICIOS CLOUD

**Estimación del coste de aprovisionar instancias de cómputo para ejecutar aplicaciones bag-of-task e  
cloud de Amazon** (Actas\JCIS\JCIS\_2015\_submission\_2.pdf)  
Pedro Alvarez, Sergio Hernández, Javier Fabra y Joaquin Ezpeleta

**Definición de Mecanismos Personalizados de Monitorización de Servicios Cloud** (Actas\JCIS  
\JCIS\_2015\_submission\_4.pdf)  
Priscila Cedillo, Javier Jimenez-Gomez, Silvia Abrahao and Emilio Insfran

**Perfil UML para el Modelado de la Integración de Servicios Cloud en Procesos de Desarrollo Increme  
(Actas\JCIS\JCIS\_2015\_submission\_14.pdf)**  
Miguel Angel Zúñiga Prieto, Silvia Abrahao and Emilio Insfran

**Towards SLA-Driven API Gateways** (Actas\JCIS\JCIS\_2015\_submission\_12.pdf)  
Antonio Gámez-Díaz, Pablo Fernández and Antonio Ruiz-Cortés

## SESIÓN 2.2: PROCESOS DE NEGOCIO

**Towards Defining Data-Based Thresholds for Process-Related KPIs** (Actas\JCIS  
\JCIS\_2015\_submission\_6.pdf)

Adela Del-Río-Ortega, Félix García, Manuel Resinas, Francisco Ruiz and Antonio Ruiz-Cortés

**Reduciendo la complejidad gráfica de indicadores de procesos de negocio usando abstracción** (Actas\  
\JCIS\_2015\_submission\_9.pdf)

Irene Bedilia Estrada Torres, Adela Del Río Ortega, Manuel Resinas and Antonio Ruíz Cotés

**On the Calculation of Process Performance Indicators** (Actas\JCIS\JCIS\_2015\_submission\_11.pdf)  
Antonio Manuel Gutiérrez-Fernández, Manuel Resinas, Adela Del-RíoOrtega and Antonio Ruiz-Cortés

## SESIÓN 2.3: TRABAJOS PUBLICADOS Y DE POSICIONAMIENTO

**ProDiGen: Mining complete, precise and minimal structure process models with a genetic algorithm**  
(Actas\JCIS\Publicado.pdf)

Borja Vázquez-Barreiros, Manuel Mucientes, Manuel Lama

**Towards a Comprehensive Purchasing Model for Cloud Services** (Actas\JCIS\JCIS\_2015\_submission\_13)  
Octavio Martín-Díaz, Pablo Fernandez, Jose Maria Garcia and Antonio Ruiz-Cortés

**SafeWalks: aplicación móvil de supervisión de pacientes de Alzheimer** (Actas\JCIS

\JCIS\_2015\_submission\_15.pdf)

Pablo Pérez Lozano, Alejandro Pérez Vereda, Juan Manuel Murillo and Carlos Canal

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# Towards Defining Data-Based Thresholds for Process-Related KPIs\*

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**Abstract.** The definition of process-related key performance indicators (KPIs) is a key part of performance measurement and one of the most challenging because of the lack of one best way to define business-applicable KPIs that are both aligned with the strategic goals that the organisation wants to achieve and, at the same time, achievable in its context. It requires the identification of relevant threshold values able to distinguish different levels of process execution quality. However, obtaining these values remains an organization-specific task based on human abilities and no consensual technique exists. To overcome this problem, this paper introduces a methodology for threshold determination that considers not only the expert opinion but also data from real process executions.

## 1 Introduction

In process-oriented organizational settings, the evaluation of process performance plays a key role in obtaining information on the achievement of their strategic and operational goals. This evaluation of performance measures implies “having an alarm whenever the value of the specific measure exceeded some predetermined value” [1, 2], also called threshold [3].

One of the major challenges when implementing a performance measurement system for continuous improvement of business processes is related to the lack of one best way to define business-applicable process-related KPIs that are aligned with the strategic goals that the organisation wants to achieve while, at the same time, are achievable in its context. These requirements for process-related KPIs, also known as Process Performance Indicators (PPIs) [4], are determined

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by the *SMART* criteria that any indicator must fulfill, where SMART is an abbreviation for *Specific, Measurable, Achievable, Relevant* and *Time-bounded*.

Though most process best practice or reference frameworks such as ITIL, SCOR or CMMi provide PPIs for the processes defined in them, the specification of thresholds remains an organization-specific task that does not follow any methodology or best practices framework. In current state of practice, definition of PPI thresholds is usually carried out by experts based on their previous knowledge and intuition, and sometimes following a trial and error model. This is far from desired, since, according to [5], definition of thresholds requires a theory and a practical base and it should meet certain requirements: not being based on experts opinion, but on measurement data; respecting the statistical properties of the measure, such as measure scale and distribution, and be resilient against outlier values; and being repeatable, transparent and easy to carry out.

To overcome this problem, in this paper, we propose a methodology for determining PPI thresholds, where not only the expert opinion is taken into account but also data obtained from previous process executions.

## 2 Methodology for PPI Threshold Determination

Based on previous results [6, 7], where several statistical techniques have been applied to determine thresholds for different business process model measures, we propose a methodology to define PPI thresholds considering both, expert opinion and process execution data, whose main steps are the following:

**Context Selection:** First, the context needs to be selected, i.e. the organisation, its business process and the PPI set for which thresholds are to be defined.

**Experts Feedback:** Then, some interviews with experts are required, so that they, based on their knowledge about the process and its context (organisation, section, experience), can provide their opinion about the values they propose as thresholds for the selected PPIs.

**Execution Data Gathering:** Process execution data, including PPI values, need to be gathered from existing sources such as event logs, or other process aware information systems (PAISs).

**Threshold Determination:** Taking as input both, data provided by the experts and PPI values obtained from real process executions, several statistical techniques found in literature can be applied to determine best threshold values for the selected PPIs.

**Threshold Validation:** Once a group of threshold values is determined, it is interesting to know how efficient they are in classifying process executions according to the selected PPIs, that is, to validate the suitability of the threshold values obtained. For performing this step, we will follow the methods applied in [6, 7] to validate them, for which statistical techniques, such as ROC curves, and approaches from the information retrieval field, such as the calculation of Precision and Recall based on true/false positives and

negatives, can be applied. In both cases, real execution data will be again used, but cannot be the same as the used for threshold determination.

**Dashboard Development:** Finally, it would be very useful from a practical point of view to provide a dashboard including the PPI thresholds obtained so that process executions can be classified according to them and alerts can be established in case of undesired values.

### 3 Ongoing and Future Work

The methodology proposed above is being currently applied to a real case in one of the divisions of the Andalusian Health Service. In this case, the Delphi method is being used for obtaining the experts feedback. Process execution data is directly provided by the PAIS they use in their daily work. For the thresholds determination, statistical techniques such as ROC curves or the Bender method are being considered. Regarding the thresholds validation, we plan to use ROC curves too.

Finally, we plan to implement a software tool that assists users in applying this methodology. Furthermore, this tool will integrate a semaphoric dashboard including the selected PPIs, their execution values and the determined thresholds. This dashboard will provide charts where, using a red–yellow–green code, the user can identify how good/bad the process executions were according to the threshold values.

### References

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