GABRIELE NOVEMBRI
Curriculum Vitae
Place Rome
Date 8/03/2021

Part I – General Information

Full Name	Gabriele Novembri
Spoken Languages	Italian, English

Part II – Education

Type	Year	Institution	Notes (Degree, Experience,…)
University graduation	1982	University of Rome “La Sapienza”	Master's degree in Civil Engineering, Construction section, summa cum laude (110/110).
Habilitation	1982	University of Rome “La Sapienza”	Professional Habilitation
Military service	1983	Military Engineering Corps,	Lieutenant
PhD	1989	University of Rome “La Sapienza”	“Building Design and Knowledge Engineering techniques”
Academic qualification	1991	University of Rome “La Sapienza”	Research Fellow
Professional License	1994	Association of Engineers	Licensed safety coordinator
Professional License	1995	Interior Ministry	Fire protection engineer Licence n° RM13489I01780
Professional License	2018	Lazio Region	Qualified engineer in acoustics Licence n° 7537
Professional License	2018	MP Auditing	Licensed Bim Manager licence N. IT_187_18_B

Part III – Appointments

IIIA – Academic Appointments

Start	End	Institution	Position
1988	1989	University of Rome “Sapienza”	Adjunct professor of the complementary course on 'Computer-aided design methodologies'.
1991	2021	University of Rome “Sapienza” Faculty of Engineering	Research Fellow SSD ICAR/11
2000	2021	University of Rome “Sapienza” Faculty of Engineering	Aggregate Professor of " Construction Site layout design and planning”
2020	2021	University of Rome “Sapienza” Faculty of Engineering	Aggregate Professor of " Construction site Operational Design”
2021	2021	University of Rome “Sapienza” Faculty of Engineering	Aggregate Professor of " Construction Site layout design and safety”
2020	2021	University of Rome "La Sapienza" – PhD “Engineering-based Architecture and Urban Planning”	Scientific Board
2020		National Scientific Habilitation 2018-2020	II° Fascia

IIIB – Other Appointments

Start	End	Institution	Position
01/01/1989	31/12/1995	CARTESIANA Consortium – "Building Finalized Project,"	Scientific and Technical Director
01/09/2016	2021	DaaDgroup (Digital augmented architectural Design group)	Vice-Director
2017	2021	O.I.C.E. Italian Organisation of Foreign Consultants	Probo Viro

Part IV – Teaching experience

Year	Institution	Lecture/Course
1988	University of Rome "La Sapienza"	Lectures/Computer-aided design methodologies
2000	University of Rome "La Sapienza"	Lectures/Construction Site layout design and planning
2020	University of Rome "La Sapienza"	Lectures/Construction site Operational Design
2021	University of Rome "La Sapienza"	Lectures/Construction Site layout design and safety
2020	University of Rome "La Sapienza"	Seminars/PhD in "Construction and management of airport infrastructures
2020	University of Rome "La Sapienza"	Seminars/PhD in Architecture and Urbanism Engineering

Part V - Society memberberships, Awards and Honors

Year	Title
2005	ISTeA - Italian Society of Science, Technology and Engineering of Architecture
2016	DaaD group - Digital advanced architectural Design

Part VI - Funding Information [grants as PI-principal investigator or I-investigator]

Year	Title	Program	Grant value
1989-1995	KAAD Knowledge Assistant for Architectural design	**"National Research Council CNR"**	**PI € 500.00,00**
		The research activity carried out by the CARTESIANA research unit had as its objective the development of a software system aimed to the building and architectural design support which, contrary to the systems currently available, was able to provide real support in the initial stage of the design activity. In the first phase of the research activity, the operational unit defined the methodological defined from a methodological point of view and realised a prototype software system called KAAD (Knowledge-based Assistant for Architectural capable of verify design choices against a system of constraints. Another way of looking at the role that KAAD can play in the design activity is to codify and make operational the knowledge that are normally used in the design process. A Knowledge Base contains information about the building objects, the choices the designer is making and the constraints that the choices the designer is adopting must respect a fulfil.	
1998	Innovative materials and methods for restoration works in heritage buildings	**Athenaeum 40%**	**PI (€ 2000)**
		The research activity was aimed at the definition of innovative procedures for consolidation works on existing buildings.	

		Although new technologies and new materials for the execution of restoration works on existing buildings are nowadays made available, compatibility with the existing structures and the procedures with which they are carried out are often poorly understood. The research activity is aimed to analyse the problems that the application of these new technologies poses and to evaluate the opportunity of new materials utilization to application not originally foreseen.	
2016	New technologies for the design/management of reuse works on the heritage buildings. Case study on historical or modern buildings: definition of the building organism in BIM, reuse of the building, conservation of stone elements, construction site layout design and management.	**Athenaeum call - small**	**I (€4000)**
		The research unit's project was focused on the definition of a predictive model aimed at the optimization of the resources, both material and immaterial, required for the successful execution of construction work. The model will be defined in order to properly operate in constrained environments, in line with the current context, which is increasingly oriented towards works on buildings. The need for this research, in fact, derives from the evidence that, at the present time, the methodologies commonly used for work planning are not able to effectively manage the complexity and multiplicity of factors, often conflicting, that characterise the design process and, consequently, the construction phase of architecture. In this sense, many expectations are placed on the adoption of the ¿Building Information Modeling methodology, recently introduced also in the legislation on public procurement, to manage the amount of information related to the building object. This methodology, however, in the current state of the art, is more directed towards the design aspects rather than the construction aspects and, although it constitutes a valid visual support for the management of the temporal phases, it does not fully support the designer in the decision-making phases of building production. The objective of the research is therefore the formulation of an effective method of site management, supported by appropriate innovative digital technologies. Therefore, on the basis of the most widespread BIM software platforms, applications will be developed that are able, thanks to the inference between intelligent agents, to simulate construction site situations in advance. Moreover, the intelligence of the agent can be expressed on different levels: from a low level, exclusively reactive, to higher levels of abstraction, allowing a proactive approach to problem solving.	
2017	Integrating 'Agents' and BIM for building design and construction site planning	**Athenaeum call - small**	**PI (€ 3000)**
		The research derives from the need to provide the "actors" of the building process with tools and methodologies to support them in governing the complexity and multiplicity of aspects that characterize the design, construction and management of a building. An innovative approach to the design process has been achieved thanks to the constant reliability and pervasiveness of digital design support tools, which are being used by an increasingly wide range of users to the point of becoming, in some regulatory contexts, a requirement. However, in the current state of affairs, these tools are limited to the enrichment - only informative - of geometries, which are in any case deficient in linking the project dimension to the dynamic and "unpredictable" dimension of construction work. Although the Building Information Modeling (BIM) methodology provides the 4D (time management) and 5D (cost management) dimension, these represent only additional data owned by the objects themselves, as they do not have the ability to support designers with analyses on the feasibility of works according to certain propedeuticities, or a predictability on the time and cost of realisation. The objective of the proposed research is therefore the creation of a prototype of a support system for building design, with specific reference to the preparation of the programme of worksite	

		activities, aimed at the proactive management of architectural construction processes. This system is based on the interaction between the basic BIM model, which represents the context in which the works are carried out, and the results of simulations of "Dynamic Agents", which describe the highest probability that a work is feasible given certain boundary characteristics, and the relative times and costs.	
2018	Modelling, simulation and design optimisation of hospital or historical building construction through AI, agent and AR methodologies and techniques	**Athenaeum call - medium**	**I (€ 11000)**
		The research aimed to the creation of a prototype of a support system for building design with specific reference to the preparation of the schedule of construction site works, designed to proactively govern the processes of architectural construction. The system is based on the interaction between the basic BIM model, which represents the context in which the works are carried out, and the results of simulations of "Dynamic Agents", which describe the highest probability that a work is feasible given certain boundary characteristics, and the relative times and costs. The research has led to the development of frameworks and prototypes presented at international conferences, including eCAADe 2017, of which the candidate was organiser and co-chair.	
2018	TPTI TERNI - Techniques, Heritage and Industrial Territories in the Province of Terni	**Athenaeum call - medium**	**I (€12.200)**
		Construction of a Geo-BIM operational workflow to support a multi-scalar and multi-disciplinary approach to regeneration of multi-scalar and multi-disciplinary approach to regeneration. The construction of knowledge of industrial heritage are censuses and cataloguing of assets that help place them in history, in places and give them value places and give them value.	
2020	Agent-based simulation and management of the design process for healthcare buildings or public buildings in the pandemic era	**Athenaeum call - small**	**PI (€ 3600)**
		The new attitudes towards interpersonal distances and public hygiene force us to reconsider consolidated habits and the functional-distributive conformation of buildings. In this context, the simulative approach can support the decisions of designers and administrations, thanks to the possibility of virtually testing the behaviour of users combined with building characteristics and usage scenarios. This study is not only addressed to the pandemic case, but is of general applicability, and can be declined for specific problems. To this end, we propose a simulative "agent" model that allows us to model the users of the building as autonomous entities, characterised or not by the sharing of rules such as the respect of signs, the average time of standing at a point and other factors that, in general, lead to configure groups of people as a "swarm of agents". In this way, it is possible to predict the potential risks for the spread of viruses, dust and pollutants, using among the parameters also the control of mutual distance, and the possible situations of interaction in the use of the building. This process allows two types of evaluation: at a qualitative level, it is possible to visualise how users move around the space; at a quantitative level, it is possible to more accurately measure possible situations of risky contact. The overall result is to have a tool for a more risk-aware and safer design. To validate the methodology, a case study will be conducted based on the BIM model of a hospital structure. The software prototype will use the Unity3D simulation engine to develop a user interface that can be used by non-experts. Furthermore, the prototype will interface with Virtual Reality tools to define and verify the building space in an "immersive" way.	

Part VII – Research Activities

Keywords	Brief Description

Knowledge Engineering Agent Swarm Modeling Dsign Activity Proactive Productivity Swarm Modeling KAAD BIM Commonsense Knowledge Architectural Design Construction site design Construction site management	Gabriele Novembri has been working on new approaches to building and architectural design, construction site planning and management for many years, believing that the use of software systems and AI techniques can offer a strategic support for the whole building process improving the efficiency growth of the sector. The comparison between the productivity increases of the construction sector compared to other industrial sectors is indeed quite dramatic. In the last fifty years, production of industrial sector has considerably grown, in contrast to the productivity of the building sector which does not appear to have significantly improved its productivity in the same period. Since the mid-1960s, demand for housing has almost tripled. While, in the same period, the manufacturing industry achieved an overall increase in productivity of 220%, the construction sector decreased simultaneously by 25% his productivity. Tools and resources available must necessarily undergo a deep transformation process in order to guarantee the required productivity growth. Gabriele Novembri carries out a research activity aimed to this end exploring the designer-computer interaction in order to define support tools for building and architectural design that can play a pro-active role in the whole building process using Knowledge Engineering and Artificial Intelligence techniques. In the 1990's developed an innovative design support system called KAAD (Knowledge Assistant for Architectural Design) considered one of the first prototypes in the sector. It has recently defined an innovative approach to building modelling defined as Swarm Building modelling in which building components are simulated by intelligent agents that, with the support of a BIM system, interact each other and with the designer assuming a proactive role in the design activity. Information managed through a traditional BIM system are so enriched and completed in order to provide building objects with a typical behaviour of Multi-Agent systems aimed to verify the choices made by the designer from the early stages of the design activity while providing a proactive behaviour to the overall system. Agents can manage "hard constraints" using "Commonsense Knowledge" and the so-called "Thumb rules" and "Mandatory Constraints" derived from the regulations are represented, manged and transformed into active components The multi-agent system through Distributed Constraint Optimisation problem-solving techniques can evaluate the design choices taken by the designer as well as autonomously suggest, in the course of the design activity, better or alternative solutions with respect to undertaken ones searching for solution characterized by high levels of satisfaction of Hard and Soft Constraint. The Swarm Building modelling approach have been tested in order to achieve reliable prediction of work tasks and cost starting from the early design stages is, however, a key factor in order to respect the expected construction schedules and costs and, in general, to achieve an appropriate productivity.

Part VIII – Summary of Scientific Achievements

The hereby undersigned Gabriele Novembri intends to take part, in compliance with art. 24, paragraphs 5 and 6, of law n. 240/2010, to the evaluation procedure for the appointment of n. 1 second level Professor at the Department of Civil, Building and Environmental Engineering - Faculty of Civil and Industrial Engineering – Recruitment Field 08/C1 SSD ICAR/11 for which the procedures for the national scientific qualification are classified as non-bibliometric. The Summary of Scientific Achievement related to the national scientific qualification procedure[1] are:

Papers	16	>	14
Papers in A-class journals	1	=	1
No. of books	1	=	1

The Summary of Scientific Achievement are:

Papers	8
Papers or chapters	13
Books	1
Communication in a congress	5
Communication in a congress volume	19
Abstract	1
PhD Thesis	1
Design	1
Engineering product	2

Part IX– Selected Publications

List of selected publications.

1	2020	"**Introduction to Proactive Design. Toward the implementation of BIM methodology for managing complexity in architectural projects"** pp.11-13. In Sustainability and Automation in Smart Constructions - ISBN:978-3-030-35532-6. In Advances in Science, Technology & Innovation - ISSN:2522-8714 Novembri, Gabriele; Rossini, Francesco Livio; Fioravanti, Antonio
2	2020	Journal paper: Novembri, Gabriele, Rossini, Francesco (2020). "**Swarm Building Information Modeling: an hybrid Agents-Actor framework to improve design support systems capabilities**." Electronic Journal of Information Technology in Construction, vol. 25, p.398-415, ISSN: 1403-6835
3	2019	Monography Novembri, Gabriele (2019). "**Building Swarm Modelling**" ARTI, Rome: Ginevra Bentivoglio, ISBN: 9788831347150
4	2018	Journal paper Antonio Fioravanti, Gabriele Novembri, Francesco Livio Rossini "**A theoretical framework to align lean construction techniques**" in the 4.0 building industry. IN BO, vol. 09, p. 184-191, ISSN: 2036-1602
5	2018	Volume Contribution Novembri Gabriele, Fioravanti Antonio, Rossini Francesco Livio "**Improving the integration between BIMs and Agent-Based Simulations. The Swarm Building Modeling – SBM**"

[1] Source IRIS – CINECA 05/03/2021 16.32.44

		In: Karlshoi Jan; Scherer Raimar Joseph. eWork and eBusiness in Architecture, Engineering and Construction, proceedings of the 12th European Conference on Product and Process Modelling (ECPPM 2018), Copenhagen, Denmark, 12-14 September 2018. p. 123-126, Leiden; Boca Raton: CRC Press/Balkema ISBN: 978-0-429-50621-5
6	2017	Volume Contribution Novembri Gabriele, Fioravanti Antonio, Rossini Francesco "**Construction time and cost optimization using A.I. and statistical methods, through Bayes-Point Machines.**" In: Ciribini Angelo; Alaimo Giuseppe; Capone Pietro; Daniotti Bruno; Dell'Osso Guido; Nicolella Maurizio. Re-shaping the construction industry. POLITECNICA, vol. 1, p. 40-49, Sant'Arcangelo di Romagna (RN) Maggioli spa, ISBN: 978-88-916-2486-4, ISSN: 2240-4392
7	2017	Volume Contribution Novembri, Gabriele, Rossini, Francesco, Fioravanti, Antonio "**Actor-Based Modeling design intentions on BIM systems**." In: Ciribini Angelo; Alaimo Giuseppe; Capone Pietro; Daniotti Bruno; Dell'Osso Guido; Nicolella Maurizio. Re-shaping the construction industry. POLITECNICA, vol. 1, p. 30-39, Sant'Arcangelo di Romagna (RN) Maggioli spa, ISBN: 978-88-916-2486-4, ISSN: 2240-4392
8	2017	Conference proceedings paper Rossini, Francesco, Novembri, Gabriele, Fioravanti, Antonio "**AS&BIM - A Unified Model of Agent swarm and BIM to Manage the Complexity of the Building process**." In: Future Trajectories of Computation in Design, Proceedings of 17th International Conference, CAAD Futures 2017 Istanbul, July 12-14, 2017. vol. 1, p. 321-332, Istanbul, TK:Cenklar, ISBN: 978-975561-480-9, Istanbul, 12-14/07/2017
9	2017	Conference proceedings paper Fioravanti, Antonio, Novembri, Gabriele, Rossini, Francesco "**Improving Proactive Collaborative Design Through the Integration of BIM and Agent-Based Simulations**." In: Shock! Sharing of Computable Knowledge, v.1 Proceedings of the 35th International Conference on Education and Research in Computer Aided Architectural Design in Europe. vol. 1, p. 103- 108, Bruxelles and Rome: eCAADe and DICEA, Sapienza - University of Rome, ISBN: 9789491207129, Rome, 20-22/09/2017
10	2016	Conference proceedings paper Rossini, Francesco, Novembri, Gabriele, Fioravanti, Antonio, Insola, Cristiano "**Integrating BIM and agent-based modelling for construction operational optimization - a LBS approach**" ECPPM 2016. vol. 1, p. 627-635, Leiden; Boca Raton; London; New York: CRC Press/Balkema (a company of Taylor & Francis Group, London, UK), ISBN: 978-1-138-03280-4, Limassol, Cyprus, 7-9 September 2016

15/09/2021

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