UNIVERSITÀ
DEGLI STUDI
DI SALERNO

UNIVERSITY OF SALERNO

XVI Summer School "Francesco Turco" Impianti Industriali Meccanici
Abano Terme (Padova, Italy) - 14-16 September 2011

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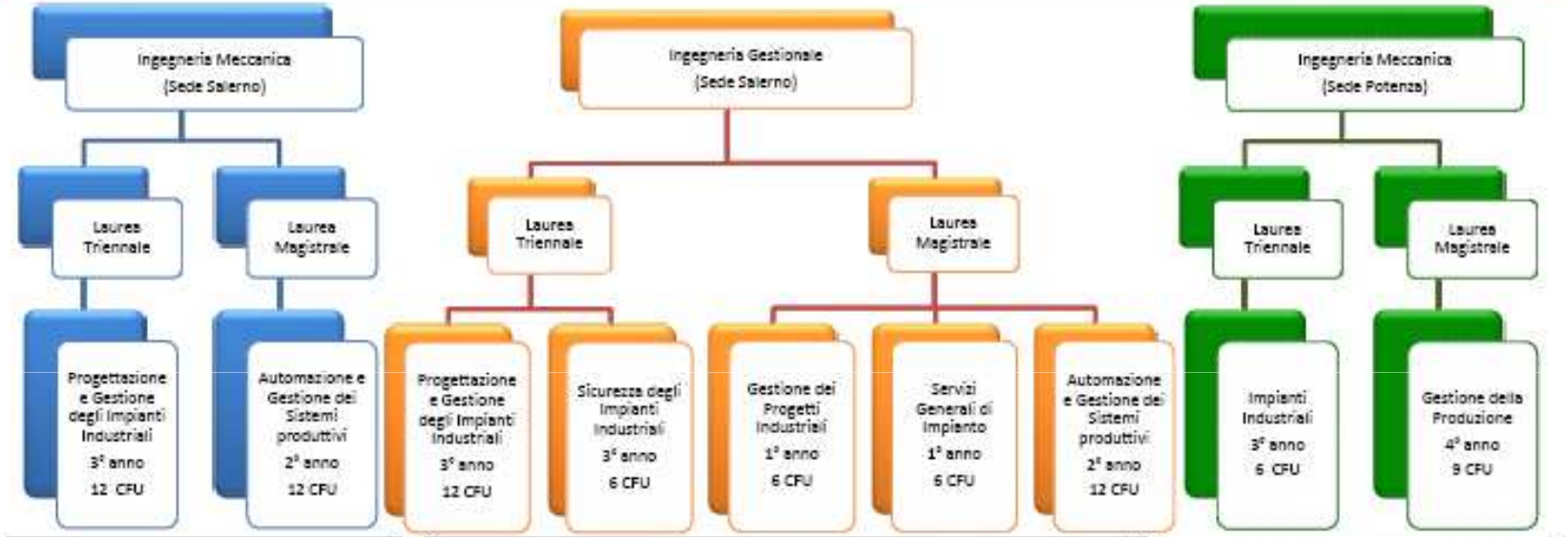
TEACHING ACTIVITY



Ph.D. School in "Engineering and Economics in Innovation"

Head prof. Stefano Riemma
4 scholarship/year

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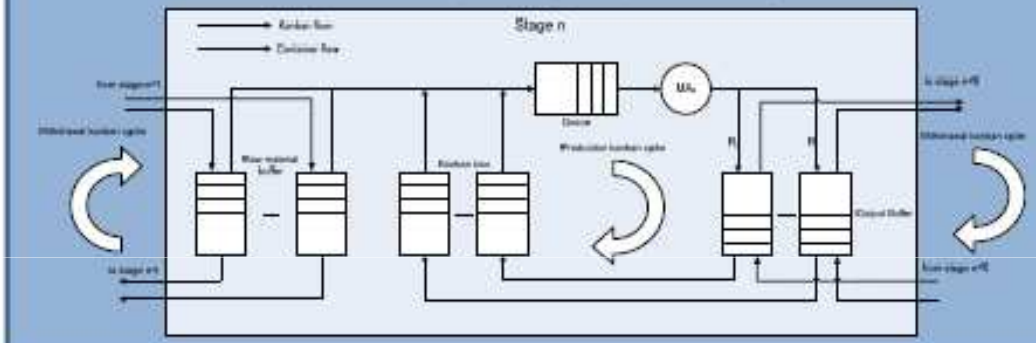
PRODUCTION SYSTEM DESIGN

A heuristic procedure to determine the number of kanban

Problem formulation

$$\sum_{i} a \cdot ct + \sum_{i} g \cdot ch + \sum_{i} r \cdot ct + \sum_{i} |D - p| \cdot ch \longrightarrow \text{Min}$$

setup · inventory · transportation · backlog



Procedure

step 1. *Determination of the Economic Production Quantity.*

$$EPQ_j = \sqrt{\frac{2 \cdot cs_j \cdot d_j}{ch_j \cdot (1 - d_j / p_j)}}$$

step 2. *Determination of the economic cycle of production kanban in MA_i cell (T_j).*

$$T_j = EPQ_j / d_j$$

step 3. *Determination of production kanban.*

$$kp_j = \frac{d_j \cdot (T_j + t_q + \sigma_j)}{c_j}$$

step 4. *Determination of withdrawal kanban.*

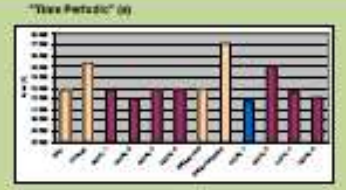
$$kw_j = \frac{d_j \cdot (T_{i-1} + Tw_j + \sigma_j)}{c_j}$$

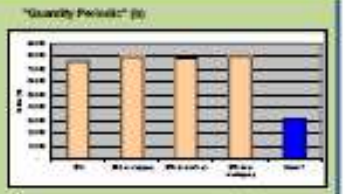
step 5. *Simulation.*

step 6. *Optimization of container size.*

Simulation

	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Cell 6
No. of Items	1	1	1	1	1	1
Raw material	4	4	0	0	0	0
Machine	TR1a(3.3,3.8,5.0)	TR1a(2.3,3.0,5.0)	TR1a(3.3,3.5,4.5)	TR1a(4.0,4.5,6.0)	TR1a(3.0,4.0,4.5)	TR1a(3.0,4.0,4.5)
Setup time	0	TR1a(2.2,3.0,4.0)	0	0	TR1a(1.5,2.0,3.4)	TR1a(1.5,2.0,3.4)
Transport. Time	-	Horiz(0.3,1.0)	Horiz(0.3,1.0)	Horiz(0.3,1.0)	Horiz(7.2,5.0)	Horiz(7.0,2.0)





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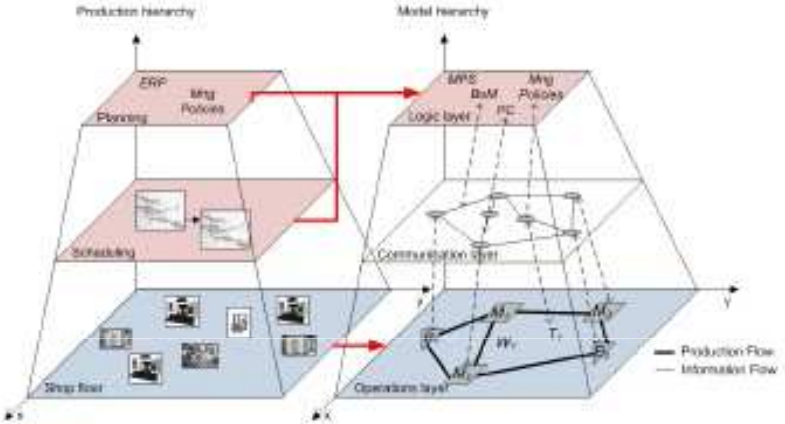
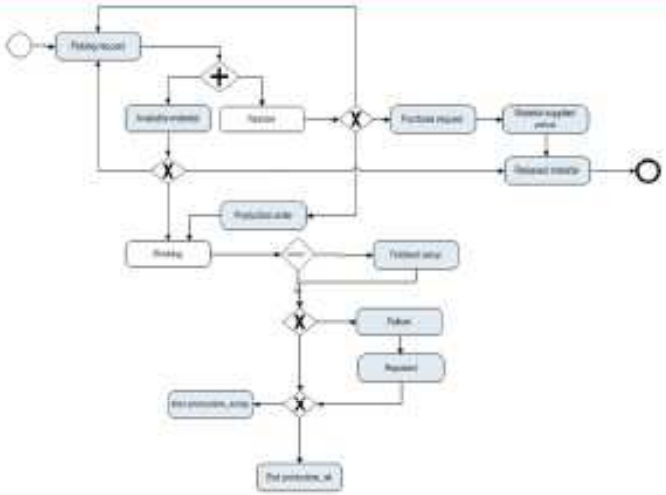
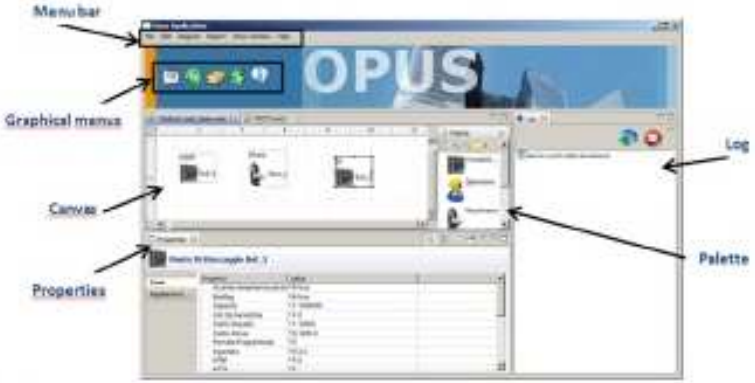
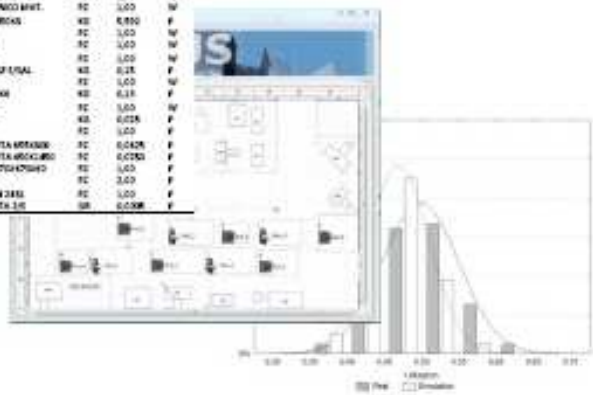
PRODUCTION SYSTEM DESIGN

Optimizing Production Using Simulation









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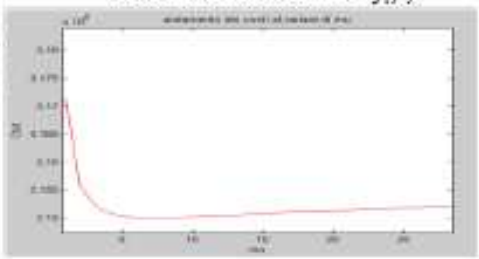
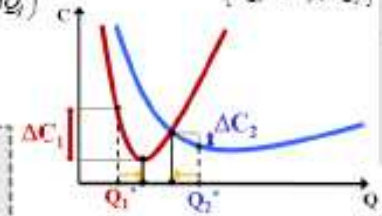
Stock Management in presence of space restrictions

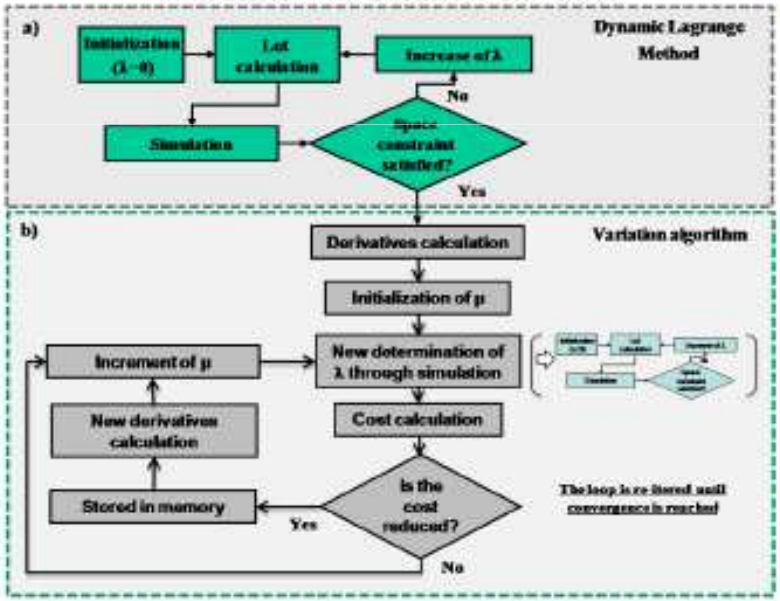
Modified formula of the Lagrange multipliers: $Q_i = \sqrt{\frac{2 \cdot C_i \cdot d_i \cdot T}{k_i \cdot T + \lambda \cdot v_i + \mu \cdot \left(\frac{dC_i}{dQ_i} - \frac{1}{N} \sum_{j=1}^{N} \frac{dC_j}{dQ_j} \right)}}$ Where: $\mu > \max_i \left\{ \frac{k_i \cdot T}{\frac{dC_i}{dQ_i} - \frac{1}{N} \sum_{j=1}^{N} \frac{dC_j}{dQ_j}} \right\}$

Total Cost Function CT= f(μ)

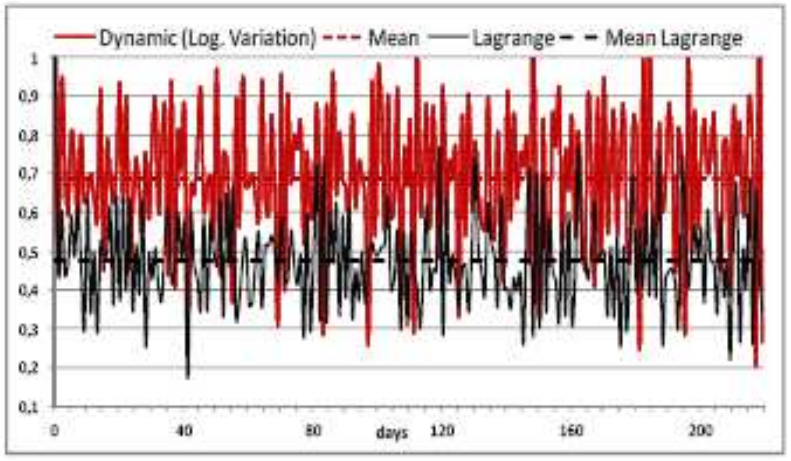




2-steps algorithm for lot sizes calculation

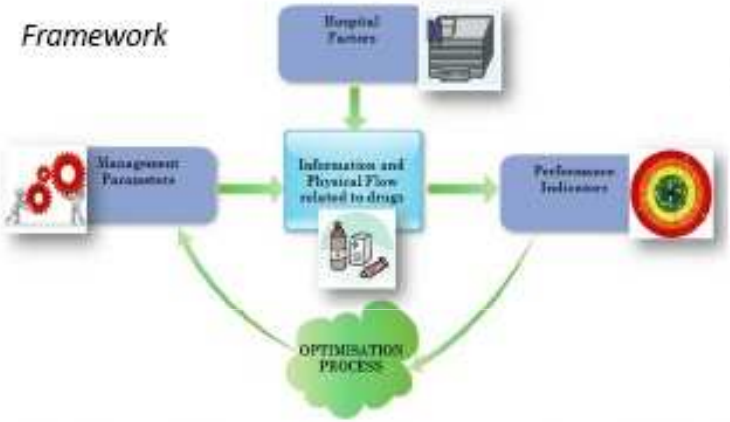


Comparison with the classical approach (Warehouse Saturation)

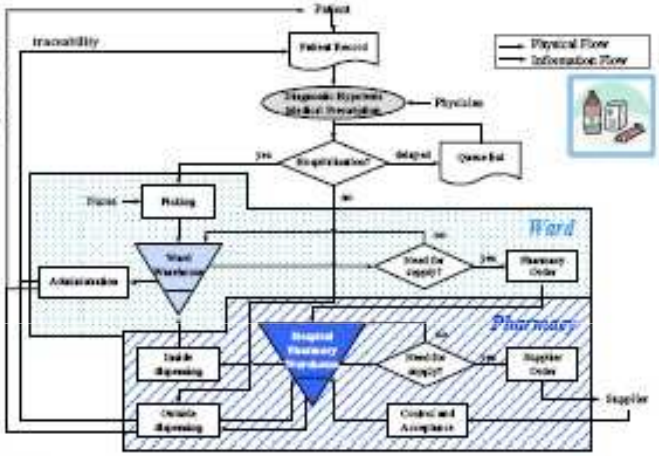


Conceptual framework for drug management optimisation in hospital

Framework

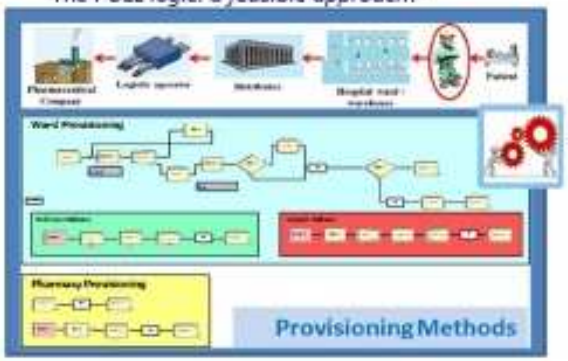


Information and Physical flow



Ongoing activities: optimisation process through simulation

The PULL logic: a feasible approach?



Components of the simulated system

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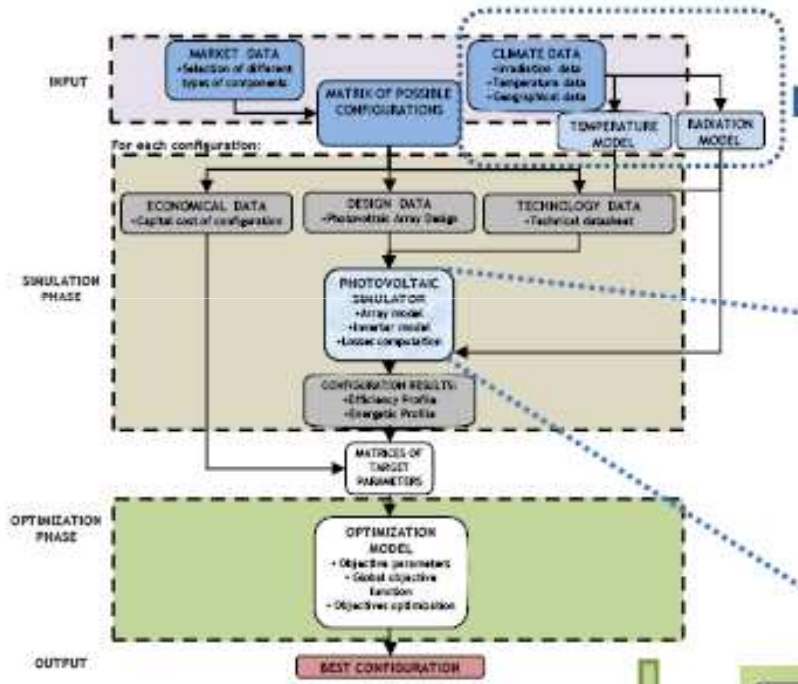
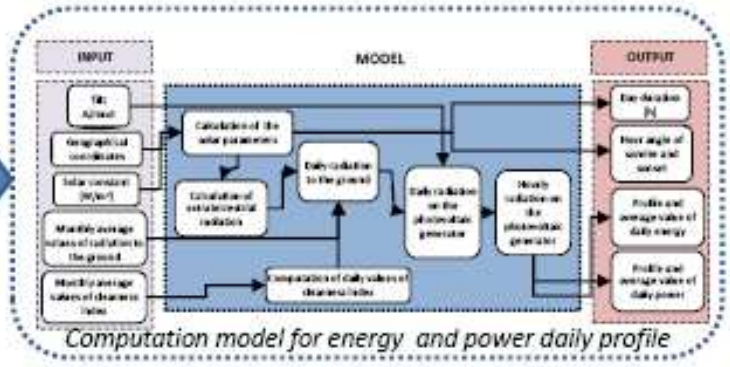
RENEWABLE ENERGY SISTEMS DESIGN AND OPTIMIZATION

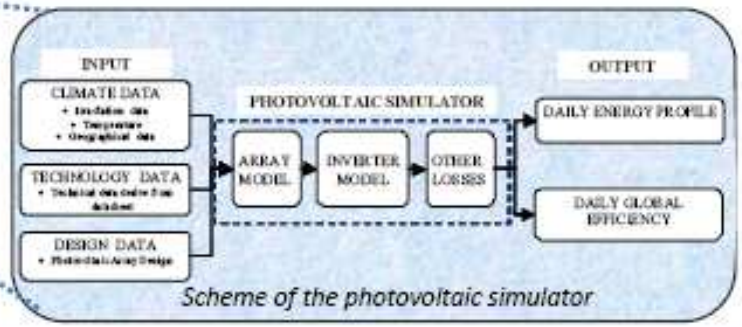
Integrated model for the optimization of grid-connected photovoltaic plants



General scheme of the model



Computation model for energy and power daily profile



Scheme of the photovoltaic simulator

Steps of the optimization phase

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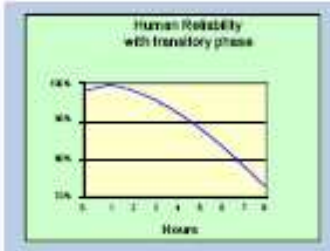
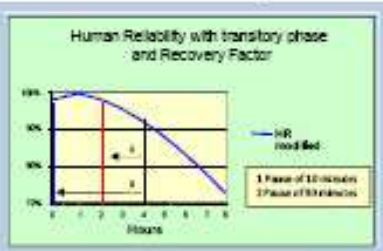
HUMAN RELIABILITY ANALYSIS

A simulative model for the automatic pause determination

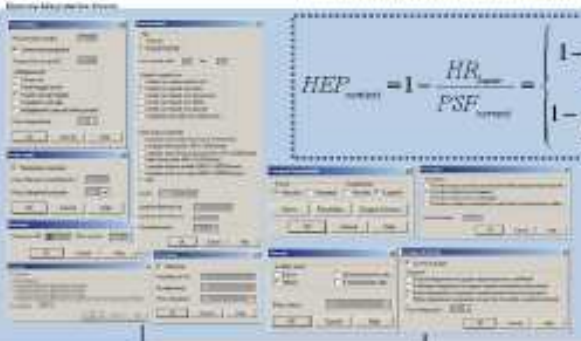




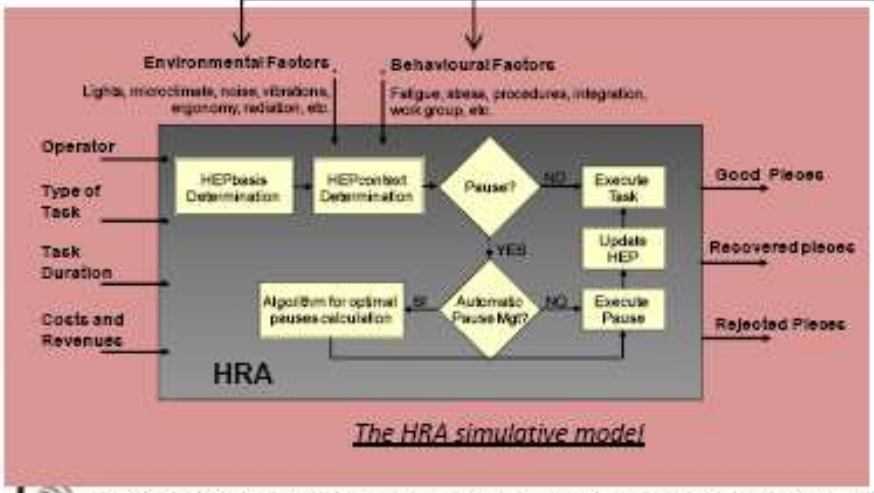
$$HEP_{task}(t) = 1 - k \cdot e^{-a(t-t)^b} \quad \forall t \in [0,1]$$
$$HEP_{task}(t) = 1 - k \cdot e^{-a(t-t)^b} \quad \forall t \in [1,\infty[$$

$$HEP_{Recovery}(T) = 1 - e^{-a(T+\ldots)^b}$$

$$HEP_{current} = 1 - \frac{HR_{current}}{PSF_{current}} = \begin{cases} 1 - \frac{k}{PSF_{current}} \cdot e^{-a(t-t)^b} & \forall t \in [0,1] \\ 1 - \frac{k}{PSF_{current}} \cdot e^{-a(t-t)^b} & \forall t \in [1,\infty) \end{cases}$$

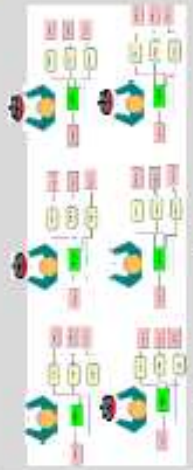


Human Reliability Teoretic Modelization

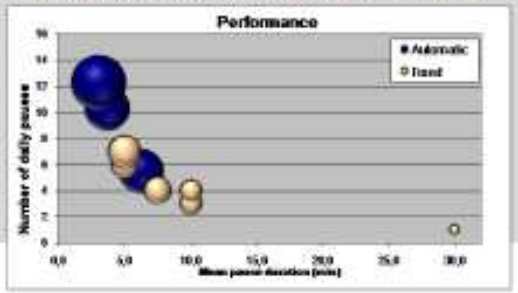


The HRA simulative model

The Case Study



Product	A	B	C
Cycle Time min (minutes)	30	22	12
Cycle Time min (minutes)	35	25	15
Cycle Time max (minutes)	38	30	18
Unit Price (€)	150	100	80
Unit Fixed Cost (€)	95	55	32
Unit Variable Cost (€)	30	10	20
Production Mix (scenario 1)	10%	20%	70%
Production Mix (scenario 2)	30%	50%	20%
Production Mix (scenario 3)	10%	80%	10%



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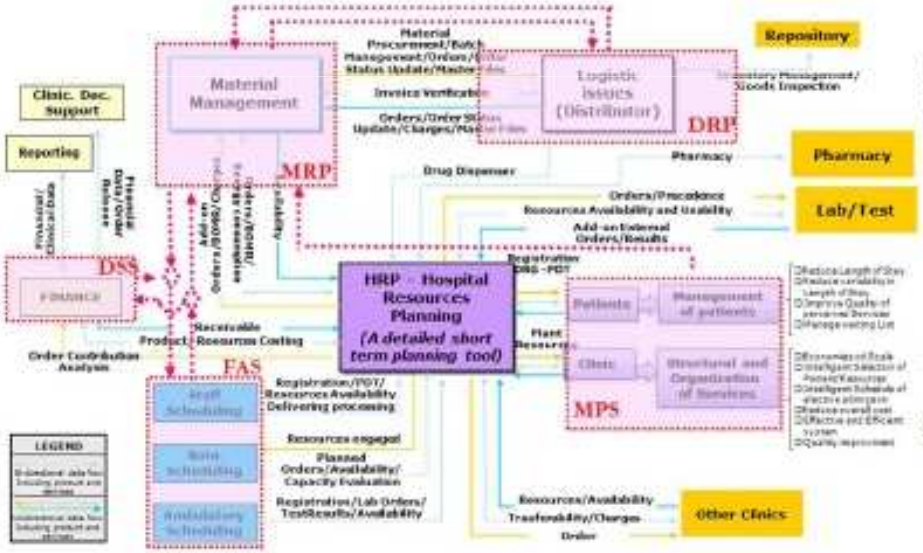
SERVICE MANAGEMENT

The care for Planning and Control in Healthcare services – Hospital management

The Hospital Resource Planning Structure

CAPACITY REQUIREMENT TO ACHIEVE SUPPLY EXCELLENCE

*From Long Term plans To Short Term Delivery – **HOSPITAL RESOURCE PLANNING** [Integrated Definition and Function Modelling]*



Impact Analysis

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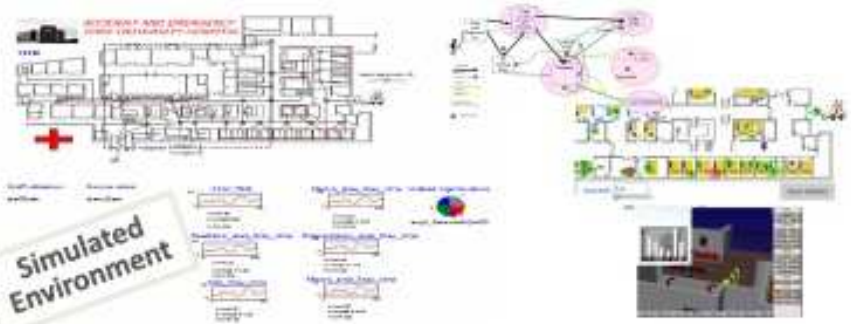
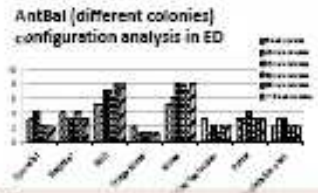
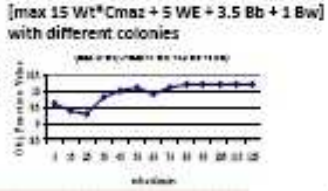
SCHEDULING OF EMERGENCY FACILITIES

Computer simulation and Swarm Intelligence in ED facilities



Patient Length of Stay (I) Major , (II) Miron Areas -(III) Mean SHO Utilization

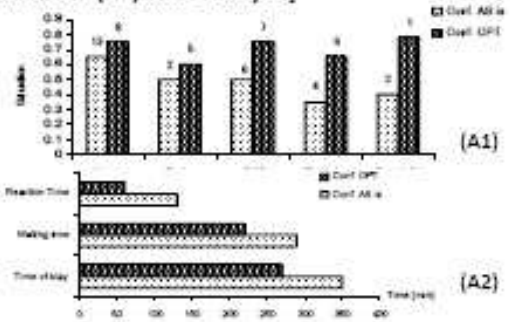




$$Obj\_func = \gamma \cdot \frac{Wtime}{C^{*}_{max}} + \chi \cdot WE + \varepsilon \cdot B_b + \phi \cdot B_w$$

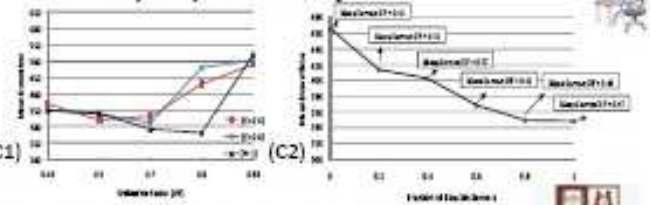
Obj_func = Waiting Efficiency + Weighted line Efficiency + Balance Workload between work-centres + Balance of workloads within work-centres

Configurations and Scheduling Performances [(A1) Utilization - (A2) Time Analysis]



Bed Assignment policies [(B1) cost - (B2) Time analysis]

Operating Room Scheduling [(C1) Utilization - (C2) flexibility anaysis of servers]



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In collaboration with Cork Institute of Technology and Cork University Hospital

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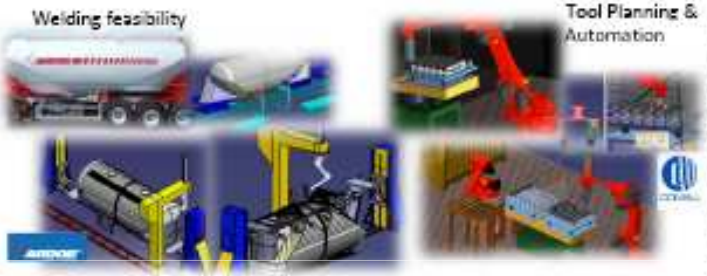
AUTOMATION, ERGONOMIC AND SAFETY IN PRODUCTION SYSTEMS

Digital Modelling for Layout Optimisation and Ergonomics [in collaboration with Comau – Fiat Group - Antonio Amato – Ardor s.r.l. – D'Acunzi – Cartiera Confalone S.p.A.]

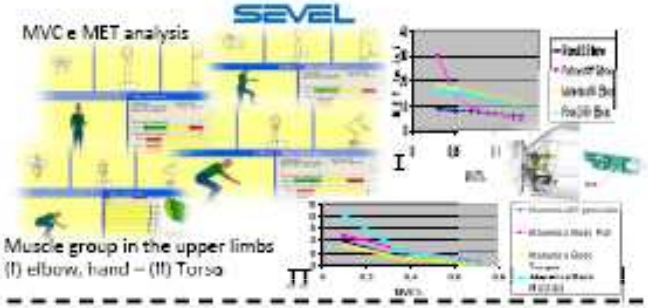
PROCESS ANALYSIS

AUTOMATION AND REACHABILITY ANALYSIS

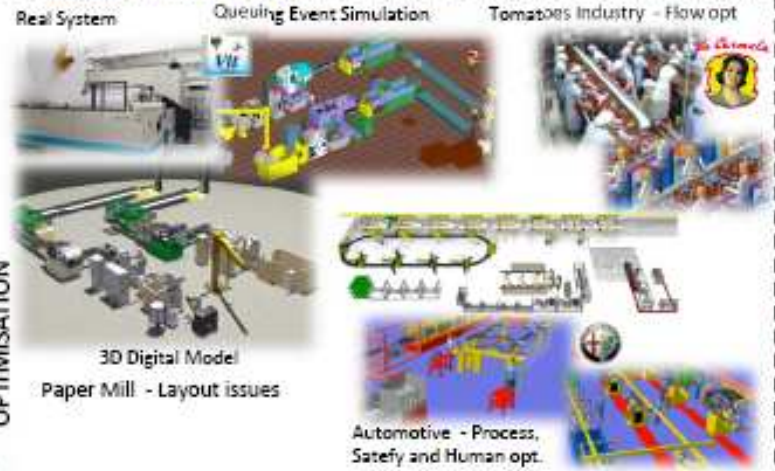


HUMAN FACTOR

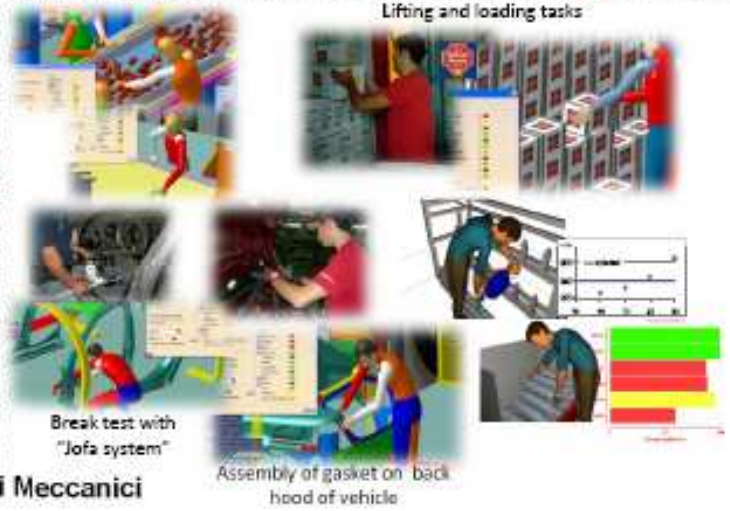
FATIGUE ENGAGEMENT



LAYOUT ANALYSIS AND OPTIMISATION



ERGONOMICS AND STRESS ANALYSIS



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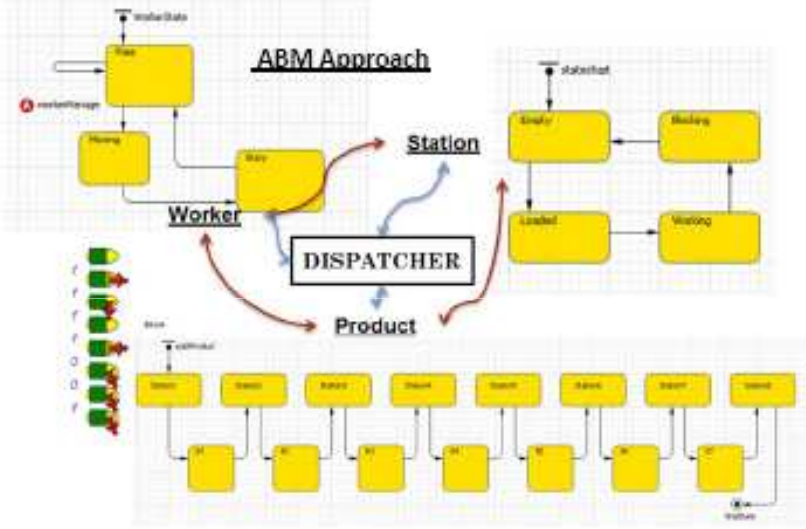
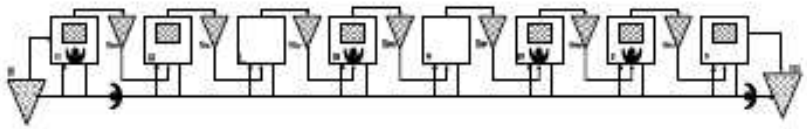
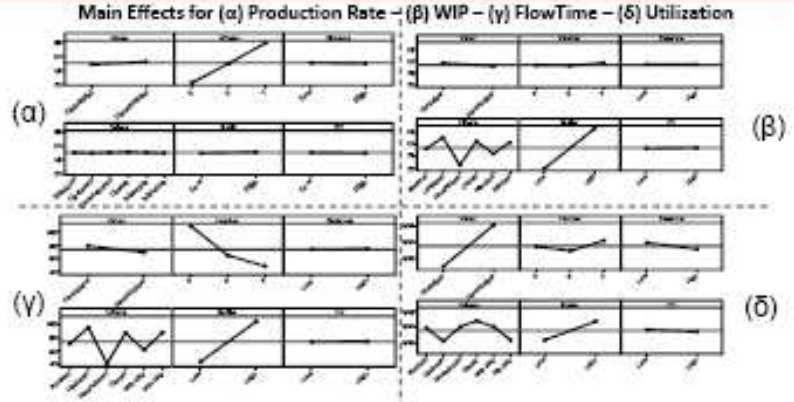
SIMULATION AND HUMAN FACTORS

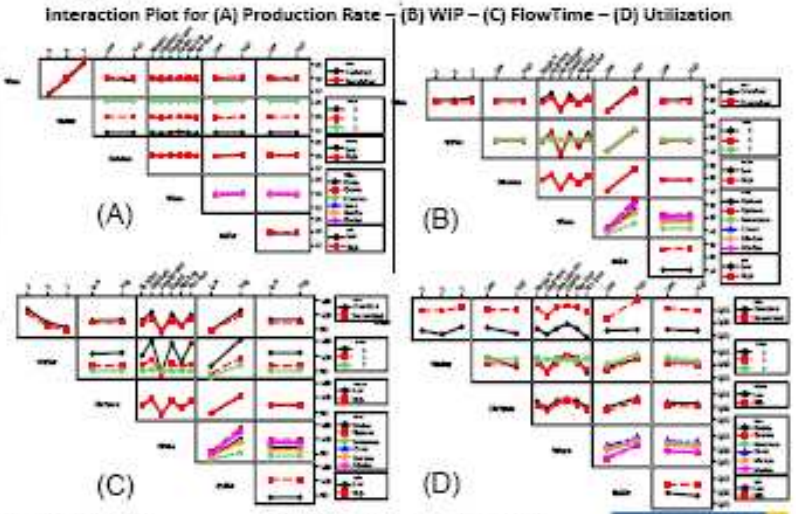
Agent Based Modeling of Movement Rules in DRC systems for Volume Flexibility



Ligth assembly Flow Shop Environment – DRC system







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In collaboration with Ryerson University – Toronto - Canada

RYERSON UNIVERSITY

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TOP 10 PUBLICATIONS last 5 years (2006-2011)

Authors	Title	Journal/Conference	Year-Vol.-PP.	Research Topic
Battista, Dello Stritto, Giordano, Iannone, Schiraldi	A business process modeling approach to support production systems analysis and simulation	The 23rd European Modeling & Simulation Symposium	2011	1
Lambiase A. , Lambiase F.	An integrated approach to the analysis of automotive assembly activities using digital manufacturing tools	*Int. J. of Internet Manufacturing and Services*	2008, Vol. 1, No.2, pp. 160-175	1
Iannone, Miranda, Riemma, Spagnuolo, Tafuri	An integrated approach to the simulation/ optimization of grid-connected photovoltaic systems: the rational choice of components	*Renewable Energy*	2011, Accepted	2
de Falco, Falivene, Miranda	A structured approach to managing technical process reengineering projects	*Int. J. of Services Operations and Informatics*	2009, Vol. 3, No.2, pp.178-190	3
Fruggiero, Sammarco, Lambiase , Neumann	Agent Based Modeling of Movement Rules in DRC systems for Volume Flexibility – Human Factors and Technical Performance	*Int. J. of Production Research*	2011, Reviewed	4
Fallon, Fruggiero, Lambiase	Computer simulation and swarm intelligence organization into an emergency department: a balancing approach across Ant Colony Optimization	*Int. J. of Services Operations And Informatics*	2008, Vol. 3, No.2, pp.142- 161	5
Iannone, Miranda, Riemma	The search for the optimal number of kanbans in unstable assembly-tree layout systems under intensive loading conditions	*Int. J. of Computer Integrated Manufacturing*	2009, Vol. 22, No. 4, pp. 315–324	5
Iannone, Miranda, Riemma, Sarno	Proposal of a conceptual framework to optimise drug management in healthcare systems	*IADIS Int. Conf. - E-HEALTH*	2011, pp. 215-220	6
Iannone, Miranda, Riemma, Sarno	A Model for Vendor Selection and Dynamic Evaluation	*Advances in Production Management Systems*	2010, Vol. 338, pp.283- 290	6
Iannone, Miranda, Riemma	Supply chain distributed simulation: an efficient architecture for multi-model synchronization	*Simulation Modelling Practice & Theory*	2007, Vol. 15, pp. 221-236	6

Research Topics – Ing/Ind-17

1	2	3	4	5	6	7
Production system analysis and design	Auxiliary plant analysis and design	Processes and production technologies	Ergonomics and safety of industrial systems	Production system management	Logistics	Production system automation

UNIVERSITÀ DEGLI STUDI DI SALERNO

RESEARCH PROJECT INDUSTRIAL PARTNERS last 4 years (2007-2011)

RESEARCH PROJECTS (2007-2011): PUBLIC FUNDING

Project	Year	Area	Description
3.17 ICT	2009	3	OPUS - Optimizing Production Using Simulation
Legge 5	2007	5	Quadro di controllo per le attività di pianificazione
PRIN	2008	6	Innovazione di Reti di Servizi Sanitari con tecniche di Supply Chain Management

RESEARCH INDUSTRIAL PROJECTS (2007-2011): STRUCTURED PARTNERS

- MAGALDI INDUSTRIE (Salerno)
- PRO-METAL (Salerno)
- Vit–CARTIERA CONFALONE Sp.A (Sa)
- CONFINDUSTRIA SALERNO
- CONSORZIO APPENNINO MERIDIONALE
- FOS (Battipaglia - Sa)
- GUERRASIO (Roccapiemonte - Sa)
- MECAR (Nocera Superiore - Sa)
- AMES (Montecorvino Pugliano - Sa)
- ARDOR (Eboli - Sa)
- COMUNE DI FELITTO (Sa)
- KERR ITALIA (Scafati - Sa)
- OFFICINE MECCANICHE PONTILLO (Scafati - Sa)
- IMPRESS (Cava de' Tirreni - Sa)
- SEDA (Napoli)
- EXIST (Napoli)
- ANSALDO (Napoli)
- ENGINFO (Napoli)
- OSLA SUD (Striano - Na)
- VULCANAIR (Casoria - Na)
- ELASIS (Pomigliano d'Arco - Na)
- CAMEP (Cardito - Na)
- DE VITA (Qualiano - Na)
- IMBALSUD (Arzano - Na)
- FIAT Group (Pomigliano d'Arco – Na)
- SOL MECCANICA (Solofra - Av)
- A.O. MOSCATI (Avellino)
- CUMERIO (Avellino)
- COSMEVAT (Flumeri - Av)
- DESMON (Nusco - Av)
- FIREMA TRASPORTI (Caserta)
- LOGICAL SYSTEM (Jesi - An)
- ABETE (Roma)
- ACCENTURE (Roma)
- SEVEL Sp.A (Atessa – Ch)
- EUROFLEX (Susenaga - Tv)
- SISTEMI COMANDI MECCANICI S.C.M (Tito – Pz)
- BARILLA G. e R. Fratelli (Melfi – Pz)
- COMER INDUSTRIES (Matera)
- FREUDENBERG POLITEX (Pisticci- Mt)
- CORK UNIVERSITY HOSPITAL (Cork)