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Design & Health
14TH WORLD CONGRESS & EXHIBITION



The Potential of AI in the Evaluation of hospital infrastructure:

An Architectural and Technical Diagnostic Study Towards Future-Ready Healthcare

Giulio Altieri

CEO/Founder, AGA Consulting, Switzerland

"Designing Tomorrow, Building Dreams Today"

01 November 2025



PAN PACIFIC HOTEL OF SINGAPORE



WWW.AGA-CONS.COM



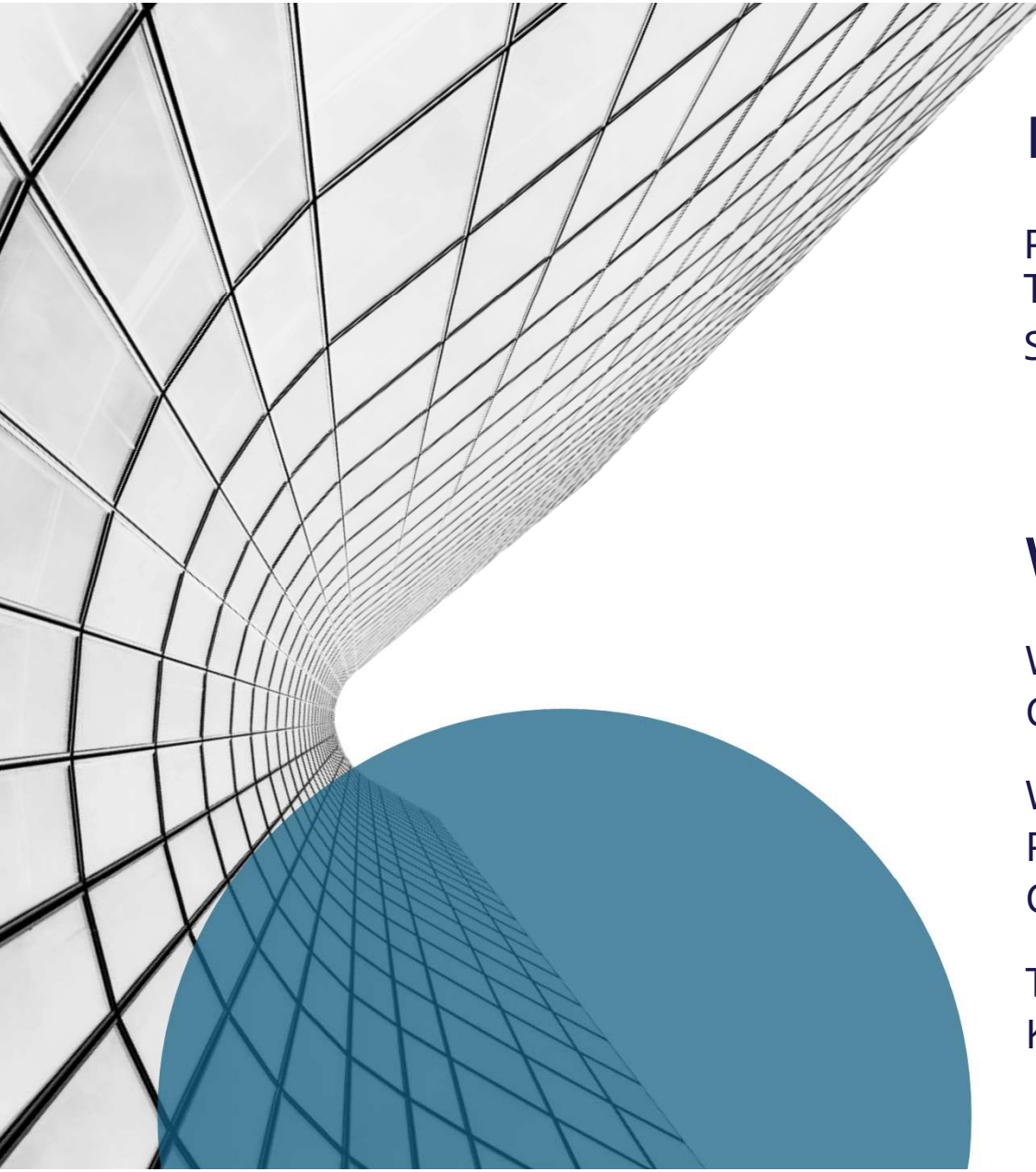
AGA Consulting

- International firm specialized in healthcare infrastructure
- Full project lifecycle: from strategy to design and delivery
- Merging architecture with innovative technology



Giulio Altieri

- CEO & Founder of AGA Consulting, fourth-generation architect-engineer
- Led design of 30+ hospitals worldwide
- Advocates for integrating advanced technologies into healthcare architecture



MISSION

PIONEERS IN CREATING THE HEALTHCARE OF
TOMORROW –
SUSTAINABLE, PERSONALISED AND FLEXIBLE.

WORKING WITH AGA CONSULTING

WE ARE FULLY DEDICATED TO UNDERSTANDING
CLIENT'S NEEDS AND MAKING THEM A REALITY.

WE APPRECIATE THE COMPLEXITIES OF HEALTHCARE
PROJECTS AND THE INFRASTRUCTURE
CONSTRUCTION MARKET.

THANKS TO OUR EXTENSIVE GLOBAL EXPERIENCE WE
KNOW HOW WE CAN BEST ACHIEVE CLIENT'S GOALS.



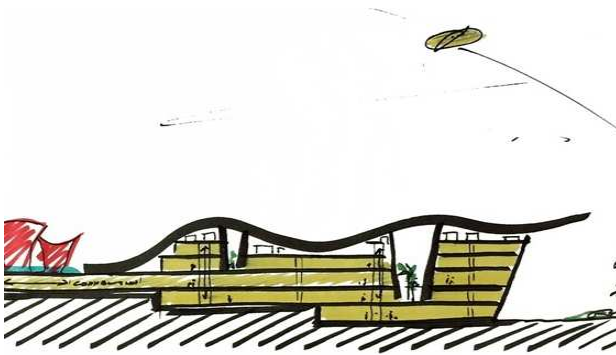
9 Radiology/Radiotherapy Centers - KSA



Hirslenden Clinic



CERN Laboratories



Medical Pyramids Heights Masterplan - Egypt



Red Whale - Water rehabilitation centre



New Vaud Hospital

Uncertainty

Have you ever supported an organization unsure about what to do with its existing healthcare infrastructure?



Uncertainty

How to manage, renovate,
or repurpose
the existing facilities?



The Challenge: Diagnosing Uncertainty

- Ageing healthcare buildings
- Evolving models of care.
- Limited resources.
- Key questions: Can we keep this building? Renovate or rebuild?

Tradition vs Solution

- Traditional Methods are...

Slow
Subjective
Fragmented
Not cost-effective

- The new AI Solution is...

Comprehensive
Cost Effective
Objective
Fast

Case Study: Les Champs Hospital (HUG)

Hôpital de psychogériatrie Les Champs Site de Belle-Idée

Project description

- Built 1990–1995, 8,000 m², 83 beds.
- Located in Belle-Idée campus, psychogeriatric specialization.
- Client: Hôpitaux Universitaires de Genève (HUG).

Project Objective

- Deliver fast, objective, data-driven assessment
- Evaluate whether existing buildings could be maintained and upgraded or should be replaced
- Perform an architectural and technical assessment.
- Diagnostic delivered in 1 month.



AI-Powered Methodology

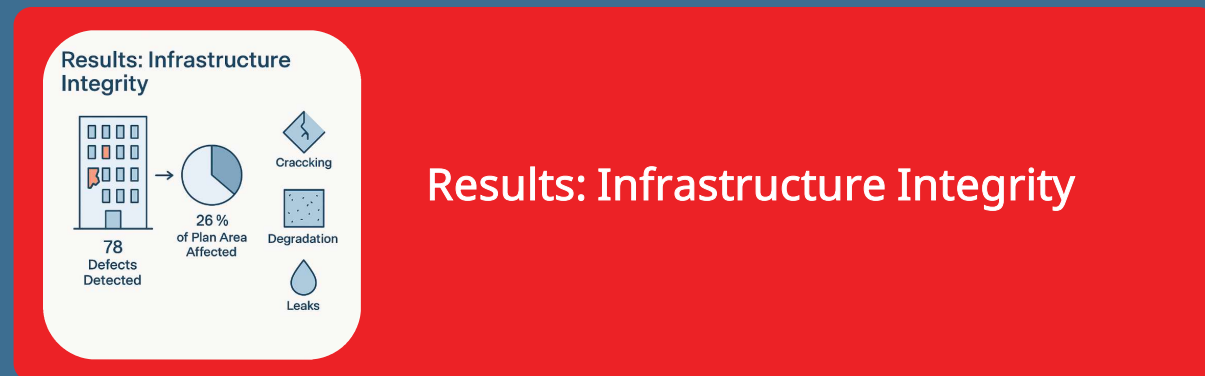
- Integrate AI-based defect detection and cost modeling.
- Interior & Exterior Inspector (360° imagery + CNN).
- Scan duration: 80 minutes.
- Upload → AI analysis → report within 48 hours.
- Automated detection, classification, severity scoring.



Data Acquisition Process



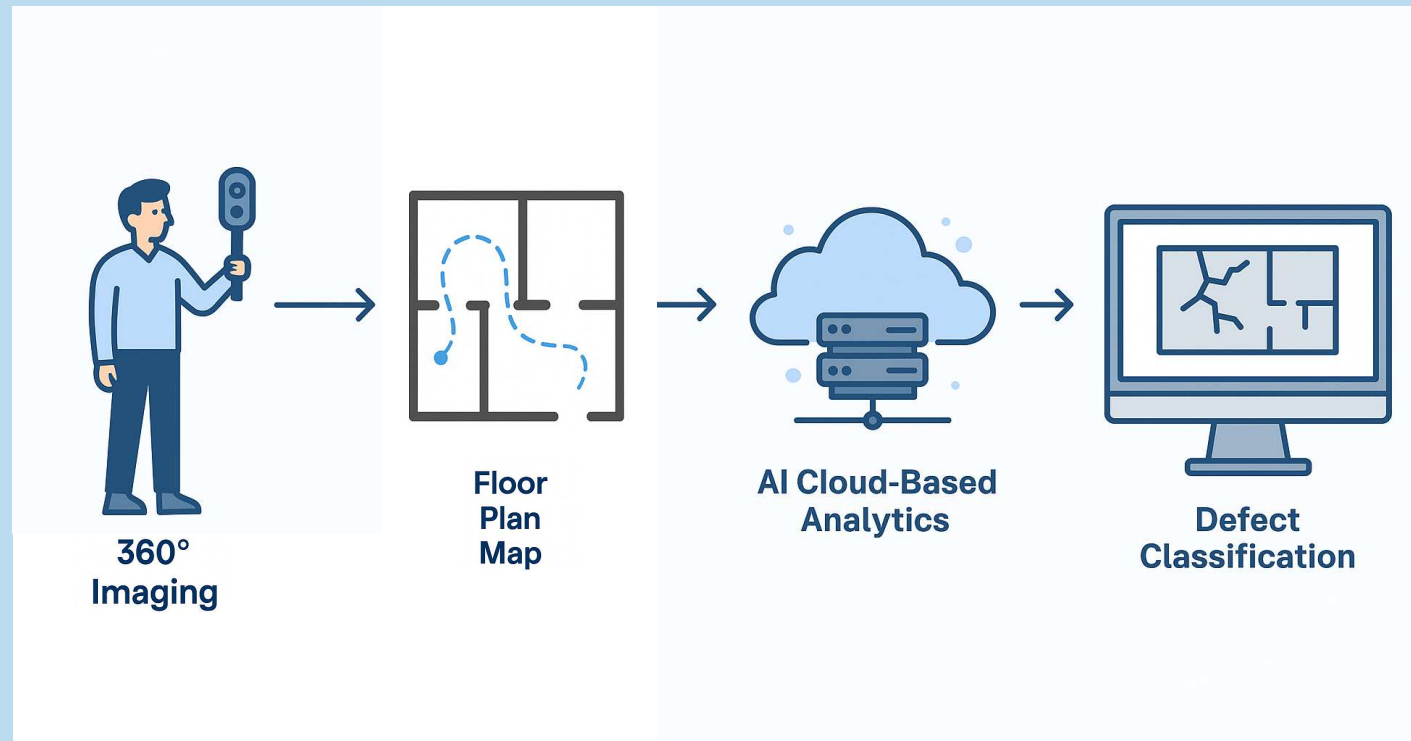
AI Processing & Outputs



Results: Infrastructure Integrity


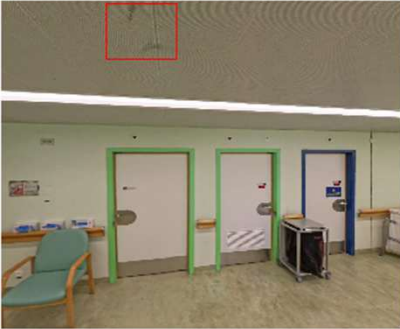
- Non-intrusive 360° imaging suitable for sensitive care settings.
- Full interior & exterior coverage.
- No scaffolding, no disruption to hospital operations.

1-Data Acquisition Process



2-AI Processing & Outputs

- Defects tagged with ID, type, severity, material.
- Geo-referenced mapping and 3D visualization.
- Integrated with BIM and digital twin environments.

2						
Description Soiling / Staining / Surface Deposits	Material Aluminium	Severity Safe	Condition Score 1 - Excellent condition	Intensity Developed	Other Comments Stain on ceiling	Solution Scrape off the paint and repaint the ceiling with existing colour scheme of the ceiling.

S/N 5						
Description Open joints	Material Plasterboard / Calcium Silicate Board	Severity Require Repair	Condition Score 2 - Good condition	Intensity Developed	Other Comments Gap between the wall panels	Solution Fill with appropriate filler material to seal off the gap

S/N	Image 1		Image 2		Description			Material	Severity	Condition Score	Intensity	Other Comments	Solution
7					Soiling / Staining / Surface Deposits			Wood	Safe	1 - Excellent condition	Starting	Stain mark on the window.	Remove the stain with appropriate stain removal solution.
14					Open joints			Plasterboard	Require Repair	1 - Excellent condition	Developed	Worn off sealant.	To seal off the joints with new sealant and to ensure water and air tightness.
17					Soiling / Staining / Surface Deposits			Emulsion	Safe	1 - Excellent condition	Developed	Stain mark on the plaster finished wall.	Scrape off the paint and repair the wall with existing colour scheme of the wall.
48					Missing Parts			Aluminium	Unsafe	3 - Reasonable condition	Developed	Missing ceiling panel.	To remove and refix in place properly.
57					Soiling / Staining / Surface Deposits			Ceramic Tiles	Safe	1 - Excellent condition	Developed	Stain on floor surface	To remove the stain with appropriate stain removal solution.

2-AI Processing & Outputs

S/N	Image 1		Image 2		Description			Material	Severity	Condition Score	Intensity	Other Comments	Solution
11					Cracks / Fractures			Ceramic Tiles	Unsafe	1 - Excellent condition	Progressing	Tile crack.	Clean and remove loose material. Mix some matching paint with water proofing tile filler, and dab it onto the crack. Allow the tile filler to dry for a few seconds, then wipe lightly with a damp cloth. If the tile is too badly damaged to fix, remove and replace it.
61					Peeling			Emulsion	Unsafe	2 - Good condition	Developed	Paint peeling	Scrape over the defective area and thoroughly clean the surface and apply suitable corrosion protection coating.

2-AI Processing & Outputs

S/N	Image 1		Image 2		Image 3	
11						
Description Solling / Staining / Surface Deposits	Material Plaster	Severity Safe	Condition Score 1 - Excellent condition	Intensity Developed	Other Comments Water stain on the wall.	Solution Scrape off the paint and repaint the wall with existing colour scheme of the wall.
12						
Description Solling / Staining / Surface Deposits	Material Plaster	Severity Safe	Condition Score 1 - Excellent condition	Intensity Developed	Other Comments Water stain on the wall.	Solution Scrape off the paint and repaint the wall with existing colour scheme of the wall.

S/N	Image 1		Image 2		Image 3	
49						
Description Surface Finish Deterioration	Material Aluminium	Severity Safe	Condition Score 1 - Excellent condition	Intensity Developed	Other Comments Discoloured surface	Solution Scrape off the paint and repaint the surface.
50						
Description Surface Finish Deterioration	Material Aluminium, Glass	Severity Safe	Condition Score 1 - Excellent condition	Intensity Developed	Other Comments Discoloured surface	Solution Scrape off the paint and repaint the surface.

S/N	Image 1		Image 2		Image 3	
23						
Description Solling / Staining / Surface Deposits	Material Plaster	Severity Safe	Condition Score 1 - Excellent condition	Intensity Developed	Other Comments Water stain on the wall.	Solution Scrape off the paint and repaint the wall with existing colour scheme of the wall.
24						
Description Loose Parts	Material uPVC	Severity Require Repair	Condition Score 1 - Excellent condition	Intensity Developed	Other Comments Damaged pipe holding clip	Solution For damaged elements, need to be repaired or replaced.

3-Results: Infrastructure Integrity

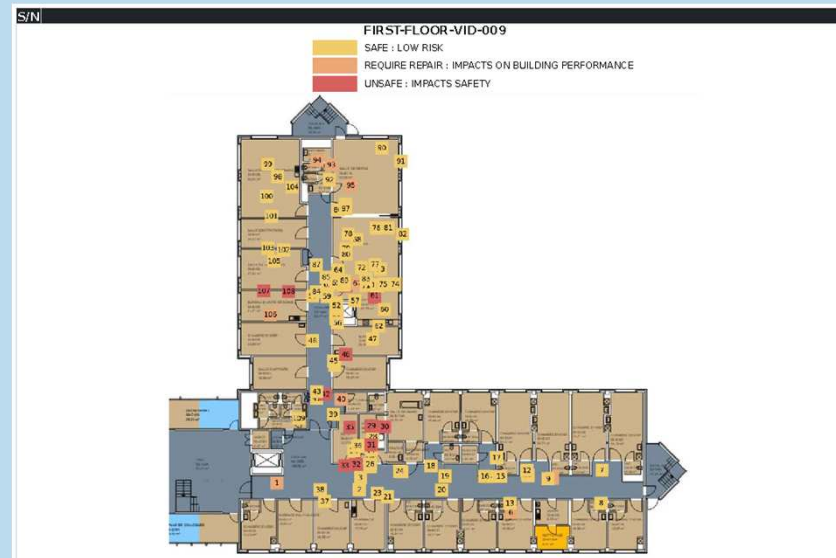
- 384 interior defects (cracks, humidity, chipping).
- Accuracy: ~95%,
Time: -70%,
Cost: -50%
vs traditional methods.

Defects Report for inspection HUG Les Champs - FIRST - FLOOR - VID - 009 -Inspection 19 June 2024

Facade Inspector report from Jun 20, 2024

Inspection Summary

	FIRST-FLOOR-VID-009	Total
Total defects	109	109
Chipping	1	1
Soiling / Staining / Surface Deposits	86	86
Misalignment	3	3
Open joints	4	4
Detachment / Loss	11	11
Cracks / Fractures	2	2
Degradation of joints / Sealants	2	2



3-Results: Infrastructure Integrity

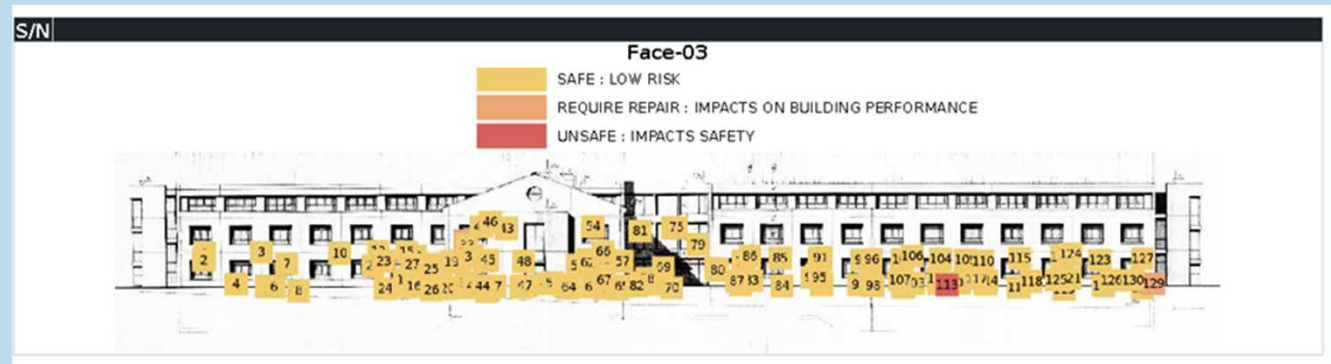
- 345 exterior defects (mainly surface staining, sealant issues).
- Accuracy: ~95%,
Time: -70%,
Cost: -50%
vs traditional methods.

Defects Report for inspection Hug Les Champs FACADE-001 - Inspection 20 June 2024

Facade inspector report from Jun 21, 2024

Inspection Summary

	Face-01	Face-02	Face-03
Total defects	49	94	130
Soiling / Staining / Surface Deposits	43	90	122
Degradation of Joints / Sealants	4	0	0
Surface Finish Deterioration	2	1	5
Chipping	0	3	2
Peeling	0	0	1
Loose Parts	0	0	0



Integrated AI solution

Digital Twin Visualization

- Interactive web-based model for remote access and validation.
- Enables multidisciplinary collaboration (architects, engineers, clinicians).
- Strengthens transparency and planning efficiency.



Integrated AI solution

Digital Twin Visualization

- Interactive web-based model for remote access and validation.
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Cost & Maintenance Forecasting

- Each defect geometrically measured → cost per m².
- Baseline for renovation and predictive budgeting.
- Supports CAPEX/OPEX forecasting for short-, medium-, long-term planning.

Scalability & Standards

- Applicable across hospital typologies worldwide.
- Compatible with International standards.
- Enables data-driven infrastructure management.

Strategic Impact & Next Steps

- Bridges architecture, engineering, and hospital governance.
- Supports predictive maintenance and sustainability to support long-term capital planning.
- Integration with IoT sensors to enable real-time monitoring.

Benchmark: AI vs Traditional Methods

- Traditional Methods are...

Time | 3-4 weeks
Accuracy | 70-80%
Cost | High
Disruption | High
Safety | Med-High

- The new AI Solution is...

Time | 48 hours
Accuracy | ~95%
Cost | -50%
Disruption | None
Safety | High

Conclusions

- AI provides fast, objective, replicable infrastructure diagnostics.
- Strengthens decision-making and lifecycle planning.
- Demonstrated success at HUG Geneva → scalable internationally.

The AI-based diagnostic approach supports a salutogenic vision by making hospital environments more understandable, manageable, and health-promoting environments that support lifelong well-being."



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THANK YOU!

Get in touch

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