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## Process and Product Systems Presentation

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# Process and Product Systems “Iconic” Construction Project

## Aviva Stadium, Dublin, Ireland



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# “ICONIC”

- “very famous and well known, and believed to represent a particular idea”

[www.mcmillandictionary.com/dictionary/british/iconic](http://www.mcmillandictionary.com/dictionary/british/iconic)

## Overview of the project – Aviva Stadium, Dublin, Ireland

- Built on the site of the world’s oldest international rugby ground.
- 51,700 seats in a continuous curvilinear shaped stand enclosing all four sides of the ground.
- Design developed to provide maximum daylight to the pitch whilst maintaining daylight to the neighbouring residential area.
- Cost €410million
- Construction Period May 2007 until April 2010.
- Site size 63,802 sq.m
- Project included the demolition and recycling of the existing stadium, 5,000 tonnes of structural steel, 8,000 precast concrete units manufactured off site, 72,000 tonnes concrete cast in-situ on site.

## Awards

- Awarded British Construction Industry Award (BCIA) for best International Project 2011.
- Awarded RIBA (Royal Institute of British Architects) Award – projects in the European Union region 2011.
- Winner Irish Concrete Society Awards – Building Category and Overall Winner 2010



# Background

- Located in the heart of Dublin city adjacent to a busy rail way line, housing and the river Dodder.
- Part of the demolition of the existing West stand was over the railway and facilitated the construction of a new podium structure which gave access to higher levels within the proposed structure.
- A venue for sports events, concerts and conferences.
- Main national IRFU (Rugby) and FAI (Soccer) match venue
- The client, Lansdowne Road Stadium Development Company (LRSDC), engaged consultants for all stages from concept stage.
- Consultants hired based on experience of similar projects.
- Extensive public consultation exercise prior to submitting planning application.
- LRSDC appointed sub-contractors, prior to receipt of planning, for many of the larger packages. The main contractor, Sisk, would later take these on as domestic contractors.
- Main Contractor, Sisk, had previously worked on the redevelopment of Croke Park. But this was really 4 projects over a 12 year period.



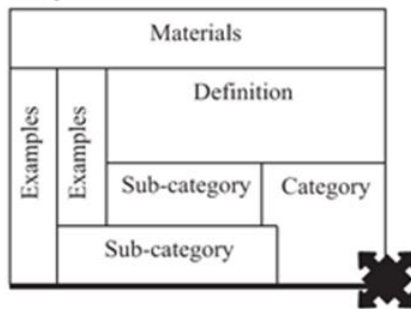
Aviva Stadium, Dublin, Layout plan.

# The Approach - Off-site Manufacture

Main off-site manufacture sub-contract packages – Mainly Non-volumetric pre-assembly:

- Pre-cast concrete frame and floors.
- Precast concrete tunnels.
- Precast concrete culverts.
- Poly-carbonate roofing and cladding.
- Roof steelwork.

**Key:**



Various materials		Steel, pre-cast concrete, timber, aluminium, advanced composites, hybrids	
Door furniture, windows, etc. Bricks, Tiles, etc.	Items always made in a factory and never considered for on-site production	Pre-assembled units which do not create usable space	
	Factory-made components	<b>Non-volumetric pre-assembly</b>	Skeletal
	Sub-assemblies		Planar
		Complex	
Edge of town retail units, motels, prison blocks, medium rise residential	Factory clad	<b>Modular building</b>	Within another building
	Clad on site		On to another building
	Pre-assembled volumetric units which form the actual structure and fabric of the building	<b>Volumetric pre-assembly</b>	
		Pre-assembled units which create usable space and are usually fully factory finished internally, installed within, or on to an independent structural frame	
		Plant rooms, etc. Toilet pods, shower rooms	
Steel frames, stressed skin plywood, pre-cast concrete, various cladding, materials		Dry-lined lightweight steel frames, pre-cast concrete, advanced composites	

**Source:** Gibb and Isack (2003)

# Off-site Manufacture – The Relevance

- The site was very restricted as nearly the entire footprint of the site was built upon. This reduced the space available to store plant and materials during construction.
- Access routes were limited and congested.
- Public transport routes, namely rail, could not be effected for long periods of time.
- On-site manufacture would have posed a greater threat of environmental danger to the local water table and waterways.
- Off-site manufacture cited as a key element in the success of the timely delivery of the project.
- Off-site manufacture combined with just in time delivery reduced the material storage requirements on site.
- Programme was key. This is shown by the way in which the Client and design team commenced at concept stage. Planning was paramount.
- In order to set the pace and keep momentum, design needed to incorporate a manufacturing strategy. In this case off-site manufacture combined with just in time delivery.
- Both Client and design team noted the relevance of the earlier design in specialist subcontractor packages requiring off-site manufacture





# Off-site Manufacture – The Reality

- This redevelopment project had been in discussion for many years and once approved it needed to proceed quickly and efficiently as there were limited options regarding alternative venues.
- The Client (LDRDC) compiled a design and construction management collaborative team together in order to design a mechanism which would allow efficient construction.
- Strategic sub-contractors were engaged at pre-planning stage and then appointed as domestic sub-contractors to the main contractor (SISK) after selection.
- All risk factors were reviewed (such as cost, time, available space, treat of legal proceedings, but to name a few) and it was decided that the construction process needed to be streamlined.
- The collaborative team designed the building using systems which satisfied the structural integrity, usability and aesthetic requirements of the Client.
- These systems also allowed for components to be manufactured off-site and delivered when necessary. This practice aligns itself to the work of Azimi, Lee and AbouRizk, (2011) who noted the advantages of off-site construction as *“higher productivity, better quality, better safety, and improved time and cost effectiveness”*.
- These components were used in all parts of the construction (examples include: precast culverts, 3,500tonne precast structure over the railway line for 150m, pre-cast flooring, steel frame, roof steel, poly-carbonate cladding etc.)
- **Construction and manufacturing process** planning is a crucial and challenging management task. A good plan is essential to project success (Zozaya-Gorostiza, 2013)

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