

Role of a Digital LPS[®] to Ensuring Safe and Productive Workforce and Workflow in COVID-19 Pandemic

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PRESENTATION OUTLINE

- 👉 Problem Background
- 👉 Production Management and safe working
- 👉 Case study
- 👉 When the covid hit the site
- 👉 Production planning
- 👉 Production control
- 👉 Conclusion
- 👉 Outlining the Future



BACKGROUND FOR THE PROBLEM

- 🚩 Covid has made devastating impact on construction industry financially
- 🚩 Work gets suspended
- 🚩 Many restrictions
- 🚩 Workforce Safety requirements become more stringent.
- 🚩 Office teams struggle with production, coordination and collaboration
- 🚩 Site teams struggle with delivery and productivity goals due to restrictions

How these things impact the production process? What's the response?

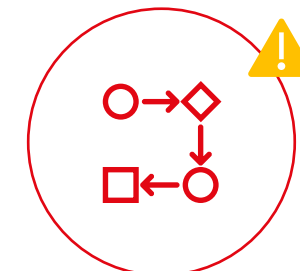


LITERATURE REVIEW

- ❖ **Traditional Safety management** practices are often treated as **separate and isolated entity** not integrated.
- ❖ Increased project **complexity brings high levels of change and uncertainty** providing unpredictable **flow of delivery and productivity**.
- ❖ Safety has been referred only from **'People' and 'Technology'** that is more focused towards **Assurance** rather than **'Processes'**.
- ❖ The identification method of the safety hazards is getting efficient, but more **reactive type of safety management** rather than the proactive one.
- ❖ **Balanced review of safety** involving **people, process, product, and technology** combined is needed.



People



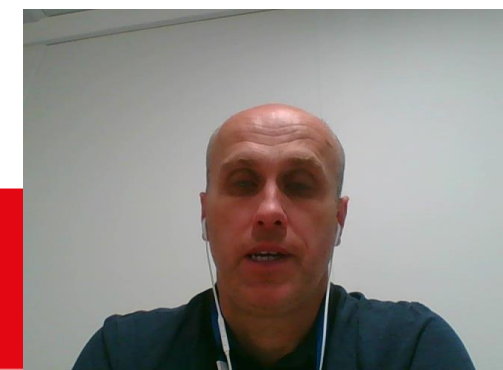
Process



Technology



Product



LEAN PRODUCTION MANAGEMENT AND SAFETY

- ❖ Production system design and workflows has definite impact on the safety (Mitropoulos 2012)
- ❖ Saurin et al. (2002) has provided **safety planning and control model (SPC)** infused with the production management.
- ❖ Lean construction methods like LPS reported **45 percent fewer accidents** (Mitropoulos et al. 2005)
- ❖ **LOB, Location based planning and Takt** has also proven **effective**.
- ❖ Key to success is **in maintaining the flow of workforce** in such a way that the safety hazards can be minimised **in alignment with the process flow**.
- ❖ **Digital LPS processes** has proven track record to **support the fragmented teams** by enabling digital collaboration environment. Hence, It can be useful in **safe distancing**.



CASE-STUDY

- 🚩 **Datacenter** project near Dublin.
- 🚩 86,000 square meter structure,
- 🚩 **8 data halls** admin building.
- 🚩 **46,264 Daily man hours**
- 🚩 Roughly **900 operatives** were at the site



Figure 1. CLN 5-6 Datacenter Project

CHALLENGES

WHEN THE PANDEMIC HIT THE SITE



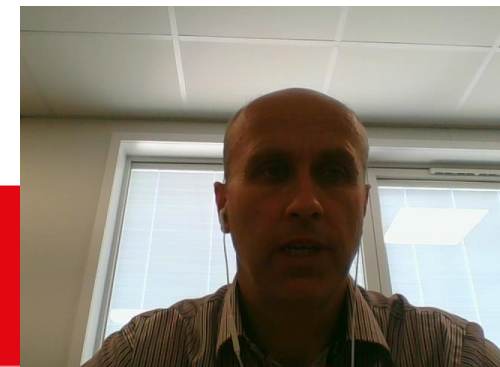
Reduce the risk of infection, following the Workforce distancing measures. (Increased focus on workforce management)



Production coordination and discussions became **more difficult** due to remote working and work safety distancing.



Ensuring the volume of work is getting delivered while **avoiding the safety risks**.
Securing continued employment during the pandemic!



RESEARCH METHODOLOGY

- 🚫 Design Science research
- 🚫 To address the requirement of another iteration for the Digital LPS.

FINDING THE SOLUTIONS

- 🚫 labour maximum occupancy levels were introduced on the project to maintain social distancing on the project.
- 🚫 Introducing new way of visualising and analysing workforces,
- 🚫 remote working where possible for site-based support management
- 🚫 Additional shift patterns were accommodated



PRODUCTION PLANNING

EXECUTION W 02 WEEKLY W 04 LOOKAHEAD W 05-07 PHASE W 08-11

25/01/2021 - 21/03/2021

USER	LOCATION	Week 04	Week 05	Week 06	Week 07	Week 08	Week 09
5.00.C.01 DATA		2nd Fix Sprinkler Pipework Install Task 5... James Williams DH C South: Installation Of ISO Spools T... Patrick Campbell DH C North: Installation Of ISO Spools T... Patrick Campbell DH C FCW Close Out Works Patrick Campbell Airtest MDF A And DHC Rudolf Von Bunau	DH C South: Installation Of ISO Spools T... Patrick Campbell FCW Sprinkler 2nd Fix South James Williams DH C North: Installation Of ISO Spools T... Patrick Campbell DH C FCW Close Out Works Patrick Campbell	Complete Ceiling Grid Rudolf Von Bunau 7000 - DHC - Fire Alarm Fit Out Kody Kocis 7000 - DHC - Small Power/Lighting Fit Out Kody Kocis	7000 - DHC - Fire Alarm Fit Out Kody Kocis 7000 - DHC - Small Power/Lighting Fit Out Kody Kocis	7000 - DHC - EMS Fit Out Kody Kocis 7000 - DHC - Modular Containment & Tia... Scott Muller 7000 - DHC - Small Power/Lighting Fit Out Kody Kocis	7000 - DHC - Fire Alarm Fit Out Kody Kocis 7000 - DHC - SBR Cable Pulling Kody Kocis 7000 - HAC Test Prep/Inspection & Oper... Kody Kocis 7000 - DHC - Small Power/Lighting Fit Out Kody Kocis
5.00.C.03		T&J & Painting Rudolf Von Bunau					
5.00.C.05		7000 - C/D Corridor - Install HL Riser Co... Emmett Doron					
5.00.C.10							

Figure 2. Digital pull plan session

WEEKLY W 04 LOOKAHEAD W 05-07 PHASE W 08-11

LOCATION

5.00.C.01 DATA

Task	Assignee
2nd Fix Sprinkler Pipework Install Task 5...	DH C S... Patrick
2nd Fix Sprinkler Pipework Install Task 5...	FCW Sp... James
DH C South: Installation Of ISO Spools T...	DH C N... Patrick
DH C North: Installation Of ISO Spools T...	DH C N... Patrick
DH C FCW Close Out Works	Patrick Campbell
Airtest MDF A And DHC	Rudolf Von Bunau

Total Workforce

	28/06	29/06	30/06	01/07	02/07
2	2	2	2	2	2
1	1	1	1	1	1
2	2	2	2	2	2
1	1	1	1	1	1
2	2	2	2	2	2
64	59	64	56	64	5
74	68	74	66	74	

Columns: 28/06/2021 04/07/2021 Show Clear Save Config View Config Show Unassigned Tasks

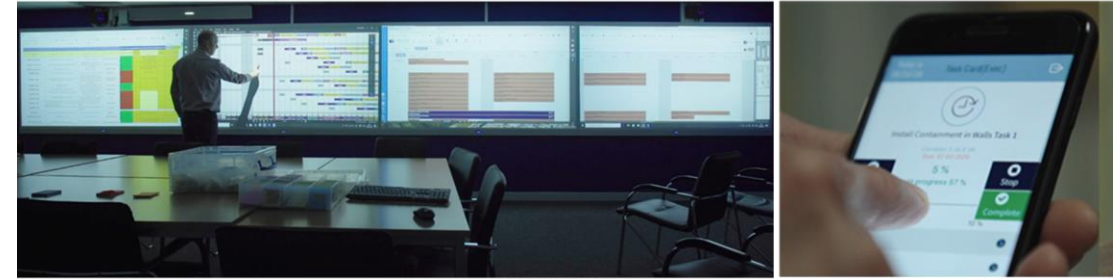
Show 25 entries

No.	Organisation	Owner	Task name	Status	Location	Task Type	28/06	29/06	30/06	01/07	02/07		
							P	A	P	A	P	A	
1	Allendale	Brendan Glennon	High Level Cleaning Te...	Started	6.00.B.01 DATA HALL B	construction	7	6	7	5	7	5	7
2	Allendale	Brendan Glennon	Supervision of all tasks ...	Started	5.00.C.01 DATA HALL C	construction	1	1	1	1	1	1	1
3	Allendale	Brendan Glennon	High Level Cleaning Te...	Started	5.00.D.01 DATA HALL D	construction	10	8	10	7	10	7	10
4	Allendale	Brendan Glennon	SUPERVISOR High Lev...	Started	6.00.B.01 DATA HALL B	construction	1	1	1	1	1	1	1
5	Allendale	Brendan Glennon	Supervisor Cleaning of ...	Started	5.00.B.01 DATA HALL B	construction	1	1	1	1	1	1	1
6	Allendale	Richie Glennon	Welfare Cleaning (Days)	Started		construction	5	5	5	5	5	5	5
7	Allendale	Brendan Glennon	Ride on Sweeper DH A...	Started	6.00.D.01 DATA HALL D	construction	2	2	2	2	2	2	2
8	Allendale	Brendan Glennon	Builders Clean Switch ...	Started	5.00.C.12 ELECTRICAL R...	construction	2	2	2	2	2	2	2
9	Allendale	Brendan Glennon	SUPERVISOR High Lev...	Started	5.00.D.01 DATA HALL D	construction	1	1	1	1	1	1	1
10	Allendale	Brendan Glennon	Cleaning Racks (Days) ...	Started	5.00.A.02 MDF A	construction	2	2	2	2	2	2	2
11	Allendale	Brendan Glennon	High Level Cleaning Te...	Started	5.00.C.01 DATA HALL C	construction	4	4	4	4	4	4	4
12	Allendale	Brendan Glennon	Ride on Sweeper DH A...	Started	5.00.B.01 DATA HALL B	construction	4	3	4	3	4	3	4
13	Allendale	Brendan Glennon	Cleaning of Fan Walls (...)	Started	5.00.B.01 DATA HALL B	construction	7	7	7	6	7	6	7
14	Allendale	William Claffey	Supervision of all tasks ...	Started	CLN 586	construction	1	1	1	1	1	1	1
15	Allendale	William Claffey	Maintaining Walkways ...	Started	CLN 586	construction	2	1	2	1	2	1	2
16	Allendale	Richie Glennon	Handyman Duties (Da...	Started	Clin 6 External	construction	1	1	1	1	1	1	1
17	Allendale	Richie Glennon	Maintaining WC Facilit...	Started	Clin 6 External	construction	1	1	1	1	1	1	1
18	Allendale	Richie Glennon	Maintaining Hand Was...	Started	Clin 6 External	construction	1	1	1	1	1	1	1
19	Allendale	William Claffey	Maintaining Hand Was...	Started	CLN 586	construction	1	1	1	1	1	1	1
20	Allendale	Richie Glennon	Supervision of all tasks ...	Started	Clin 6 External	construction	2	2	2	2	2	2	2
21	Allendale	Richie Glennon	Maintaining Waste Co...	Started	Clin 6 External	construction	2	2	2	2	2	2	2
22	Allendale	William Claffey	Traffic Marshal - Twilig...	Started	CLN 586	construction	2	2	2	2	2	2	2
23	Allendale	Richie Glennon	Movement of Materials...	Started	Clin 6 External	construction	2	2	2	2	2	2	2
24	Allendale	William Claffey	Maintaining WC Facilit...	Started	CLN 586	construction	2	2	2	2	2	2	2
25	Allendale	William Claffey	Welfare Cleaning - Twil...	Started	CLN 586	construction	2	2	2	2	2	2	2

Current Plan & Actual Workforce
Total Plan & Actual Workforce



PRODUCTION CONTROL



Location	Daily Limit	17/1 SUN	18/1 MON	19/1 TUE	20/1 WED	21/1 THU	22/1 FRI	23/1 SAT
Zone 4 Tasks	-	0	0	0	0	0	0	0
5.00.M.15 ADMIN PLANTROOM Tasks	2	0	0	0	0	0	0	0
5.00.M.12 ELECTRICAL ROOM Tasks	2	0	0	6	6	6	6	0
5.00.M.09 S/R SECURITY Tasks	2	0	2	0	0	0	0	0
5.00.M.08 BOH ENTRY VESTIBULE Tasks	2	0	0	0	0	0	0	0
5.00.M.07 SECURITY OFFICE Tasks	2	0	0	0	0	0	0	0
5.00.M.06 SOC A/V Tasks	2	0	0	0	0	0	0	0
5.00.M.05 SECURITY STORAGE Tasks	2	0	0	0	0	0	0	0
5.00.M.04 SOC Tasks	2	0	0	0	0	0	0	0
5.00.M.01 BATTERY STORAGE Tasks	2	0	4	4	6	4	2	0
- Zone SC Tasks	-	0	4	4	4	4	4	0
5.00.M.02 HALLWAY Tasks	2	0	2	0	0	0	0	0
- Zone 2 Tasks	-	0	4	4	0	0	0	0

Figure 3. Workforce room occupancy management dashboard



CONCLUSION



How workers can manage and control their work environment. (**Bottom-up approach**)



Improved line of **communication** between the operational and office teams & improving the trade-to-trade handovers



Improved sequencing and onsite **coordination** without putting people at risk



Improved transparency allows disparate teams to **collaborate**

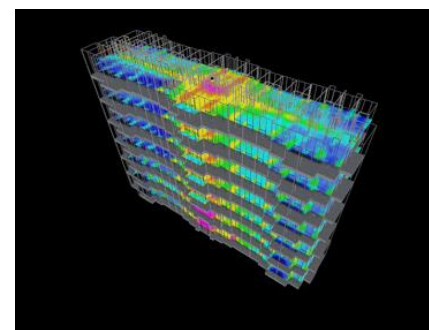
An average **1100 operative working** a cumulative of **57,000 operative hours** recorded are being managed collaboratively using the Digital LPS



OUTLINING THE FUTURE STATE

Providing a strong link between fragmented project teams a greater spatial and visual awareness is the key :

- Increased digitisation supporting lean construction processes.
- Adequate Information management system
- Realtime information using Sensory technology
- Need integrated systems that connects production, safety and BIM.



THANK YOU!

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