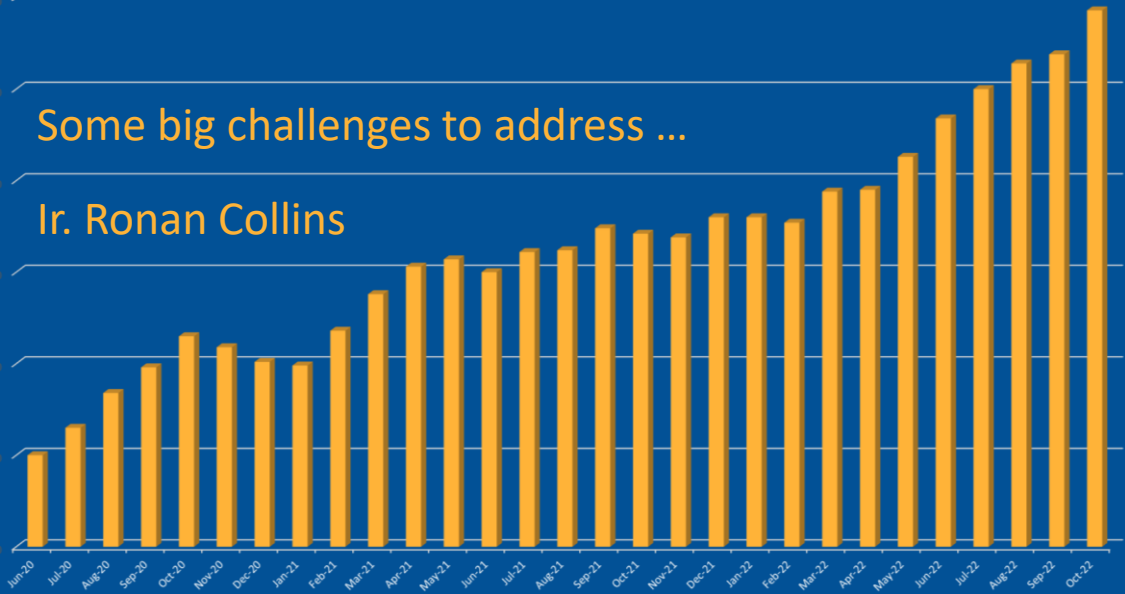


Data Management in Construction

Some big challenges to address ...

Ir. Ronan Collins



Do You speak “data” ?

Data literacy is a language we need to learn



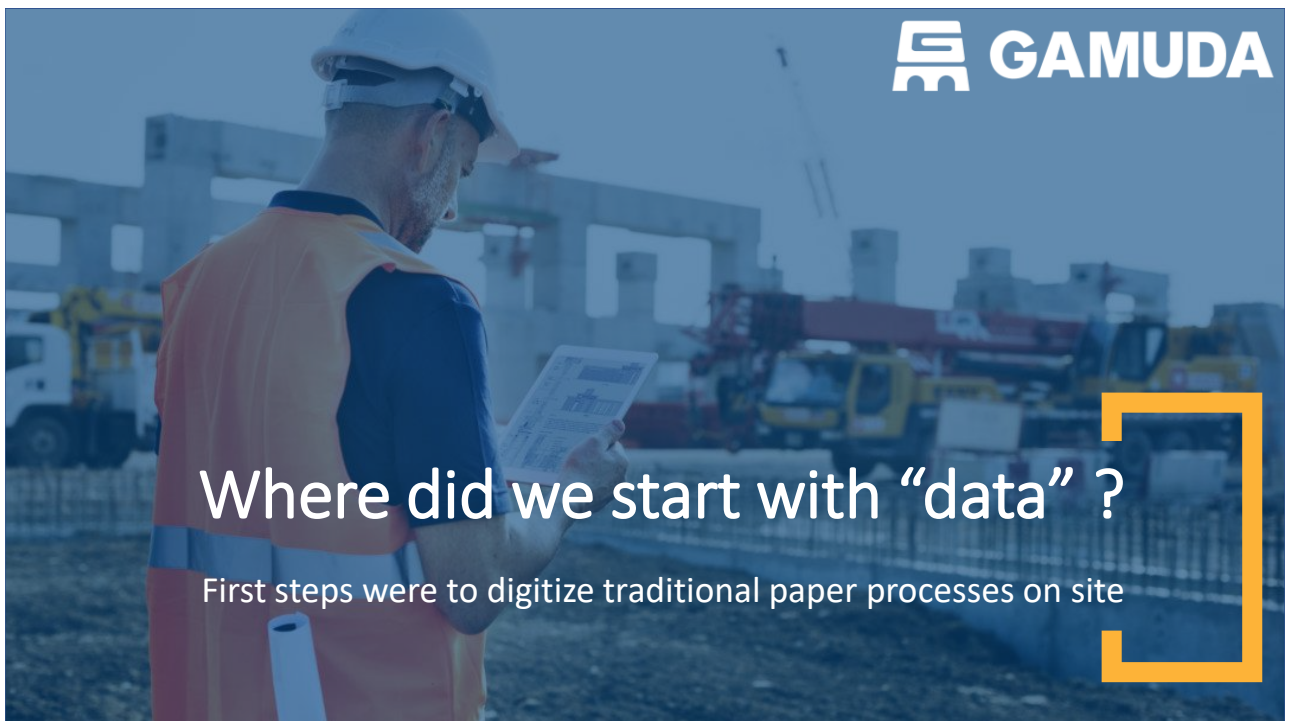


Our Vision for Data in Construction Management

- C'Suite and senior management will define specific goals for a data driven business
- Individual project managers will rely on real-time, site data driven project reports and dash boards
- Site Engineers will define measurable targets for improving productivity by using data collected that is accurate, reliable, standardized and controlled.
- All staff will be provided with data literacy skills, training & education

Perceived Benefits

- Improve adoption rates & value extraction from new digital tools
- Identify site processes to innovate, improve or transform
- Define success metrics for digital initiatives on projects
- Win new projects
- Improve profit margin certainty
- Change culture from “My Project” to “**Our Data**”



Where did we start with “data” ?

First steps were to digitize traditional paper processes on site

Paperless Construction

- Site Engineers, Operations and Managers use digital forms on site
- Digital Inspections for Subcons, Consultants, REs, Suppliers etc
- Digital Checklists and forms to Control Quality and Record Defects
- Capture photos with location data
- Communication with integrated Mobile Apps
- Fast, Reliable and Secure cloud based data and web services

Work Permits, Daily Site Diary Reports, Inspections etc

apac.fieldview.viewpoint.com/fieldviewweb/forms?o=70183&p=10042&e=19660461&eh=&pi=1&ps=50&sc=CreatedDate&sc=DESC&od=false&oa=false&staid=0

Incognito (2)

FIELD VIEW TASKS FORMS PROCESSES ASSETS FIELD CLASSIC

FORMS FORM SCHEDULES

REF STATUS LOCATION NAME CREATED TYPE

FL30422	Submitted by Supervisor	Ampang Park Station (APPS)	OPS Site Diary (Daily Progress Reports)	3/26/2020	Operation
FL30286	Step 4: Approved by CR	Ampang Park Station (APPS)	SHE Permit - Hot Work	3/28/2020	SHE
FL30287	Step 4: Approved by CR	Ampang Park Station (APPS)	SHE Permit - Hot Work	3/28/2020	SHE
FL30286	Step 4: Approved by CR	Ampang Park Station (APPS)	SHE Permit - Hot Work	3/28/2020	SHE
FL30285	Step 4: Approved by CR	Ampang Park Station (APPS)	SHE Permit - Hot Work	3/28/2020	SHE
FL30284	Reviewed and Updated by Engineer	Ampang Park Station (APPS)	OPS Site Diary (Daily Progress Reports)	3/28/2020	Operation
FL30283	Step 4: Approved by CR	Ampang Park Station (APPS)	SHE Permit - Lifting	3/28/2020	SHE
FL30250	Reviewed and Updated by Engineer	Ampang Park Station (APPS)	OPS Site Diary (Daily Progress Reports)	3/28/2020	Operation
FL30279	Raised by Site Engineer/TMC	Ampang Park Station (APPS)	Temp Works - Permit to load (Cat 3)	3/27/2020	Temp Works
FL30278	Step 4: Approved by CR	Ampang Park Station (APPS)	SHE Permit - Lifting	3/27/2020	SHE
FL30268	Opened	Ampang Park Station (APPS)	OPS Site Diary (Daily Progress Reports)	3/27/2020	Operation
FL30267	Opened	Ampang Park Station (APPS)	OPS Site Diary (Daily Progress Reports)	3/27/2020	Operation
FL30265	Step 4: Approved by CR	Ampang Park Station (APPS)	SHE Permit - Working At Height	3/27/2020	SHE
FL30264	Step 4: Approved by CR	Ampang Park Station (APPS)	SHE Permit - Hot Work	3/27/2020	SHE
FL30269	Submitted by Supervisor	Ampang Park Station (APPS)	OPS Site Diary (Daily Progress Reports)	3/27/2020	Operation
FL30259	Step 4: Approved by CR	Ampang Park Station (APPS)	SHE Permit - Hot Work	3/27/2020	SHE
FL30258	Step 4: Approved by CR	Ampang Park Station (APPS)	SHE Permit - Hot Work	3/27/2020	SHE
FL30257	Step 4: Approved by CR	Ampang Park Station (APPS)	SHE Permit - Hot Work	3/27/2020	SHE
FL30256	Step 4: Approved by CR	Ampang Park Station (APPS)	SHE Permit - Hot Work	3/27/2020	SHE

OPS Site Diary (Daily Progress Reports)

2020-03-26

Form Reference: FL318901

Owned By: Liew Min Zhao (MGKT_SSP_MRT_Line2)

Date: 3/26/2020 6:39:28 PM

Status: Reviewed and Updated by Engineer

Project Name: Ampang Park Station (APPS)

Project Address: SSP MRT Line 2

Client Project Reference:

Location: Ampang Park Station (APPS)

Date: 3/26/2020 Liew Min Zhao 3/26/2020 6:39:28 PM

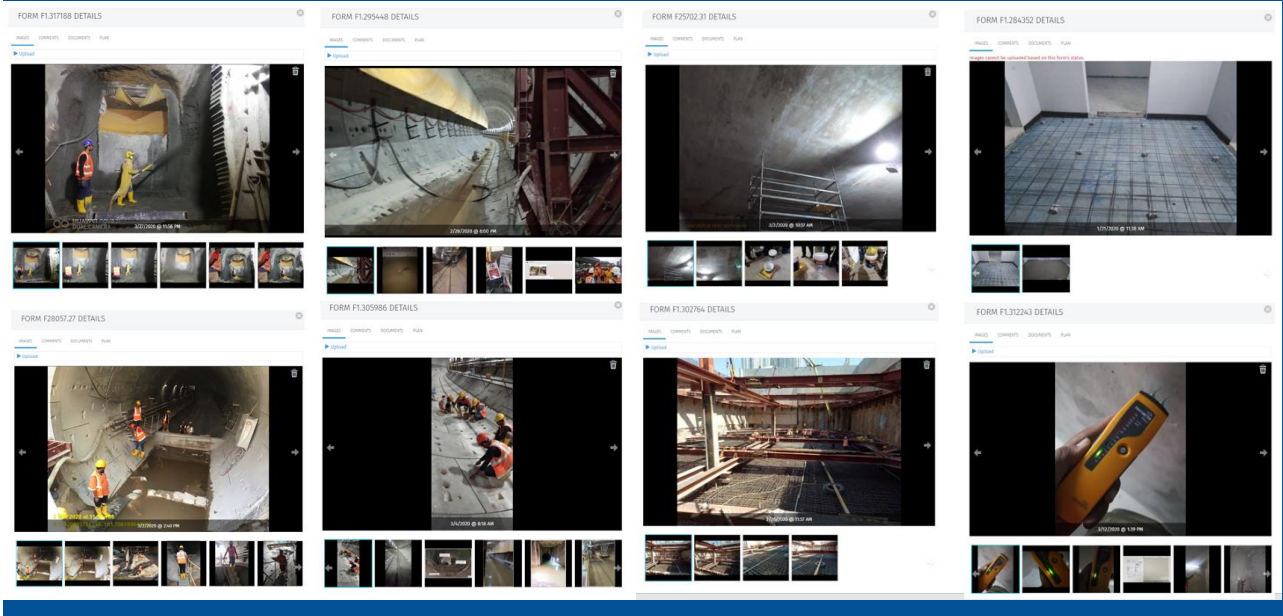
Weather

#	Weather	From (Time)	To (Time)	Answered By	Answered Date
1	Sunny	6:00 AM	7:00 PM	Liew Min Zhao	3/27/2020 10:28:00 AM

Activities

#	Contractors	Activity	Remarks	Answered By	Answered Date
1	Gamuda Engineering	Overseeing, Housekeeping and Operate Water Treatment Plant - Disinfecting tables and chairs at rest area	Manpower: Total: 9 Engineer - 1 Foreman - 2 General worker - 6	Lim Jiu Seng	3/27/2020 3:32:00 PM
2	Wai Fong-Masterpave JV	-Installation of rebar and formwork -Preparation work for Base Slab casting -Housekeeping and clear water ponding	Manpower: Total: 37 CM - 1 Engineer - 2 SHO - 1 SSS - 2 Site supervisor - 2 Lifting supervisor - 1 Ratier team foreman - 1 Concrete team foreman - 1 Carpenter team foreman - 3 Forklift operator - 1 General workers - 22	Lim Jiu Seng	3/27/2020 3:31:00 PM
3	Poh Loy Engineering Sdn Bhd	Excavation to LUP level (GL-2) Mucking out soil Transfer soil to Ampang Park Mall for stockpile as dumping ground is still closed due to MCO	Manpower: Total: 9 Engineer - 1 Supervisor - 1 Excavator Operator - 3 Crane Operator - 1 Rigger - 1 General workers -	Lim Jiu Seng	3/27/2020 3:29:00 PM

Location based images attached to checklists/forms



Digital Forms – Basic Dashboard Report

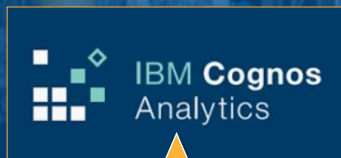




How do we get insights from data

Once data is collected, new reporting and analysis are possible

Data Analytics – A New Skill

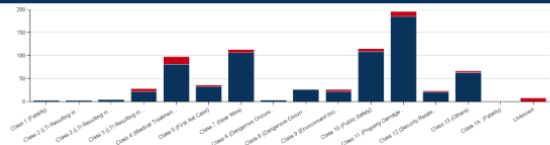
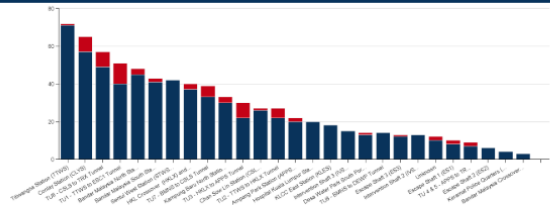
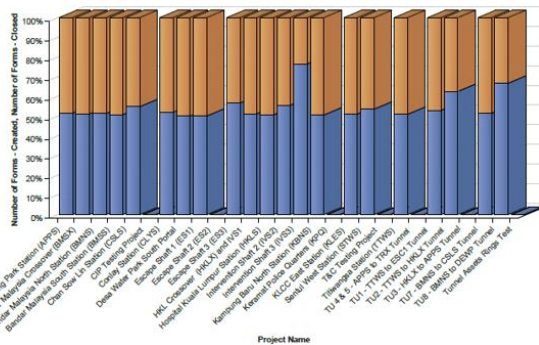
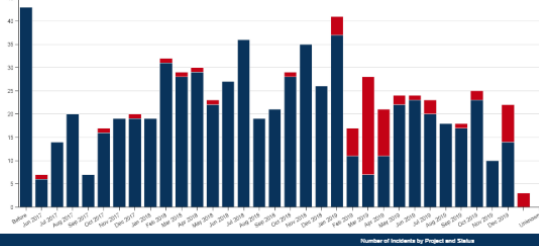


- Software & programming skills
- Subject Matter Expertise (what data)
- Data Visualisation Skills
- Web services & security skills



Analytics and Dashboard Reporting

Number of Incidents: 22



13

Safety Incident Analysis and Reporting

High Risk NCR Normal Risk NCR Need Improvement Acceptable Not Applicable Form Present, No Answer No Form

	Ampang Park Station (APPS)	Bandar Malaysia Crossover (BMSX)	Bandar Malaysia North Station (BMSN)	Bandar Malaysia South Station (BMSO)	Chan Sow Lin Station (CSLS)	Conlay Station (CLYS)	Desa Water Park South Portal	Escape Shaft 1 (ES1)	Escape Shaft 2 (ES2)	Escape Shaft 3 (ES3)	HKL Crossover (HKL2) and IVS1	Hospital Kuala Lumpur Station (HKL3)	Intervention Shaft 2 (IVS2)	Intervention Shaft 3 (IVS3)	Kampung Baru North Station (KBNS)
Part A - OSH															
1.1 Site set-up and layout PIA															
1.2 Site & office entry points															
1.3 Site internal traffic mane															
1.4 Segregation of fabrication															
1.5 Tunnel and UG Station tail															
1.6 Site lighting for access a															
1.7 Emergency & escape lightin															
1.8 EM Lighting Testing															
1.9 Storage areas															
1.10 Security															
2.1 Internal Site Notice Board															
2.2 Health and Safety Riops															
2.3 SHE Policy Statement															
2.4 First Aid information															



What else can we do?

How do we plan & monitor site works with data

Data Driven Real Time Reporting Pilot Project

- A dedicated, digitally capable team consisting of a planner, commercial manager, site engineer and overall project director will be tasked with establishing standard operating procedures for data driven reporting.
- The project team need to define timelines, cost items and KPI's for reporting daily activities and generating real time report dashboards.
- Senior PM's need to demand daily reports, based on collected site data.
- To learn how to develop these reporting tools, test them and improve their use and reliability, they will be deployed on a new building project.
- This fully digital project will be BIM based and all information will be managed on the project information platform, Viewpoint for Projects

Detailed WBS

Site Tasks

Real Time Monitoring

Accurate Model

Data Analytics

The image displays a woman in a blue hard hat and safety vest looking at a tablet. Overlaid on the image are several software interfaces: a Detailed Work Breakdown Structure (WBS) tree, a Site Tasks list, a Real Time Monitoring dashboard with a Gantt chart, an Accurate Model 3D rendering of a building structure, and Data Analytics charts including two pie charts and a bar chart showing project progress and resource allocation.

Track Planned Vs Actual Dates Live from Site

Location	ABWF 1st Fix Non Load Bearing RC Wall	ABWF 1st Fix Block Wall incl Plastering	ABWF 1st Fix Plinth Equipment Pad	ABWF 1st Fix Wall Plastering Skim Coating	ABWF 1st Fix Floor Screeding\incl Floor Hardener	ABWF 1st Fix Floor Screeding\Floor Hardener\Top Screed	ABWF 1st Fix Epoxy Flooring	ABWF 1st Fix Slab Soffit Painting	ABWF 1st Fix Wall Painting (Base+1st Coat)
ZONE 1.01 - SER>ABWF & M&E>Lower Conc	11/6/2019	11/6/2019	11/6/2019	11/6/2019	2/11/2020	11/6/2019	11/6/2019	11/24/2019	11/24/2019
ZONE 1.02 - GAS RM 05, CORRIDOR (BOH) C	11/6/2019	11/6/2019	11/6/2019	11/6/2019	12/12/2019		11/6/2019	2/13/2020	2/13/2020
ZONE 1.03 - TVS MCC RM 01, GAS RM 06, TE	11/6/2019	11/6/2019	11/6/2019	11/6/2019	12/10/2019		11/6/2019	11/24/2019	11/24/2019
ZONE 1.04 - DB RM 03, ECS PLANT RM 01, E	11/6/2019	11/6/2019	11/6/2019				11/6/2019		
ZONE 1.05 - CORRIDOR (BOH) 03, BOMBA L	11/6/2019	11/6/2019	11/6/2019	11/6/2019			11/6/2019		
Upper Plant Room Level>ZONE 1.06 - ES/FS-	11/6/2019	11/6/2019	11/6/2019	11/6/2019		11/6/2019	11/6/2019		
Plant Room Level>ZONE 1.06 - ES/FS-03, EX	11/6/2019	11/6/2019	11/6/2019	11/6/2019	12/13/2019	11/6/2019	11/6/2019	1/21/2020	1/21/2020
ZONE 1.07 - ES-01, FS-01>ABWF & M&E>Lo	11/7/2019	11/7/2019	11/7/2019	11/7/2019		11/7/2019	11/7/2019		
ZONE 2.01 - DB RM 04, CORRIDOR (BOH) 06	11/7/2019	8/31/2019	11/7/2019		11/26/2019		11/7/2019	11/19/2019	11/19/2019
ZONE 2.02 - CORRIDOR (BOH) 05, TVF RM 0	11/7/2019	11/7/2019	11/7/2019	11/7/2019	12/12/2019		11/7/2019	12/9/2019	1/21/2020
ZONE 2.03 - ECS CONTROL RM 02, ECS PLAN	11/7/2019	11/7/2019	11/7/2019		11/20/2019		11/7/2019	11/7/2019	11/7/2019
Upper Plant Room Level>ZONE 2.04 - BOMBA	11/7/2019	11/7/2019	11/7/2019	11/7/2019		11/7/2019	11/7/2019		
Plant Room Level>ZONE 2.04 - BOMBA LIFT	11/7/2019	11/7/2019	11/7/2019	11/7/2019	12/15/2019	11/7/2019	11/7/2019	1/21/2020	1/21/2020
ZONE 2.05 - ES-02, FS-02>ABWF & M&E>Lo	11/7/2019	11/7/2019	11/7/2019	11/7/2019		11/7/2019	11/7/2019		
ZONE 3.01 - LOWER CONCOURSE PAID AREA	11/7/2019	11/7/2019	11/7/2019	11/7/2019	3/2/2020	11/7/2019	11/7/2019	11/5/2019	11/7/2019
ZONE 3.02 - CORRIDOR (BOH) / FUTURE PA	11/7/2019	11/7/2019	11/7/2019	11/7/2019	12/2/2019	11/7/2019	11/7/2019	10/28/2019	11/7/2019
OVERALL>ABWF & M&E>Lower Concourse Le				11/7/2019	11/7/2019	11/7/2019	11/7/2019	11/7/2019	11/7/2019

Track Progress Performance

LOCATION	ABWF 1ST FIX FLOOR SCREEDING\INCL FLOOR HARDENER	ABWF 1ST FIX FLOOR SCREEDING \FLOOR HARDENER\TOPPING SCREED	ABWF 1ST FIX SLAB SOFFIT PAINTING	ABWF 1ST FIX WALL PAINTING (BASE+1ST COAT)	ABWF 1ST FIX DOOR FRAME INSTALLATION AND SKIM COATING	ABWF 1ST FIX DOOR FRAME INSTALLATION (INCL CONCEAL CONDUIT CW BOX FOR EAC)	ABWF 1ST FIX TEMPORARY DOOR & LOCK	ABWF FINAL FIX FR DOOR AND ACCESSORIES	ABWF FINAL FIX DEMOUNTABLE WALL DOORS AND ACCESSORIES
ZONE 1.01 - SER > ABWF & M&E > Lower Concourse Level	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Not Applicable	<input checked="" type="checkbox"/> Work Completed 100%	<input checked="" type="checkbox"/> Work Completed 100%	<input type="checkbox"/> Not Applicable	<input checked="" type="checkbox"/> Work Progress 50%	<input type="checkbox"/> Not Started 0%	<input type="checkbox"/> Not Started 0%	<input type="checkbox"/> Not Applicable
ZONE 1.02 - GAS RM 05, CORRIDOR (BOH) 01, EVU/ LV/SPD > ABWF & M&E > Lower Concourse Level	<input checked="" type="checkbox"/> Work Progress 25%	<input type="checkbox"/> Not Started 0%	<input checked="" type="checkbox"/> Work Started 5%	<input checked="" type="checkbox"/> Work Started 5%	<input type="checkbox"/> Not Applicable	<input checked="" type="checkbox"/> Work Progress 25%	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Not Started 0%	<input type="checkbox"/> Not Applicable
ZONE 1.03 - TV5 MCC RM 01, GAS RM 06, TEF RM, TVF RM 01, TV, BOMBA LIFT LOBBY 05, LFT-04 > ABWF & M&E > Lower Concourse Level	<input checked="" type="checkbox"/> Work Progress 50%	<input type="checkbox"/> Not Started 0%	<input checked="" type="checkbox"/> Work Progress 75%	<input checked="" type="checkbox"/> Work Progress 75%	<input type="checkbox"/> Not Applicable	<input checked="" type="checkbox"/> Work Progress 50%	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Not Started 0%
ZONE 1.04 - DB RM 03, ECS PLANT RM 01, ECS CONTROL RM 01 > ABWF & M&E > Lower Concourse Level	<input type="checkbox"/> Not Started 0%	<input type="checkbox"/> Not Started 0%	<input type="checkbox"/> Not Started 0%	<input type="checkbox"/> Not Started 0%	<input type="checkbox"/> Not Applicable	<input checked="" type="checkbox"/> Work Progress 50%	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Not Started 0%
ZONE 1.05 - CORRIDOR (BOH) 03, BOMBA LIFT LOBBY 03, LFT-01, VE/VS > ABWF & M&E > Lower Concourse Level	<input type="checkbox"/> Not Started 0%	<input type="checkbox"/> Not Started 0%	<input type="checkbox"/> Not Started 0%	<input type="checkbox"/> Not Started 0%	<input type="checkbox"/> Not Applicable	<input checked="" type="checkbox"/> Work Progress 50%	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Not Started 0%	<input type="checkbox"/> Not Applicable
Upper Plant Room Level > ZONE 1.06 - ES/FS-03, EXIT PASSAGEWAY 01/02, CORRIDOR (BOH) 02, LV/EU/ECS/SPD > ABWF & M&E > Lower Concourse Level	<input type="checkbox"/> Not Started 0%	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Not Started 0%	<input type="checkbox"/> Not Started 0%	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Not Applicable
Plant Room Level > ZONE 1.06 - ES/FS-03, EXIT PASSAGEWAY 01/02, CORRIDOR (BOH) 02, LV/EU/ECS/SPD > ABWF & M&E > Lower Concourse Level	<input checked="" type="checkbox"/> Work Progress 25%	<input type="checkbox"/> Not Applicable	<input checked="" type="checkbox"/> Work Progress 25%	<input checked="" type="checkbox"/> Work Progress 25%	<input type="checkbox"/> Not Applicable	<input checked="" type="checkbox"/> Work Progress 25%	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Not Started 0%	<input type="checkbox"/> Not Applicable
ZONE 1.07 - ES-01, FS-01 > ABWF & M&E > Lower Concourse Level	<input type="checkbox"/> Not Started 0%	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Not Started 0%	<input type="checkbox"/> Not Started 0%	<input type="checkbox"/> Not Applicable	<input checked="" type="checkbox"/> Work Progress 75%	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Not Started 0%	<input type="checkbox"/> Not Applicable
ZONE 2.01 - DB RM 04, CORRIDOR (BOH) 06, EVU/ LV/SPD > ABWF & M&E > Lower Concourse Level	<input checked="" type="checkbox"/> Work Progress 95%	<input type="checkbox"/> Not Started 0%	<input checked="" type="checkbox"/> Work Completed 100%	<input checked="" type="checkbox"/> Work Completed 100%	<input type="checkbox"/> Not Applicable	<input checked="" type="checkbox"/> Work Progress 50%	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Not Started 0%
ZONE 2.02 - CORRIDOR (BOH) 05, TVF RM 02, TV, TV5 MCC RM 02, GAS RM 08 > ABWF & M&E > Lower Concourse Level	<input checked="" type="checkbox"/> Work Progress 95%	<input type="checkbox"/> Not Started 0%	<input checked="" type="checkbox"/> Work Progress 75%	<input checked="" type="checkbox"/> Work Progress 75%	<input type="checkbox"/> Not Applicable	<input checked="" type="checkbox"/> Work Progress 75%	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Not Started 0%



GAMUDA

Data Literacy is Critical

Training, Education, skills development are all needed

Learn “Data” as a Second Language

- Educate all our staff on the importance of data
- Everyone needs to know about data collection, analysis and reporting
- Staff must share their data experience to improve everyone’s knowledge
- Data Analytics is a primary skillsets which needs to be mastered.

Different Training for Different Folks

- **Senior staff** - Awareness on importance of data driven reporting, business value of information management and importance of data for real time project reporting.
- **Project Managers & Engineers** - use data for coordination, interface management, construction planning and cost management. Data courses will include training on the planning of resources, managing deliverables and procedures
- **Technical Staff** - specific software skills required for competency and literacy in the collection, analysis and reporting using data. Training will provide a robust foundation for our staff to build their competencies in using data tools.



Do You speak “data” ?

Courses, trainers, educators are rare.

“If you have a problem,
if no one else can help,
and if you can find them,
maybe you can hire...
the DATA-Team”

The A-Team, circa 1980's

Follow Ronan



Ronan Collins

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Twins | Keynote Speaker

www.linkedin.com/in/ronancollins/