



Enhancing AiM/CPPM with TOC

Theory of Constraints

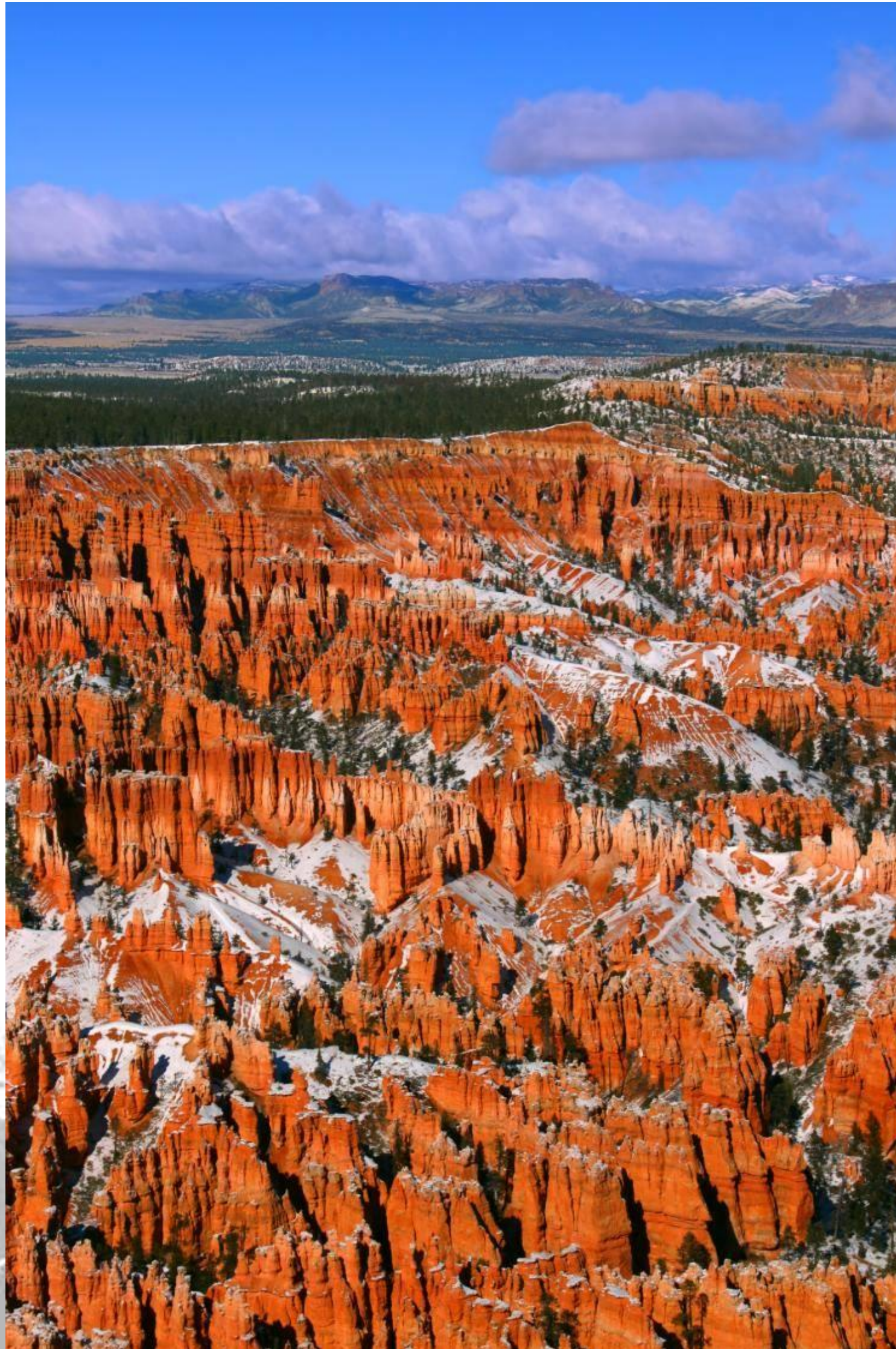
Presented By: Jerry Sheets

Utah!



Asset 2019
World

Utah!



Agenda

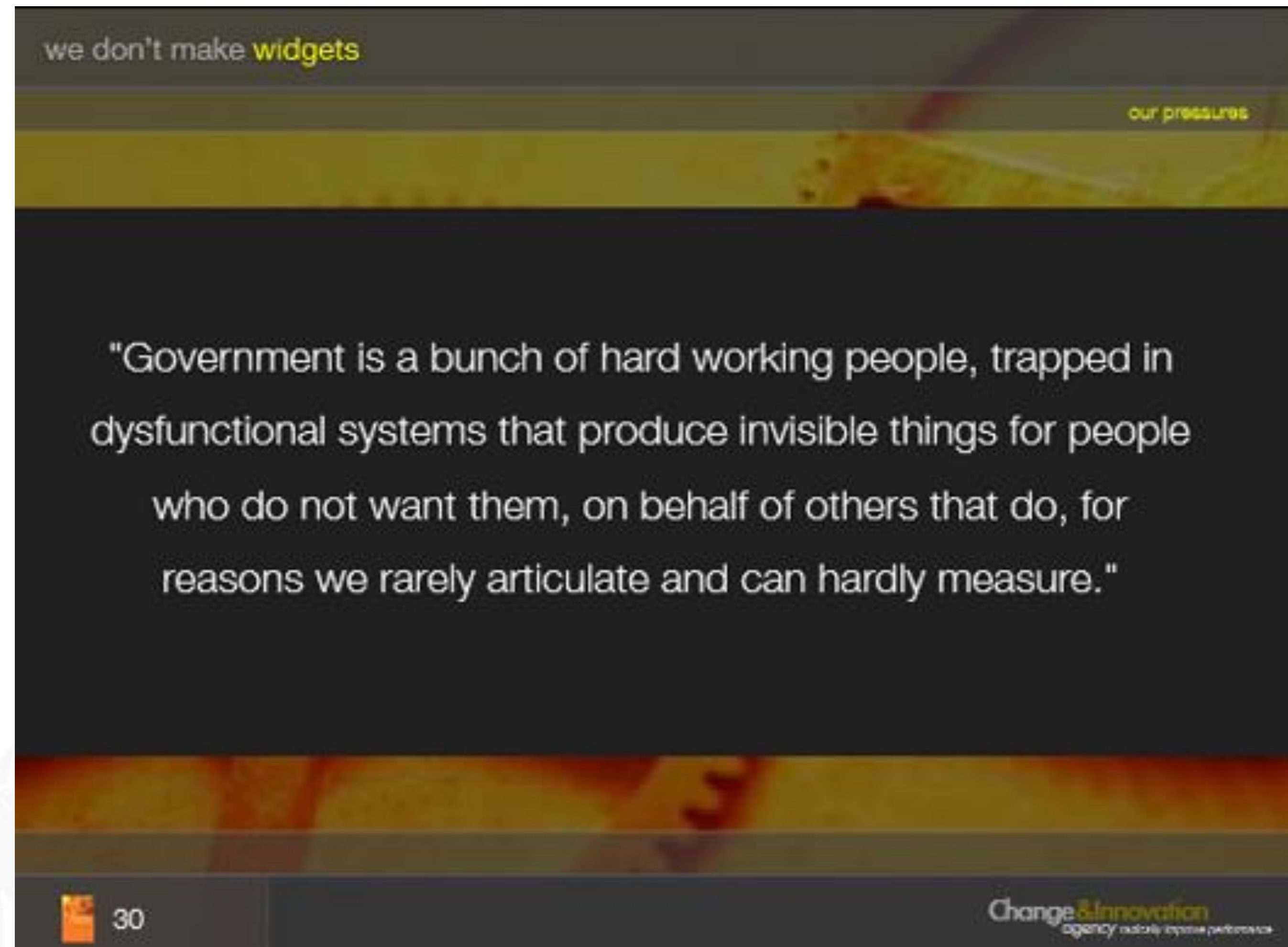
- Background
- What is TOC?
- The Problem
- The Solution
- What's Next?
- Resources
- Q & A

The Work of the Public Sector

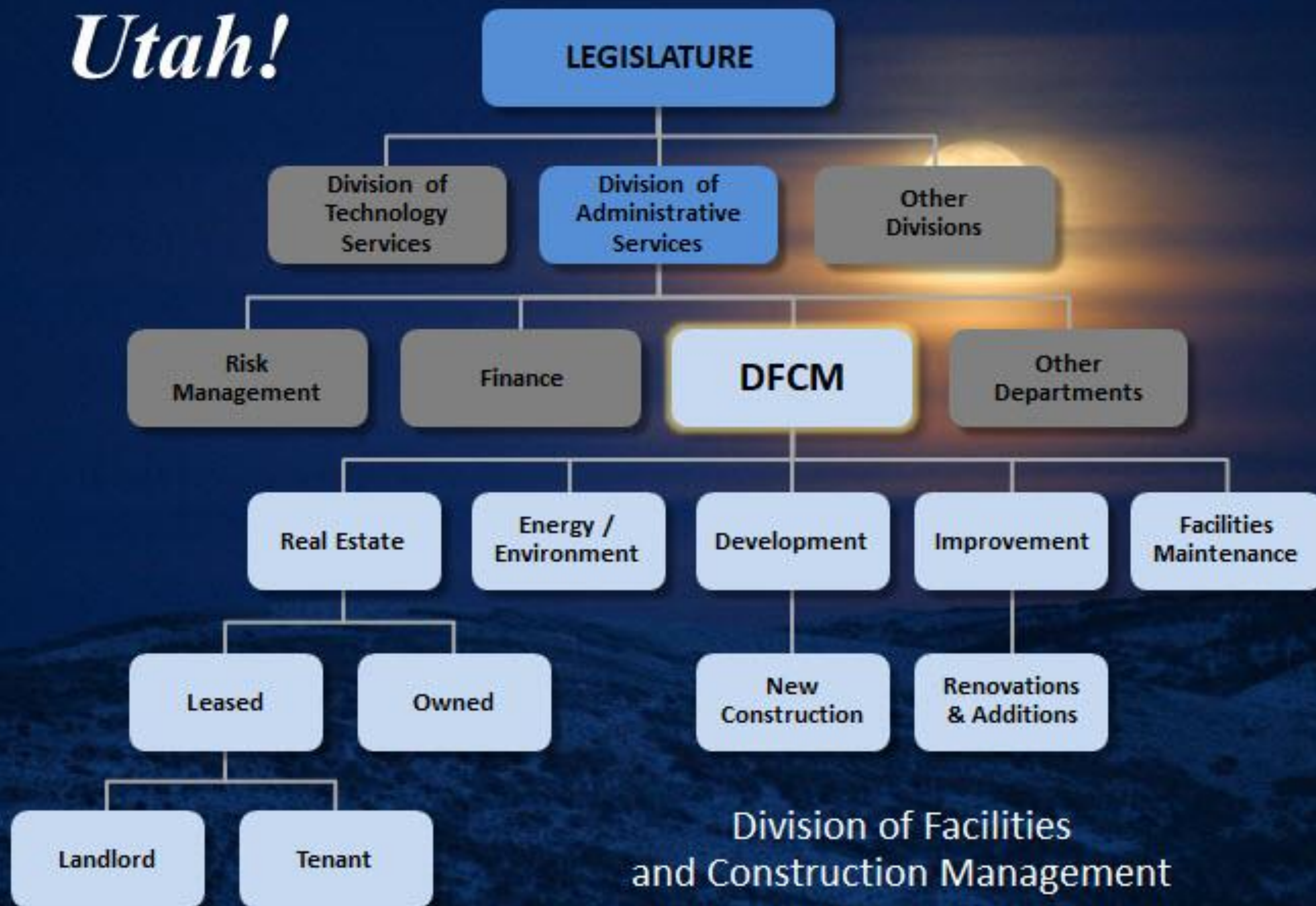


Quote by Ken Miller

‘Extreme Government Makeover’
And
‘We Don’t Make Widgets’



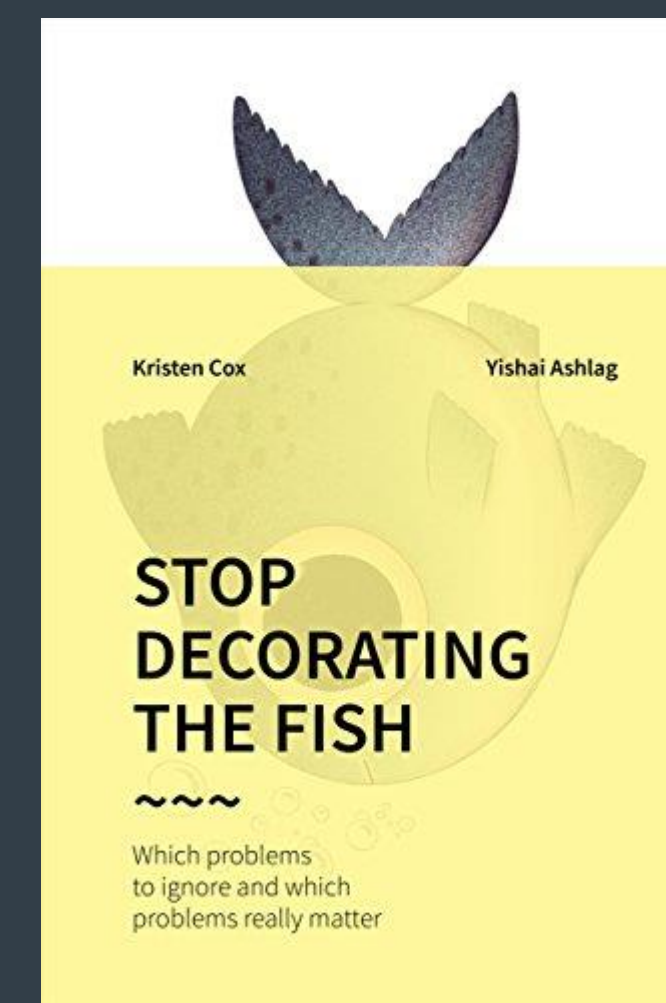
Utah!





Kristen Cox

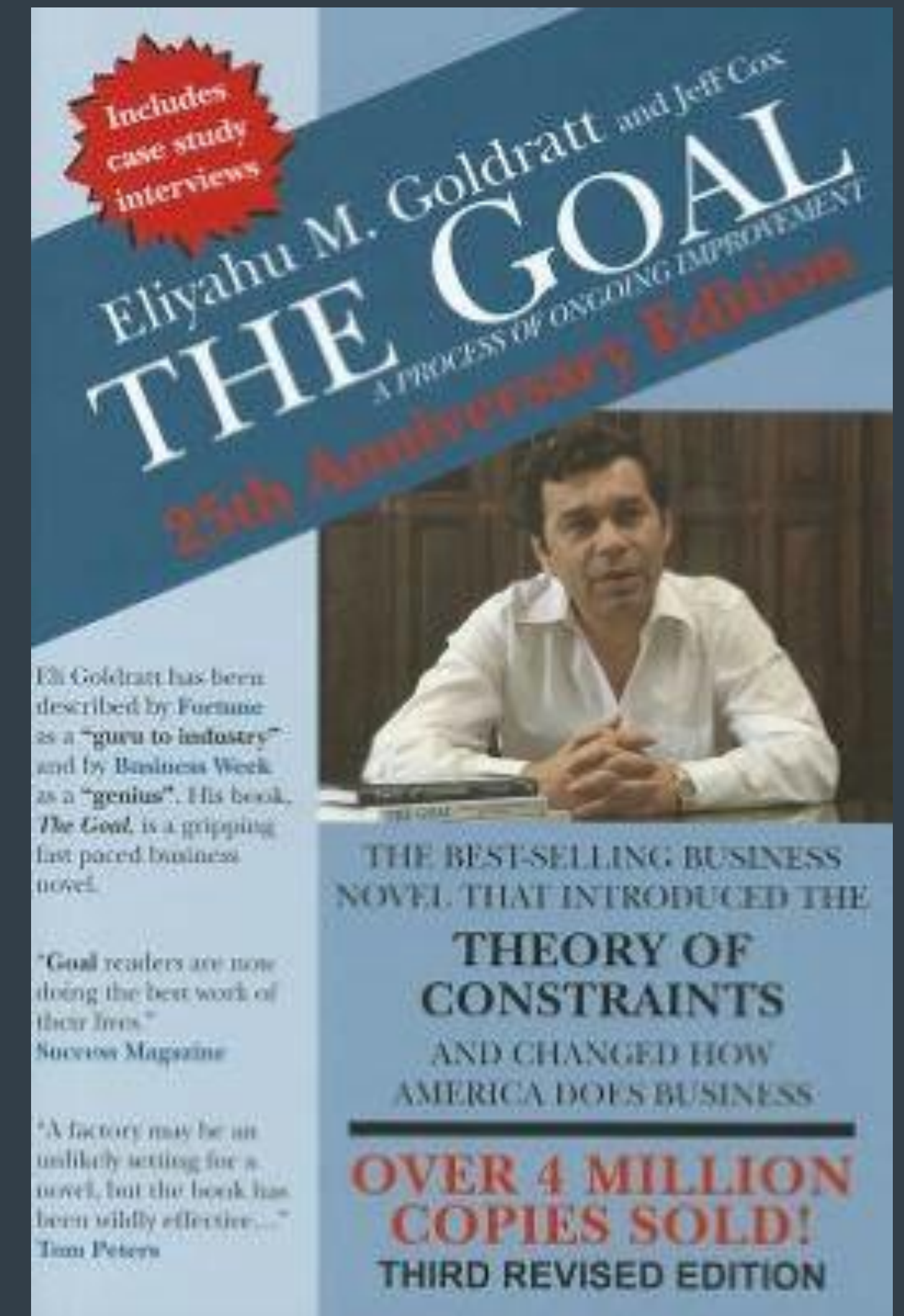
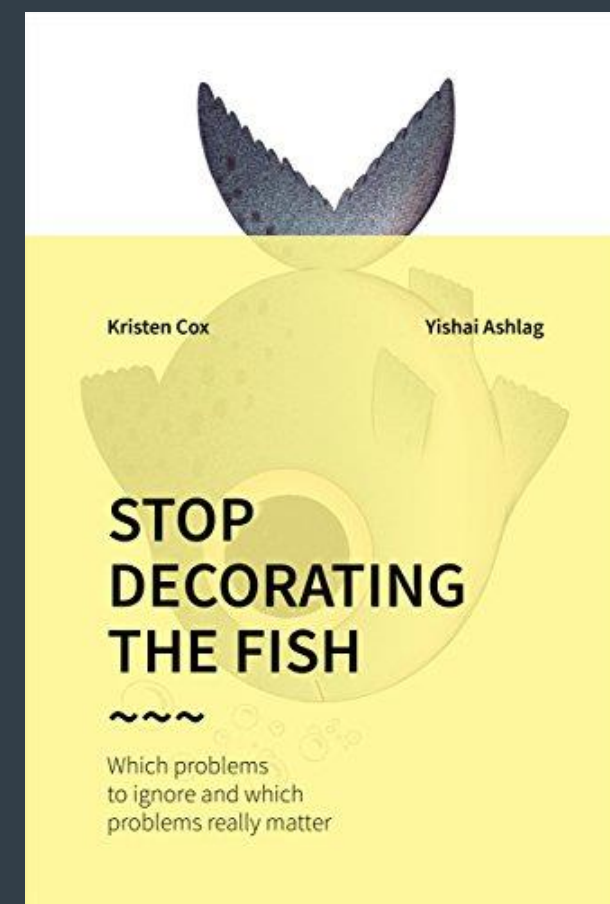
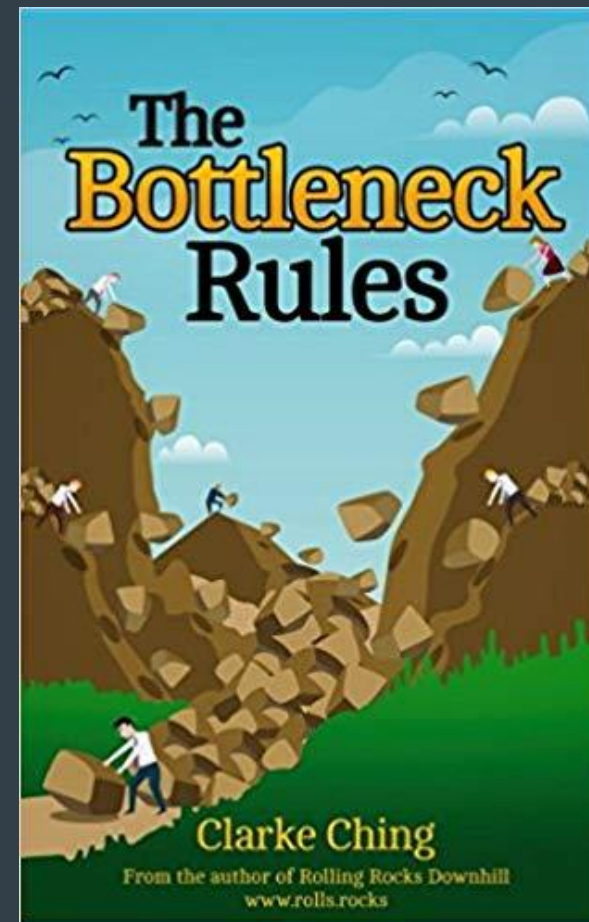
Executive Director, Office of Management and Budget





What is TOC?

Theory of Constraints

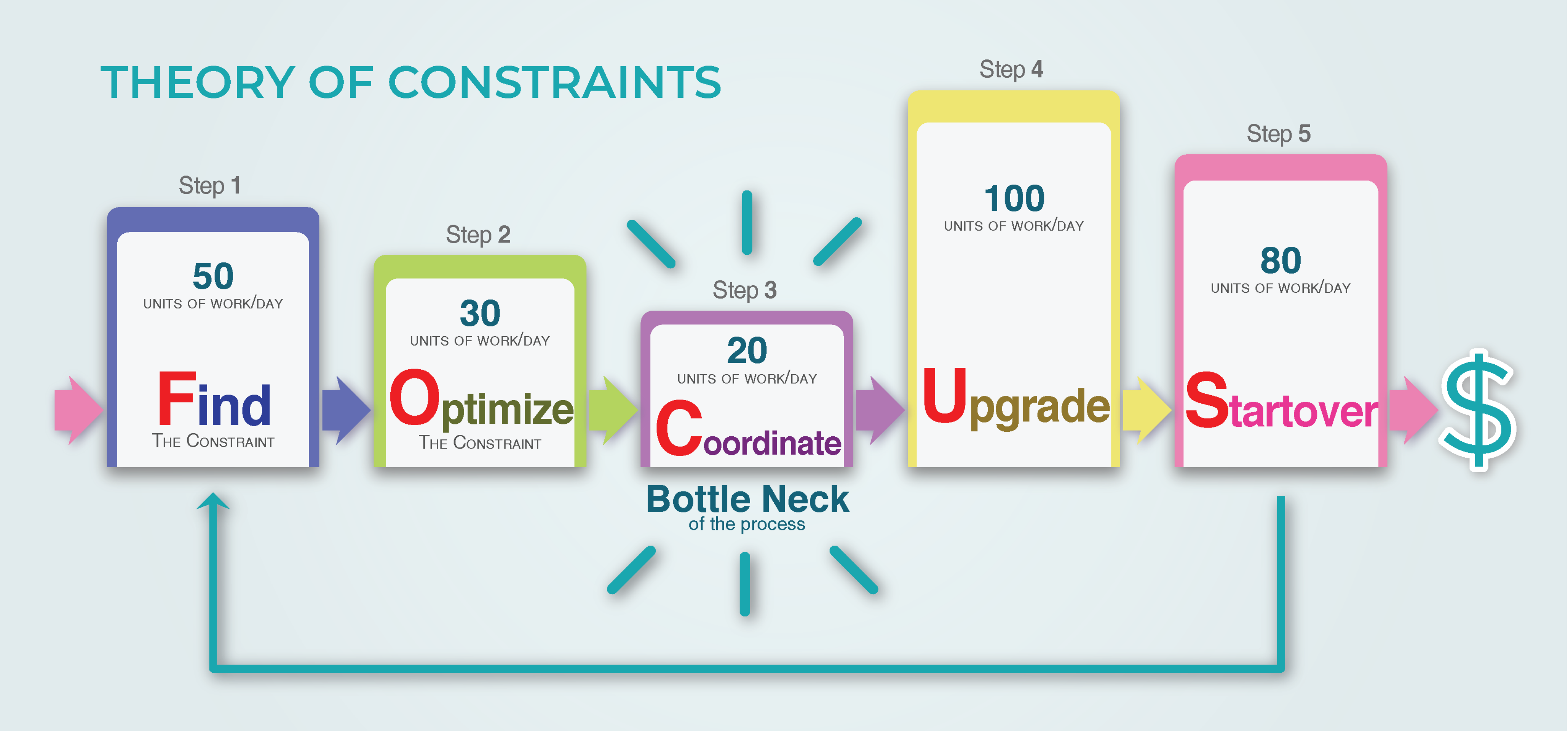


Utah!

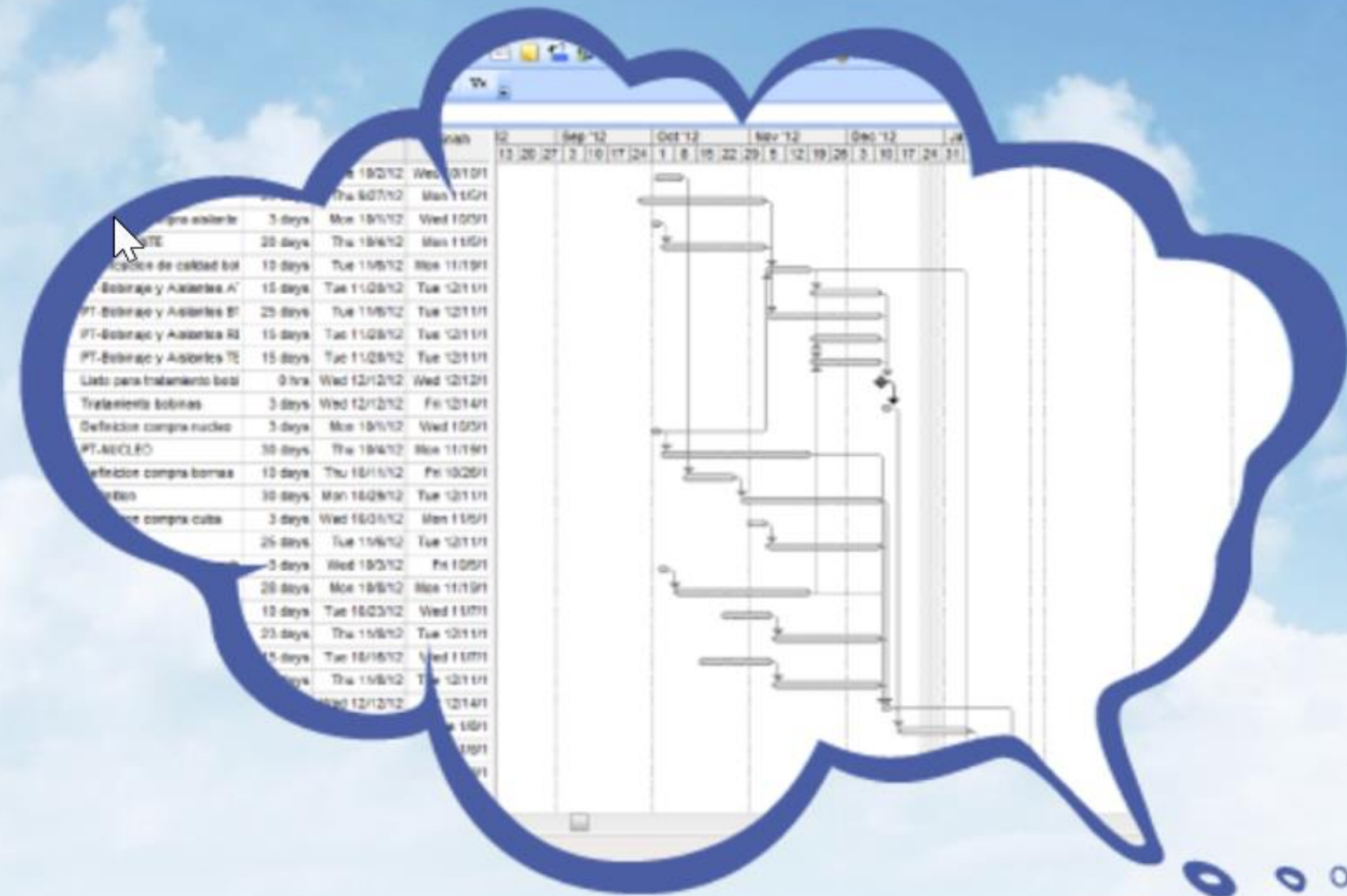


The 5 **FOCUS**ing Steps of the Theory of Constraints (TOC)

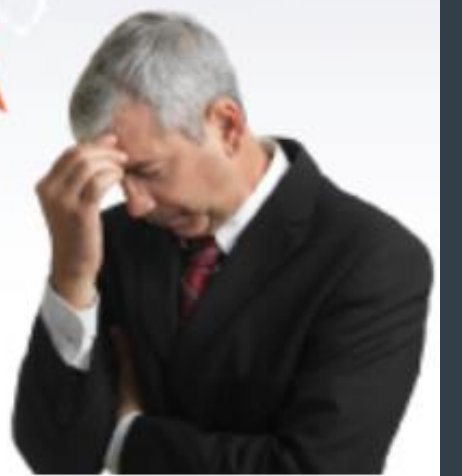
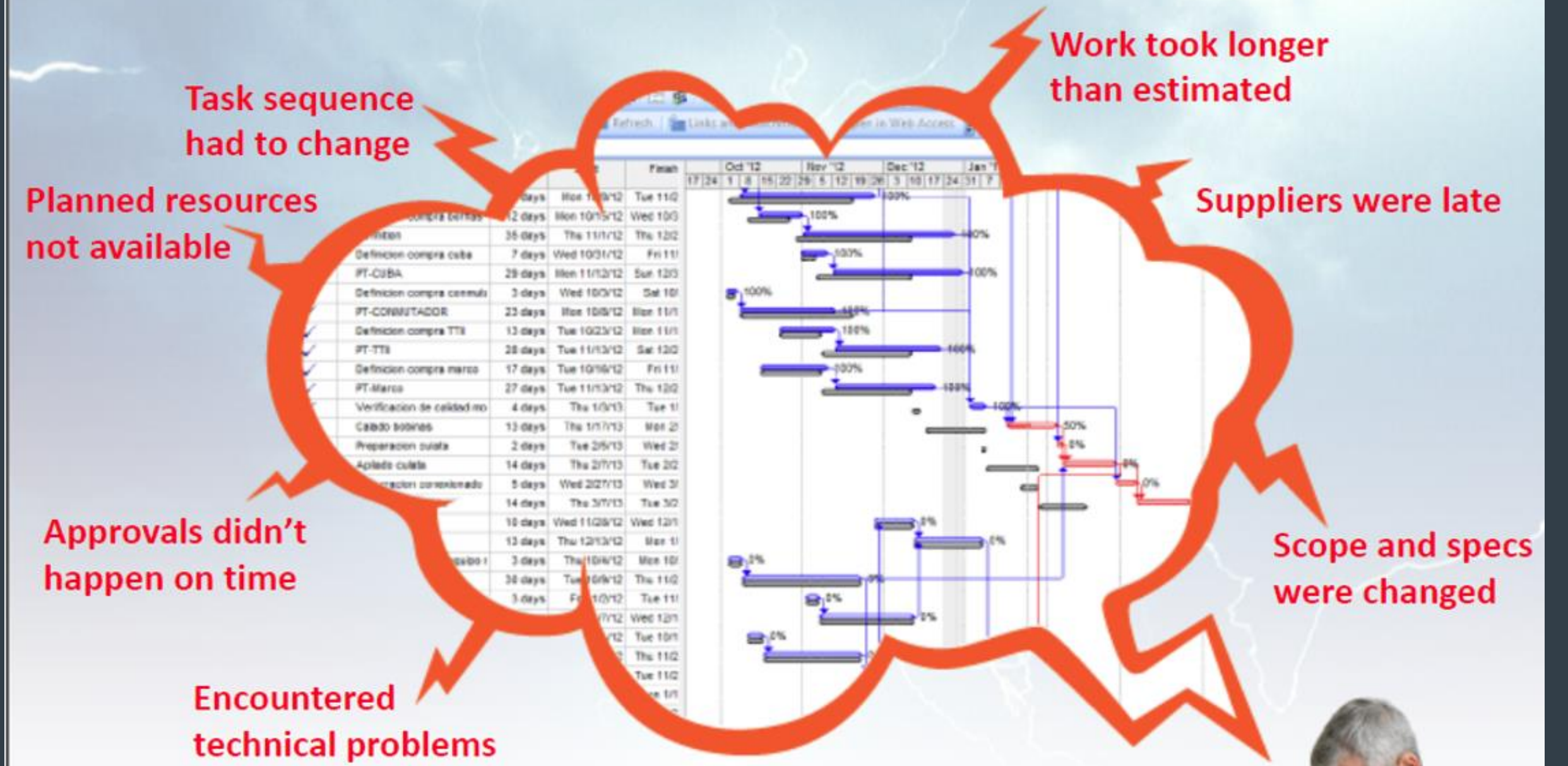
5 Key Steps in Effective Process Improvement



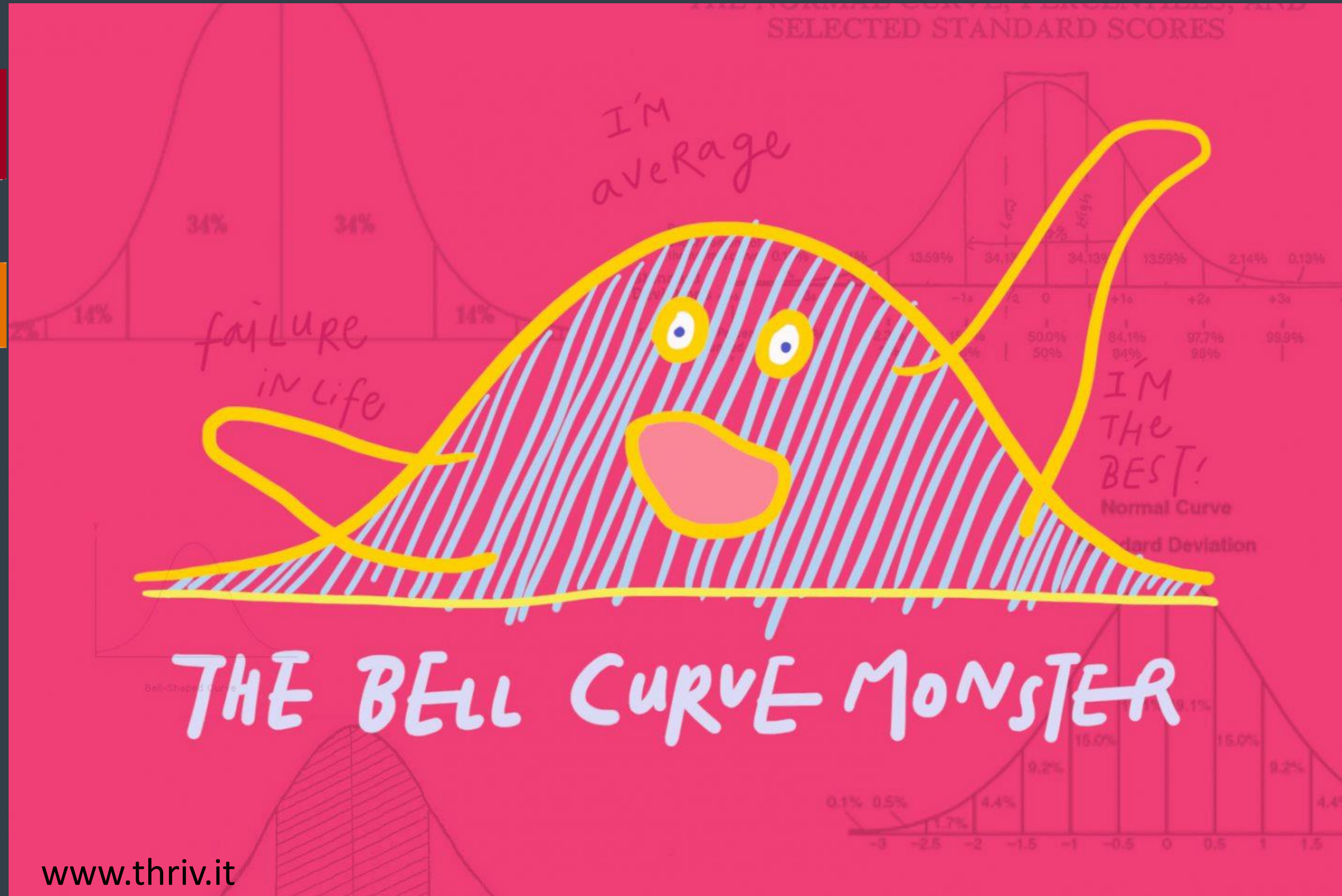
THE PROMISE OF PROJECT PLANS



THE PROBLEM WITH PROJECT PLANS



Bell Curve Monster



THE PROMISE OF PROJECT PLANS

Critical Path Project Management

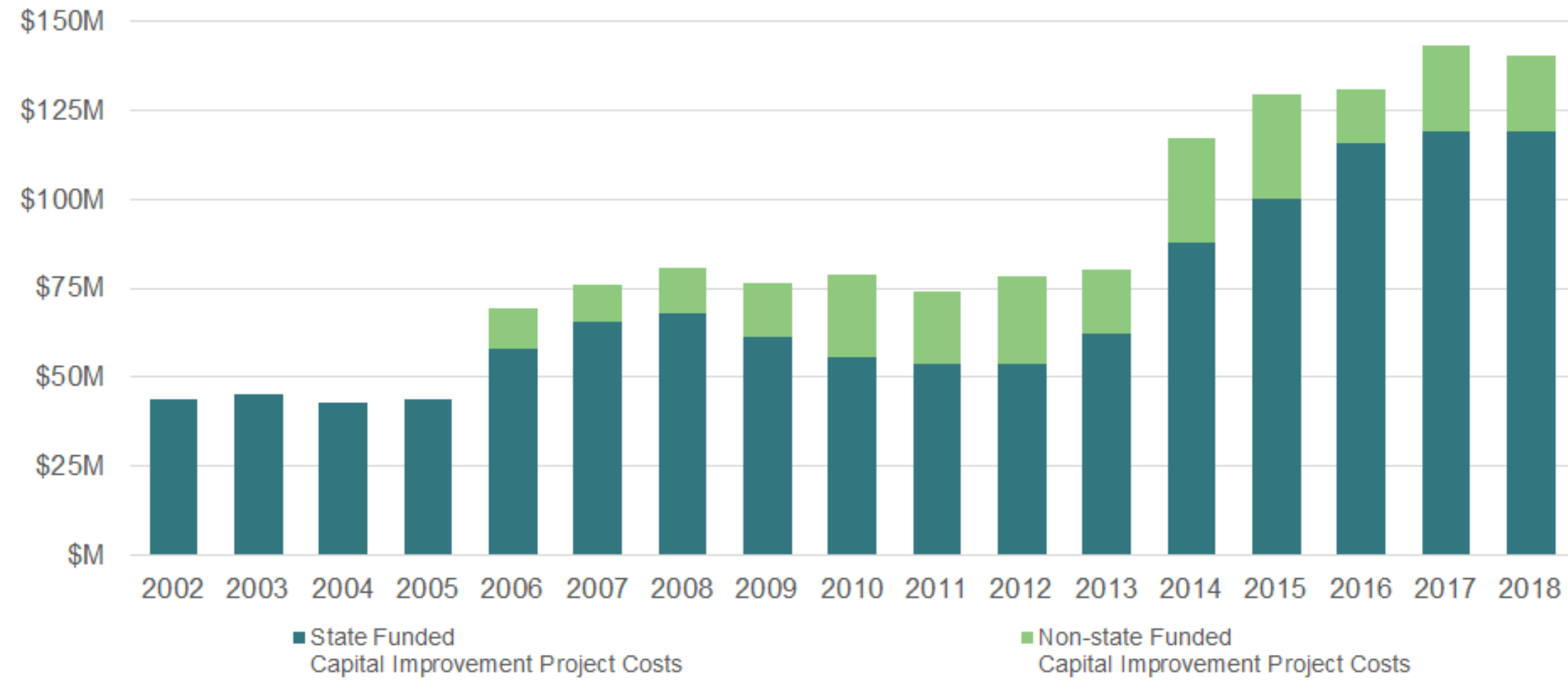


Critical Chain Project Management



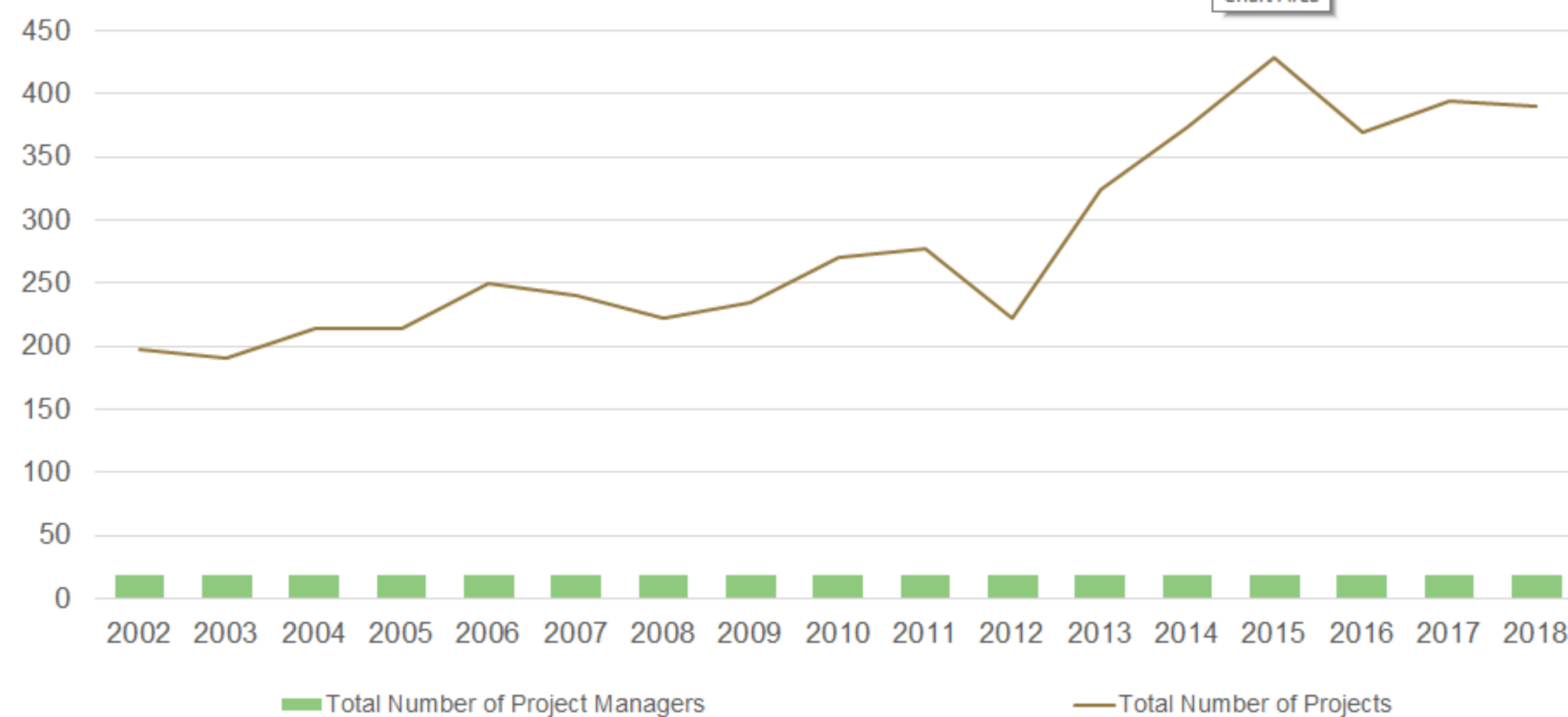
Capital Improvement Projects

Capital Improvement Funding History



Capital Improvement Projects

Personnel vs Number of Projects

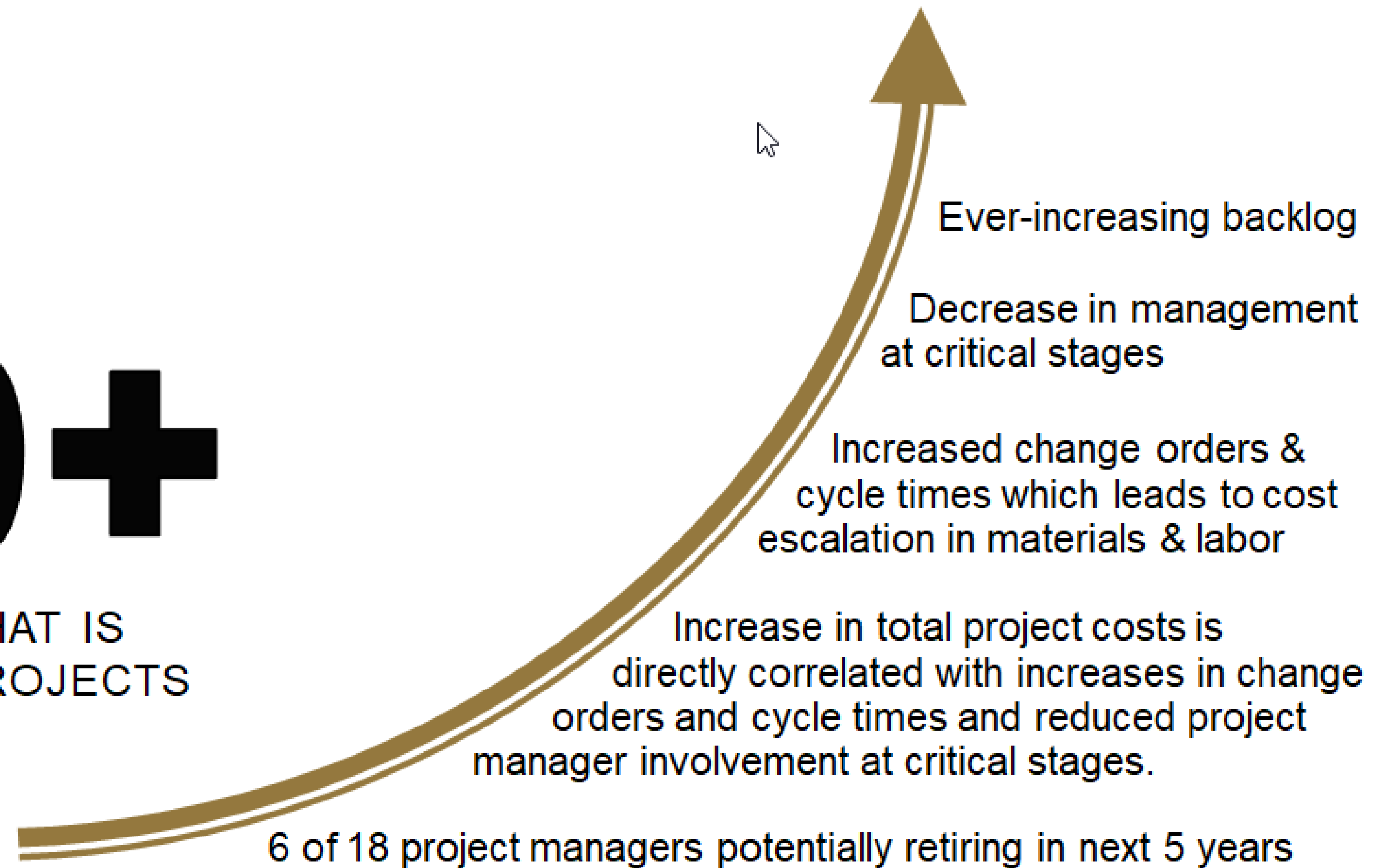


Capital Improvement Projects

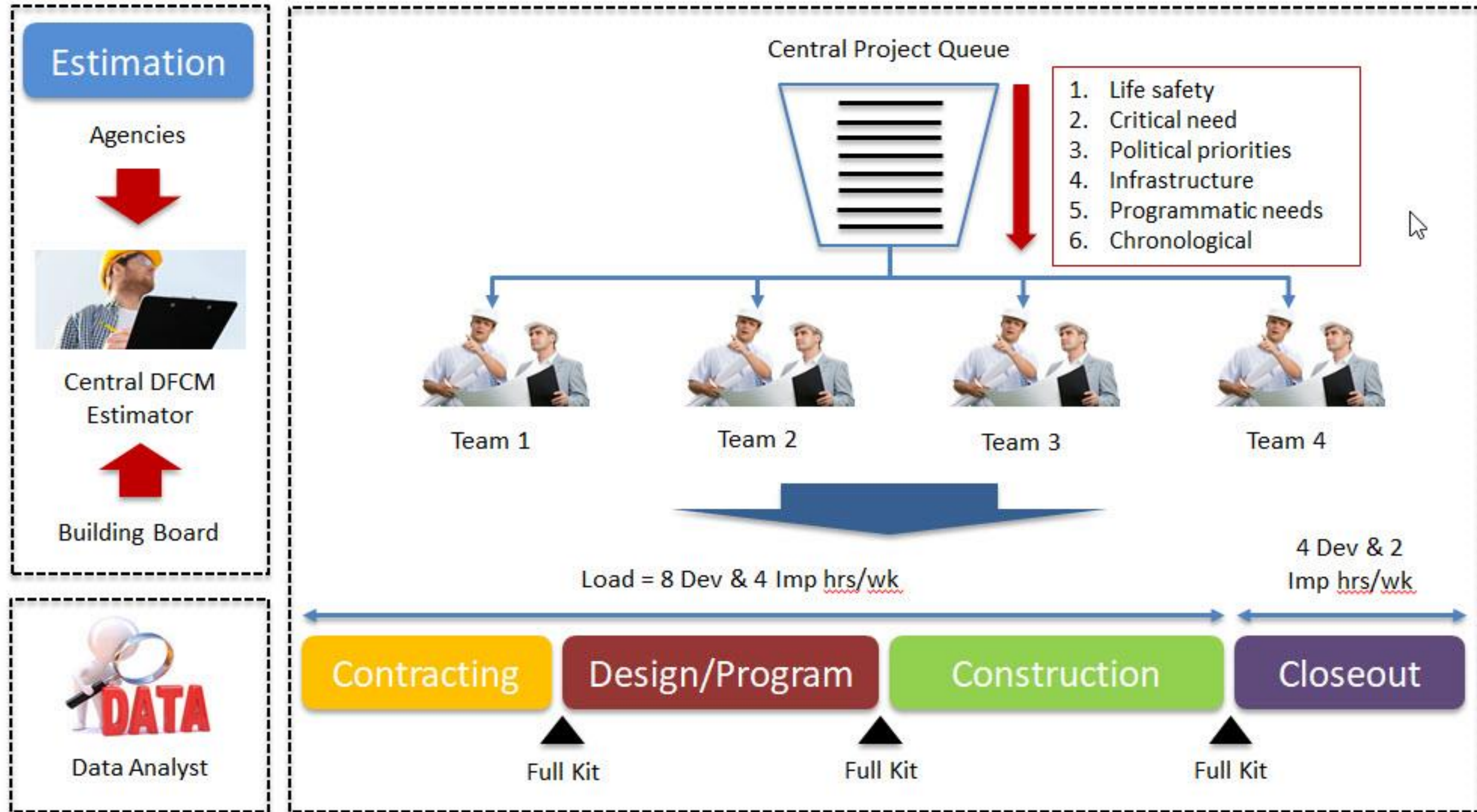


200+

PROJECT BACKLOG THAT IS
GROWING BY OVER 30 PROJECTS
PER YEAR

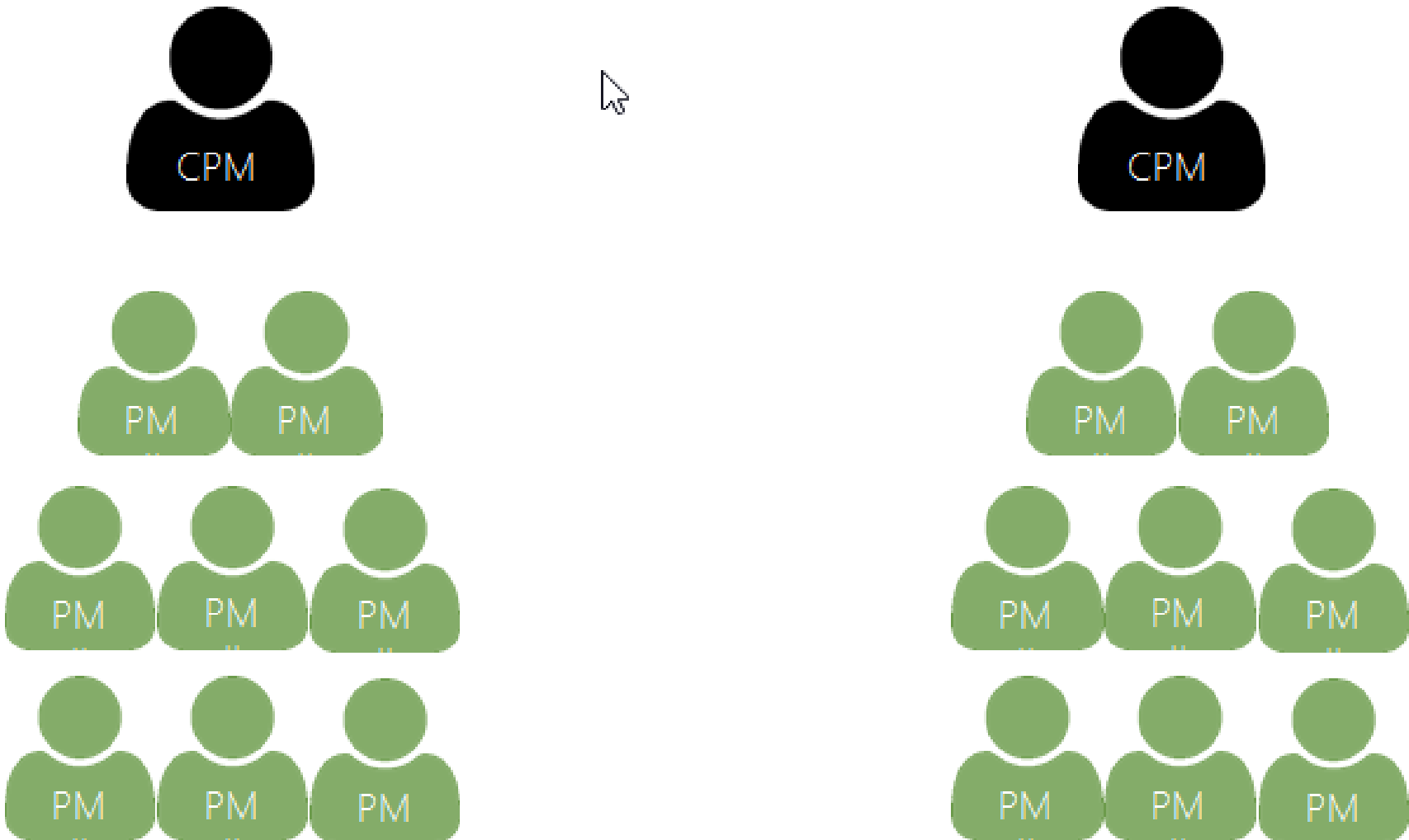


Schematic for Projects \$100M & below:

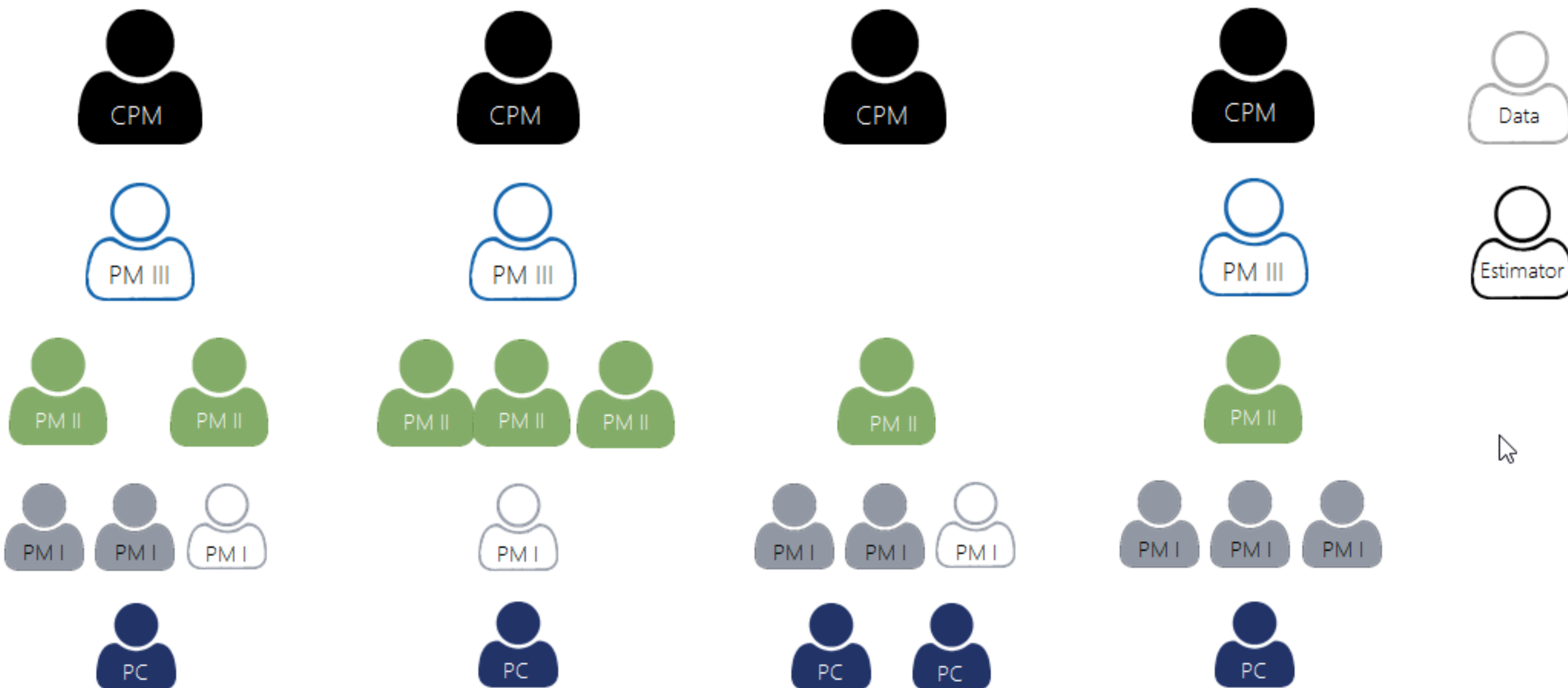




Old Team Structure



New Team Restructure



Full Kit Checklist

Estimation	Programming	Schematic Design	Detailed Design
<ul style="list-style-type: none"> Stakeholder identification Scoping Risk register Delivery method Communications plan Estimate Schedule RFP for programming Bid & award programming FF&E/Equipment IT/AV/Security 	<ul style="list-style-type: none"> Project management plan Full scope document DFCM programmatic standards checklist Risk register update Communications plan update Estimate update Schedule update (Gantt) Energy modeling Owner's Performance Requirements BECC Commissioning agent (CX) RFP for Design (where appropriate) Bid & award design (where appropriate) RFP for CM/GC (where appropriate) Bid & award CM/GC (where appropriate) FF&E/Equipment IT/AV/Security Sign-off (Architect, Agency, DFCM) Management approval Lead and asbestos survey 	<ul style="list-style-type: none"> DFCM SD checklist Communications plan Risk register update Estimate update Programmatic review Schedule update (CPM) Sign-off (Architect, agency, DFCM, CM/GC) Management approval FF&E/Equipment IT/AV/Security 	<ul style="list-style-type: none"> DFCM DD checklist Communications plan Risk register update Estimate update Programmatic review Schedule update (CPM) Sign-off (Architect, agency, DFCM, CM/GC) Management approval FF&E/Equipment IT/AV/Security
Construction Docs	Pre-construction	Construction	Closeout
<ul style="list-style-type: none"> DFCM CD checklist Communications plan Risk register update EDMS plan & approval Permit Inspections RFP for construction Bid & award construction Estimate update Programmatic review Schedule update (CPM) FF&E/Equipment IT/AV/Security Sign-off (Architect, agency, DFCM, CM/GC) Management approval 	<ul style="list-style-type: none"> Construction stakeholder identification Communications plan QA/QC plan Safety plan Closeout plan Contractor training Pre-con meeting 	<ul style="list-style-type: none"> All RFIs answered All PCOs processed All submittals approved All deferred submittals approved Establish OAC FF&E/Equipment IT/AV/Security Moving 	<ul style="list-style-type: none"> Certificate of Significant Completion Certificate of Occupancy Punchlist Redlines / As-built drawings Warranties O&M User training Commissioning sign-off Ratings (AE, contractors, CX) Reconcile contracts Approve final payments Upload documents to <u>Projectwise</u>



Expected Outcomes

Project cycle times will decrease by at least 10%

Number of error and omission change orders will decrease by at least 10%


Throughput will increase by at least 10%

Attention to critical activities will lead to measurable cost savings and/or cost avoidance

No new projects will be added to current backlog

Current backlog can be resolved in 2.5 years

Within four years, savings resulting from imprint processes will exceed the cost of added resources



Project Checklist Worksheet(Full Kit)

IMPROVEMENT (state and non-state funded)

Queue Checklist

Task	1/0/1900 Estimated Start	1/0/1900 Estimated Completion
Setup AIM Budgets		
Customize checklist in AIM		
Initiate Stakeholder Register		
Initiate scoping		
Initiate Risk Register		
Initiate Communications Plan		
CBE line item review checklist		
Initiate milestones schedule		
Funding commitment (related doc)		

Bidding Checklist

Task	1/0/1900 Estimated Start	1/0/1900 Estimated Completion
RFP		
Bid review and contractor award		
Update Stakeholder Register		
Update Risk Register		
Update Communicaitons Plan		
CPM schedule update		
Safety plan		
Closeout plan		
Pre-con meeting		
Establish OAC		

Design Checklist

Task	1/0/1900 Estimated Start	1/0/1900 Estimated Completion
Scope review and verification		
Hazardous building materials survey		
Procurement and award design		
Communications plan update		
Risk register update		
CBE and funding commitments update		
Schedule update		
Stakeholder registry confirmed		

Construction Checklist

Task	1/0/1900 Estimated Start	1/0/1900 Estimated Completion
All RFIs answered		
All approved PCOs processed		
All submittals approved		
All deferred submittals approved		
O&M		
Redlines / as-built drawings		
User training		
Substantial completion		
Warranties		

Construction Docs Checklist

Task	1/0/1900 Estimated Start	1/0/1900 Estimated Completion
Risk register update		
Permit - EDMS plan and approval		
CBE and funding commitments update		
Schedule update		

Closeout Checklist

Task	1/0/1900 Estimated Start	1/0/1900 Estimated Completion
Punchlist completion		
Ratings (AE & Contractors)		
Reconcile contracts		
Archive closeout documents		
Closeout checklist complete		
Approve final payments		

Project Checklist Worksheet(Full Kit)

AiM

Capital Project

Edit

New

Search

Action

ViewFinder

Copy

Budget Manager

Date Manager

Budget Revision

Cash Flow

Email

Print

19235790

GUNTHER TRADES BLDG AND CAMPUS HANDRAIL UPGRADES.

Organization

UTAH VALLEY UNIVERSITY

UTAH VALLEY UNIVERSITY

Created By DAVE WILLIAMS On 06/01/2018 09:54 AM

Last Edited by DWIGHT PALMER On 11/27/2018 03:32 PM

19235790

GUNTHER TRADES BLDG AND CAMPUS HANDRAIL UPGRADES.

Baseline Start

Estimated Start

Actual Start

Baseline End

Estimated End

Actual End

Nov 19, 2018

Aug 30, 2019

Component Group/ Component	Baseline Start	Estimated Start	Actual Start	Actual End	Estimated End	Baseline End
<u>QUEUE</u>		Nov 19, 2018			Nov 19, 2018	
<u>QUEUE</u>		Nov 19, 2018			Nov 19, 2018	
<u>HAZARDOUS MATERIALS</u>						
<u>PRE-CONST SURVEY</u>						
<u>PLAN AND MONITORING</u>						
<u>ABATEMENT REMOVAL</u>						
<u>DESIGN - IMPROV</u>		Dec 27, 2018			Apr 19, 2019	
<u>DESIGN</u>		Dec 27, 2018			Apr 19, 2019	

Checklist Completion Dates

QUEUE

Created By SYSTEM On 06/01/2018 09:55 AM
Last Edited by CLINT BUNNELL On 11/20/2018 01:47 PM

QUEUE - CHECKLIST ITEMS

Capital Project

19235790

GUNTHER TRADES BLDG AND CAMPUS

Component Group

QUEUE

QUEUE - PROJECT WAITING FOR FULL

Organization

Employee

Baseline Start

Estimated Start

Nov 19, 2018

Actual Start

Baseline End

Estimated End

Nov 19, 2018

Actual End

Percent Complete

100.00

Status

ACTIVE

Type

SOFT COSTS

SOFT COSTS

Component Sequence

10

Planned Budget

\$0.00

Original Budget

\$0.00

Budget Revisions

\$0.00

Total Budget

\$0.00

Committed

\$0.00

Expensed

\$0.00

Anticipated

\$0.00

Remaining

\$0.00

Checklist

Remove

Add

	Item	Description	Responsibility	Expected	Completed	Completed By
<input type="checkbox"/>	03	INITIATE STAKEHOLDER REGISTER	PM CAP IMPROVEMENT	Nov 19, 2018		
<input type="checkbox"/>	05	INITIATE RISK REGISTER	PM CAP IMPROVEMENT	Nov 19, 2018		
<input type="checkbox"/>	06	INITIATE COMMUNICATIONS PLAN	PM CAP IMPROVEMENT	Nov 19, 2018		

Status History

Related Documents

Checklist

Item

CPM's Work Desk

AiM

WorkDesk

Add

Menu

Accounts Payable

Capital Projects

Contract Administration

Finance

Lease

Property

Purchasing

Time and Attendance

System Administration

Administrator Messages

4/28/18 4:00 PM ~ GJENSEN ~ AIM PROD VERSION 9.2.6 - Oracle Exadata 12c - UPDATED FROM AIM PROD 8.3 on Oracle 12c on April 30, 2018

Quick Search

Q Capital Project

Q Consultant Contract

Q Amendment

Q Construction Contract

Q Construction Change Order

Q Payment Application

My Projects

15 Capital Projects ~ Capital Project ~ MMUELLER - ALL PROJECTS

1 Capital Projects ~ Capital Project ~ CAPITAL PROJECT STATUS = QUEUE

3 Capital Projects ~ Capital Project ~ CAPITAL PROJECT STATUS = ACTIVE

0 Capital Projects ~ Capital Project ~ CAPITAL PROJECT STATUS = MASTER PLANNING

1 Capital Projects ~ Capital Project ~ CAPITAL PROJECT STATUS = PROGRAMMING

0 Capital Projects ~ Capital Project ~ CAPITAL PROJECT STATUS = SELECTION

5 Capital Projects ~ Capital Project ~ CAPITAL PROJECT STATUS = DESIGN



Project Cleared for Activity

DESIGN IMPROVEMENT

DESIGN IMPROVEMENT - CHECKLIST ITEMS

Created By SYSTEM On 06/01/2018 09:55 AM
Last Edited by CLINT BUNNELL On 11/20/2018 01:47 PM

Capital Project

19235790

GUNTHER TRADES BLDG AND CAMPUS

Component Group

DESIGN - IMPROV

DESIGN IMPROVEMENT TYPICAL

Organization

Employee

Baseline Start

Estimated Start

Actual Start

Baseline End

Estimated End

Actual End

Percent Complete

Status

ACTIVE

Type

SOFT COSTS

SOFT COSTS

Component Sequence

20

Planned Budget

\$0.00

Original Budget

\$0.00

Budget Revisions

\$0.00

Total Budget

\$0.00

Committed

\$0.00

Expensed

\$0.00

Anticipated

\$0.00

Remaining

\$0.00

Remove

Add

... All the way to Closeout

CLOSEOUT

Created By SYSTEM On 06/01/2018 09:55 AM
Last Edited by CLINT BUNNELL On 11/20/2018 01:47 PM

CLOSEOUT - CHECKLIST ITEMS

Capital Project

19235790

GUNTHER TRADES BLDG AND CAMPUS

Component Group

CLOSEOUT

CLOSEOUT

Organization

Employee

Baseline Start

Estimated Start

Jul 26, 2019

Actual Start

Baseline End

Estimated End

Aug 30, 2019

Actual End

Percent Complete

Status

ACTIVE

Type

SOFT COSTS

SOFT COSTS

Component Sequence

10

Planned Budget

\$0.00

Original Budget

\$0.00

Budget Revisions

\$0.00

Total Budget

\$0.00

Committed

\$0.00

Expensed

\$0.00

Anticipated

\$0.00

Remaining

\$0.00

Checklist

Item	Description	Responsibility	Expected	Completed	Completed By
01	PUNCHLIST COMPLETION	PM CAP DEVELOPMENT			
02	FINAL HPBS SIGN-OFF	PM CAP DEVELOPMENT			
03	RATINGS (AE, CONTRACTORS, CX)	PM CAP DEVELOPMENT			
04	RECONCILE CONTRACTS FINAL COS & AMENDMENTS	PM CAP DEVELOPMENT			
05	CLOSEOUT CHECKLIST COMPLETED	PM CAP DEVELOPMENT			
06	ARCHIVE DOCUMENTS UPLOADED	PM CAP DEVELOPMENT			
07	APPROVE FINAL PAYMENTS	PM CAP DEVELOPMENT			

Team Dashboard



State of Utah

Division of Facilities and Construction Management

Capital Project Teams

Team = All

Manager	Name	Class	Projects			All Project Components				Checklist Components			Check Lists			Due Date Status		
Project Team: 1			All	Full Kit	Queue	All Pending	Active	Hours	CK List	<100%	100%	All	Date	Null	> 30	0-30	Late	
138222	Darrell Hunting	CPM	7	1	0	42	0	42	8	8	8	0	83	0	83		1	
211207	Alex Alford	PM1	15	15	0	398	0	398	52	90	77	13	707	91	616	3	3	9
194501	Christopher Ottley	PM1	33	16	0	448	0	448	51	96	80	16	690	95	595	5	1	10
206305	Jon Vance	PM1	15	2	0	56	0	56	4	12	11	1	95	7	88			2
211250	Mathew Daley	PM1	21	14	2	448	56	392	54	96	66	30	740	126	614	3	1	13
104577	Tim Parkinson	PM2	50	12	6	531	28	503	61	111	89	22	874	88	786	4	2	12
166306	Lucas Davis	PM3	35	13	0	364	0	364	40	78	65	13	611	85	526	1		12
Projects assigned to Team 1			176	73	8	2287	84	2203	270	491	396	95	3,800	492	3,30	16	7	59
			30%	30%	25%	100%	4%	96%	39	100%	81%	19%	31%	40%	5%	39%	32%	27%
Project Team: 2			All	Full Kit	Queue	All Pending	Active	Hours	CK List	<100%	100%	All	Date	Null	> 30	0-30	Late	
173189	Matt Boyer	CPM	8	0	1	28	28	0	1	6	0	6	48	0	48			1
109256	Matthias Mueller	PM2	15	1	2	112	28	84	13	22	15	7	213	7	206			3
190400	Taylor Maxfield	PM2	7	2	1	112	42	70	12	22	11	11	212	41	171		2	1
172200	Brian Bales	PM3	11	2	0	56	0	56	4	12	10	2	90	38	52			2
111056	Craig Wessman	PM3	7	0	0	0	0	0	0	0	0	0	0	0	0			
Projects assigned to Team 2			48	5	4	308	98	210	30	62	36	26	563	86	47	0	2	7
			8%	2%	13%	100%	32%	68%	6	100%	58%	42%	5%	7%	0%	0%	9%	3%

WIP Dashboard



State of Utah

Division of Facilities and Construction Management

Capital Project WIP Dashboard

Project Type: All; Manager: 104577; Team: All; Flag: All

Description	Hrs/Days	Queue	Program	Selection	Design	Docs	Bidding	Construct	Closeout	Held
Tim Parkinson								>30 days	<30 days	Late
	-9	3/19/19								
Ogden Weber Technical College New Outsid	4.00				19406240					
	0				3/28/19					
Ogden Weber Technical College Various Bu	4.00							19088240		
	18							4/15/19		
Wsu Engineering Tech Bldg Mep Design	4.00				19070810					
	34				5/1/19					
Wsu Stewart Stadium Sky Box And Suites W	4.00							19396810		
	126							8/1/19		
Wsu Chiller Plant Install Heat Exchanger	4.00							19400810		
	126							8/1/19		
Wsu Norda Engineering And Applied Scienc	4.00					19328810				
	146					8/21/19				
Tim Parkinson Projects:		61.00	18							

WIP Dashboard (Yellow Only)



State of Utah

Division of Facilities and Construction Management

Capital Project WIP Dashboard

Project Type: All; Manager: 104577; Team: All; Flag: Yellow

Description	Hrs/Days	Queue	Program	Selection	Design	Docs	Bidding	Construct	Closeout	Held
Tim Parkinson								>30 days	<30 days	Late
Ogden Weber Technical College New Outsid	4.00				19406240					
	0				3/28/19					
Ogden Weber Technical College Various Bu	4.00							19088240		
	18							4/15/19		
Tim Parkinson Projects:	8.00	2								

Status of Full Kit Projects



State of Utah

Division of Facilities and Construction Management

SUCCESS Full Kit Projects

Manager = 104577

Project#	Description	Type	Status	Est Start	Est End	Act Start	End Days
104577	Tim Parkinson						
19066150	Farmington Courts Bldg Courtroom Refresh Phase 1	Improvement	Design	1/31/19	2/14/19	12/20/18	-42
19070810	Wsu Engineering Tech Bldg Mep Design	Improvement	Design	2/1/19	5/1/19	2/4/19	34
19071240	Ogden Weber Technical College Campus Wide Fire Alarm Upgrades	Improvement	Design	10/1/18	11/1/18	9/27/18	-147
19084810	Wsu Various Buildings Hazardous Materials Surveys	Improvement	Design			9/27/18	
19088240	Ogden Weber Technical College Various Buildings Upgrade Refrigerant On Hvac Replacement Units	Improvement	Construction	4/15/19	4/15/19	3/7/19	18
19090810	Wsu W4 And W5 Parking Lot Landscape Irrigation Renovation - Mou	Nsf Improvement	Closeout		7/13/18	10/31/18	-258
19328810	Wsu Norda Engineering And Applied Science Bldg - Programing And Design	Development Db	Construction Docs	8/21/19	8/21/19	1/3/19	146
19329810	Wsu Davis Campus Computer & Automotive Engineering Bldg	Nsf Development	Design	11/1/18	2/28/19	8/20/18	-28
19336520	Dwr Logan Fisheries Experiment Station Test Wells Drilling	Nsf Improvement	Design			8/28/18	
19396810	Wsu Stewart Stadium Sky Box And Suites Windows Replacement - Mou	Nsf Improvement	Construction	5/1/19	8/1/19	1/16/19	126
19400810	Wsu Chiller Plant Install Heat Exchanger - Mou	Nsf Improvement	Construction	4/1/19	8/1/19	1/16/19	126
19406240	Ogden Weber Technical College New Outside Pavilion - Mou	Nsf Improvement	Design	2/28/19	3/28/19	2/28/19	0

12 Full Kit Projects for Tim Parkinson

12 Total Full Kit Projects

Status of Projects in Queue



State of Utah

Division of Facilities and Construction Management

SUCCESS Queue Status

Manager = 104577

Project#	Description	Type	Est Start	Est End	Act Start	End Days
104577	Tim Parkinson					
19065150	Ogden Juvenile Courts Bldg Security Cameras Upgrades	Improvement			5/2/18	
19069810	Wsu Swenson Gym Fan Coil Replacement	Improvement	1/30/19	1/30/19	1/30/19	-57
19085810	Wsu Various Buildings Ada Compliance Upgrades Phase 1	Improvement	1/30/19	1/30/19	2/6/19	-57
19086810	Wsu Marriott Allied Health Bldg, Facilities Management Storage, And Ticket Booth K Vrf Differential Switches	Improvement	1/30/19	1/30/19	1/30/19	-57
19087810	Wsu Various Bldgs Concrete Replacement On Walkways	Improvement	1/30/19	1/30/19	2/6/19	-57
19417810	Wsu Annex 2 Testing Center And Annex Remodel (Support Outdoor Rec. Bldg.) Mou	Nsf Improvement	3/19/19	3/19/19	3/21/19	-9

6 Projects in Queue Status for Tim Parkinson

6 Total Projects in Queue Status

Project Checklist Status



State of Utah

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SUCCESS Checklist Status

Manager = 166306; Project = ALL; Project Status = ALL

166306 Lucas Davis

19076150 Layton District Courts Bldg Hvac Rooftop Unit Curb Replacement

Project Status: Construction

		Status: ACTIVE		Estimated:	Start	Completed
% Complete:		0%		Actual:	Days	Days
					0	12/27/18 0

Bidding

Checklist Item	Due	Complete	Days	Completed By	Responsibility	Status
04 Communications Plan Update	12/27/18	12/27/18		Lucas Davis	Pm Cap Development	Active
05 Safety Plan	12/27/18	12/27/18		Lucas Davis	Pm Cap Development	Active
06 Haz Mat/Abatement	12/27/18	12/27/18		Lucas Davis	Pm Cap Development	Active
07 Qa/Qc Plan	12/27/18	12/27/18		Lucas Davis	Pm Cap Development	Active
08 Closeout Plan	12/27/18	12/27/18		Lucas Davis	Pm Cap Development	Active
09 Pre-Con Meeting	12/27/18	12/27/18		Lucas Davis	Pm Cap Development	Active
10 Hpbs Implementation	12/27/18	12/27/18		Lucas Davis	Pm Cap Development	Active
11 Establish Oac	12/27/18	12/27/18		Lucas Davis	Pm Cap Development	Active
12 Inspections	12/27/18	12/27/18		Lucas Davis	Pm Cap Development	Active
12 Checklist Items for Bidding	Without Due Dates	0	0%			

Construction Improvement

		Status: ACTIVE		Estimated:	Start	Completed
% Complete:		0%		Actual:	1/14/19 Days	1/25/19 Days
					12/27/18 18	-61
Checklist Item	Due	Complete	Days	Completed By	Responsibility	Status
01 All Rfis Answered			-999	Lucas Davis	Pm Cap Improvement	Active
02 All Approved Pcos Processed			-999	Lucas Davis	Pm Cap Improvement	Active
03 All Submittals Approved			-999	Lucas Davis	Pm Cap Improvement	Active
04 All Deferred Submittals Approved			-999	Lucas Davis	Pm Cap Improvement	Active
05 O&M			-999	Lucas Davis	Pm Cap Improvement	Active
06 Redlines / As-Built Drawings			-999	Lucas Davis	Pm Cap Improvement	Active

Project Checklist Worksheet(Full Kit)



State of Utah

Division of Facilities and Construction Management

Capital Project Summary

Capital Project# = 19084810; Manager = ALL

Capital Project: 19084810 - Wsu Various Buildings Hazardous Materials Surveys

Project Type: Improvement

Account: [3000-300-3342-FXA-19084810](#)

Staff Hours:

Project Status: Design

Proper

New Property (leasing, Purchase, Build) (00000)

Date Project Opened: May 3, 2018

Project Manager: 104577 - Tim Parkinson

Open Purchase Orders:

[\\$0.00](#)

Shop: n/a

Capital Project Funding Sources

Contingency

Display Labor

Changes

Current Budget: \$96,000.00

Actual Payments: \$30,526.65

O/S Contract Balance: \$0.00

Net Funding Transfer: \$0.00

Unencumbered: \$65,473.35

Component Group: Hazardous Materials

Component: [Pre-const Survey \(2\)](#)

Open POs: [\\$0.00](#)

<----- Budget ----->		Outstanding	Total	%	
CBE	Current	Encumb	Payments	Budget	Balance
\$96,000.00	\$96,000.00	\$65,113.35	\$30,526.65	0%	\$360.00

Contractor / Transaction Description	Contract	Date	Invoice	Type	Status	Amount
R&r Environmental (87109a)	1970097	3/8/19	6796	Consulting Invoice	Invoice Released	\$8,043.75
R&r Environmental (87109a)	1970097	3/25/19	6811	Consulting Invoice	Invoice Released	\$9,860.40
R&r Environmental (87109a)	1970097	3/25/19	6822	Consulting Invoice	Invoice Released	\$12,622.50
Total:						\$30,526.65

	<----- Budget ----->		Outstanding	Total	%	Group
	CBE	Current	Encumb	Payments	Budget	Balance
Component Group: Hazardous Materials Totals:	\$96,000.00	\$96,000.00	\$65,113.35	\$30,526.65	0%	\$360.00

	<----- Budget ----->		Outstanding	Total	Project
	CBE	Current	Encumb	Payments	Balance
Project Totals:	\$96,000.00	\$96,000.00	\$65,113.35	\$30,526.65	\$360.00

New TOC Initiatives

(T * Q)/OE
Change Orders and
Amendments



Meet the Team

Utah Division of Facilities Construction and Management (DFCM)



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TOC Resources

<http://utahexcellence.com/>

<https://www.tocclub.org/>

<https://www.tocico.org/>

<http://goldrattconsulting.com>



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Questions & Answers

Jerry Sheets

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