

On the clock



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Why are we here?.....

- To discuss a very real threat to both our business and our economy.
- To understand where the threat came from.
- To stop the bleeding and start the healing
- To prevent the threat from coming back.
- Because I don't have to wear a mask here.
- **Any C-levels in attendance?**

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Y ASK Y

COORS LIGHT

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CHOCOLATE CHIP

CHAPTER 11

MAYHEM

LET'S CHAT

DOLLY

WHOPPER

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On tap.....

- The concept of Technical Debt...and how it resembles the national debt.
- How it sprouts...and grows...and becomes unmanageable.
- The damage it does, and who's to blame.
- Some of the worst examples.
- Steps in the right direction to pay down the debt and prevent it from accruing again.
- Q & A

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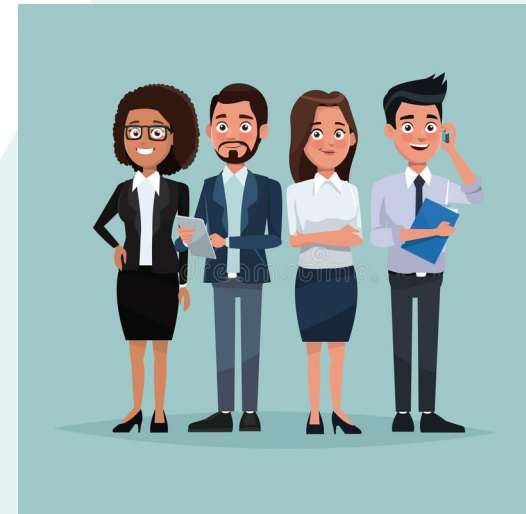
MORE...



On the Clock



The ba\$ic\$
*(so simple even a C-level
can comprehend)*



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What on earth is Technical Debt?..

- Quite simply, it is accrued, unanticipated costs and liabilities associated with using technology to manage information, that results from less than optimal practices.
- Comes in many flavors (or currencies):
 - Lo\$\$ of productivity.
 - Punitive fee\$.
 - Unplanned out\$ide \$ervice\$.
 - Project co\$t overrun\$ and blown budget\$.
 - Failure to capitalize on owned/entitled a\$\$et\$.
 - Mi\$\$ed opportunitie\$.
 - Downtime, & mucho other\$.

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Where does it come from?.....

- From the illusion/delusion that you can avoid doing something the right way, without any consequences.
- Information policies with double standards.
 - “Rules for thee but not for me”.
- Therefore it is more of a PEOPLE problem than it is technology problem.
- There are 3 kinds of information technology service:
 - Good, fast and cheap.
 - Choose any two.
- When you chose the last two...
 - It’s not going to be very good.
 - You WILL accrue Technical Debt.
 - It will come due at the worst possible time.
- Same with government.

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National vs. Technical Debt

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National debt	Technical debt
Owed to the Federal Reserve and to foreign countries.	Owed to retained earnings and to shareholders.
Grows when Congress doles out cookies to buy votes. <i>In time for Election Day.</i>	Grows when IT doles out cookies to buy favor. <i>In time for employee reviews.</i>
Thought of as play money by most politicians.	Thought of as play money by IT staff and management.
Shrugged off as the next generation's problem.	Shrugged off as the next IT regime's problem.
Requires interest payments just to maintain status quo.	Requires IT resources just to maintain status quo.
Not really sure when the bill will come due.	Not really sure when the bill will come due.



Nefarious perpetrators.....

- Lapsing of coverage.
- Cloning.
- Hard coding.
- Lack of documentation.
- Customizations.
- Please note that you cannot declare bankruptcy on Technical Debt.
 - One way or the other, someone is paying it off.
 - As inevitable as death and taxes, or Thanos.
- **Sit back and hold onto your wallets.**

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Lapsing of coverage



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Lapsing of coverage....

- Allowing support contracts to expire for economic and/or political reasons.
 - “I’m not paying those greedy bastards”.
- These contracts provide:
 - Version/Release upgrades.
 - Regular fix packs.
 - Help desk phone support.
- Example:
 - IBM Software Maintenance Agreement (SWMA).
 - Third party ERP annual license fees (ALF).
- “But I’ll save 20 grand a year and look like a hero !!!”

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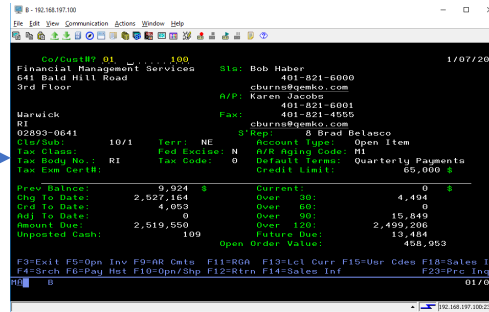
ETCHED

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Letting ERP support lapse...



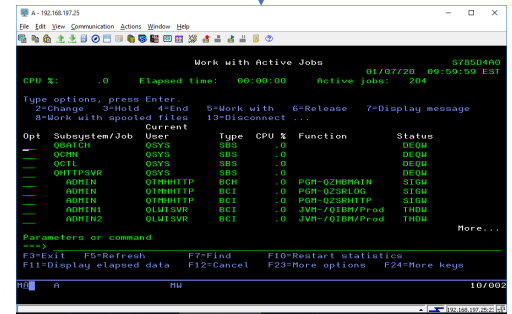
"I just spent a fortune on this damn system. I'm not spending another dime."

Locks you into old unsupported ERP release...

Which can lock you into old unsupported OS release...



A causality loop !



Which can cost BIG bucks to get back into a supported hardware & software state...

Which can lock you into old unsupported hardware...



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The debt that all lapsed pay.....

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- Will need to procure and install a complete new hardware suite since nothing will port.
- Pay a penalty for restarting SWMA (except 2020).
- BIG penalty for re-licensing application software.
 - Some vendors may require full restitution, plus penalty.
- Multistep upgrades or unsupported upgrade paths.
 - Applies to both OS and application software. Downtime !!!
- Retraining of user and IT staff.
- Major disruption associated with all the above.
- Saving \$20k per year for 10 years could end up costing several times as much.
 - And maybe somebody's head, too.
- Only escape is checkbook.





Reducing/eliminating the debt...

- Regular communication with your IBM Business Partner and/or application software partner.
 - Clarity on licensing and support fees, what benefits are received and their schedule for renewal.
 - And getting it into the proper budget.
 - Annual review of whether it makes economic sense to remain on existing hardware or upgrade.
 - Similarly, review of software features that have become available since last renewal.
 - So we get what we're paying for.
- Regular communication of above with stakeholders.
- All a part of GEMKO's iCare Plan with our clients.

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Cloning



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Cloning.....

- The horrible practice of copying a program, making just enough changes to the clone to quickly satisfy a requirement, then running it.
- In most cases, the clone takes its place in the production environment alongside the original.
- Even if needed only once, it somehow lingers forever.
- Portions of the cloned code may not be relevant and will lie dormant indefinitely.
 - Programmers often don't bother to remove them.
 - Often due to a lack of confidence and/or understanding.
 - Includes comments that no longer make sense.
- “Programmers only write one program in their career, then clone it thousands of times.”
 - This is not a good thing.

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Hello, Dolly !

```

A - 192.168.197.100
File Edit View Communication Actions Window Help
Work with Members Using PDM S06BA2CP
File . . . . . ORPGLESRC
Library . . . . . ACCTAPPS Position to . . . . .
Type options, press Enter.
2=Edit 3=Copy 4=Delete 5=Display 6=Print 7=Rename
8=Display description 9=Save 13=Change text 14=Compile 15=Create module...

Opt Member Type Text
___ AR240 RPGLE A/R Aging Report
___ AR240A RPGLE A/R Aging Report - special version for Fred
___ AR240ASV RPGLE A/R Aging Report - Fred wanted sorted for Y/E
___ AR240B RPGLE A/R Aging Report - hide colums from sales reps
___ AR240BOLD2 RPGLE A/R Aging Report - hide colums from sales reps
___ AR2400LD RPGLE A/R Aging Report - before Nov. 2016 changes
___ AR2400LD2 RPGLE A/R Aging Report - before Apr. 2014 changes
___ AR240SV RPGLE A/R Aging Report - one time for fiscal Y/E shift
Bottom
Parameters or command
==>
F3=Exit F4=Prompt F5=Refresh F6=Create
F9=Retrieve F10=Command entry F23=More options F24=More keys

MA A MW 15/077
    
```

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'Nuff said !





The debt that all cloners pay.....

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- A change in company policy or biz model means...
 - You have to modify 7 programs. Or was it 8 ?
- The dormant irrelevant code one day starts executing, and biting you in the @ss.
 - 7 times. Or was it 8 ?
- Pandering to user whims creates a sense of entitlement, which usually leads to more cloning.
 - The “Burger King” culture. Have it your way.
 - In other words, more Technical Debt.
- A mass update or modernization refit grows dramatically in scope.
 - Contractors or newbies will want to play it safe.
- Code library gets bloated, confusing, unmanageable.
 - Especially for future staff members.





Reducing/eliminating the debt....

- A key player in this endeavor is the HA.
 - Who can tell me what HA stands for ?
- Hard @ss to combat the Burger King culture.
 - Always “having it your way” adds to Technical Debt.
- Better modularization, conditioning of program code.
 - To enable/disable code regions safely.
 - Allow a single version of the program to suffice for all.
- If covering your @ss with “just in case” copies of programs, consider a change management utility.
 - Or Git or other source versioning tool.
 - Or better yet, TEST changes in a separate LPAR or VM.
 - Power servers can do that, you know.

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Hard coding



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Hard coding...

- Ugly practice of embedding business specific data and identifiers inside application code.
 - More prevalent in home grown software.
 - Can include constants such as limits or rates.
 - Can even include customer numbers, vendor numbers, user profiles, business unit ID's, etc.
- Often done for a quick fix to skirt around the rules in the software.
 - Make exceptions (“tweaks”) for a trading partner.
 - Kneejerk policy changes.
 - Fit square pegs in a round hole.
- Often done in new development too.
 - Git'r done faster.

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What's wrong with this picture?

```
// Calculate accounts receivable service charge.

if TotalDue >= 10000;
    SvcChargePct = 1.5;
elseif TotalDue >= 5000;
    SvcChargePct = 1.25;
else;
    SvcChargePct = 1;
endif;

// Notorious slow payers who have stiffed us before.
// They get higher rates. In December, charge them more
// because the mail takes longer around Christmas.
// Plus, it will help pay for the company Christmas party!

if CustomerNo = 158250 or CustomerNo = 159580;
    if umonth = 12;
        SvcChargePct = 2;
    else;
        SvcChargePct = 1.75;
    endif;
endif;
endif;
```



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NOTORIOUS

ARGUMENTS

***SYSVAL**

GOODREADS

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MOD SQUAD

SMILING TED

MORE...



The debt that all hard coders pay....

- Tweaks are often undocumented by IT and are forgotten about quickly, yet they remain.
 - Users and management never knew about them at all.
- They may have been copied to many programs either through **cloning** or brute force mass apply.
- So what happens then the tweak becomes obsolete?
 - Undesired results, maybe even discovered by a customer, or maybe a grumpy C-level. Or an auditor. Or the bank.
 - This typically causes a panic, escalated by management.
 - IT has to go searching for all instances, although they might not be sure of what they're searching for.
 - Lost time, productivity and customer satisfaction.
- In some cases, the IT person's job.
 - Even the C-level's reputation.



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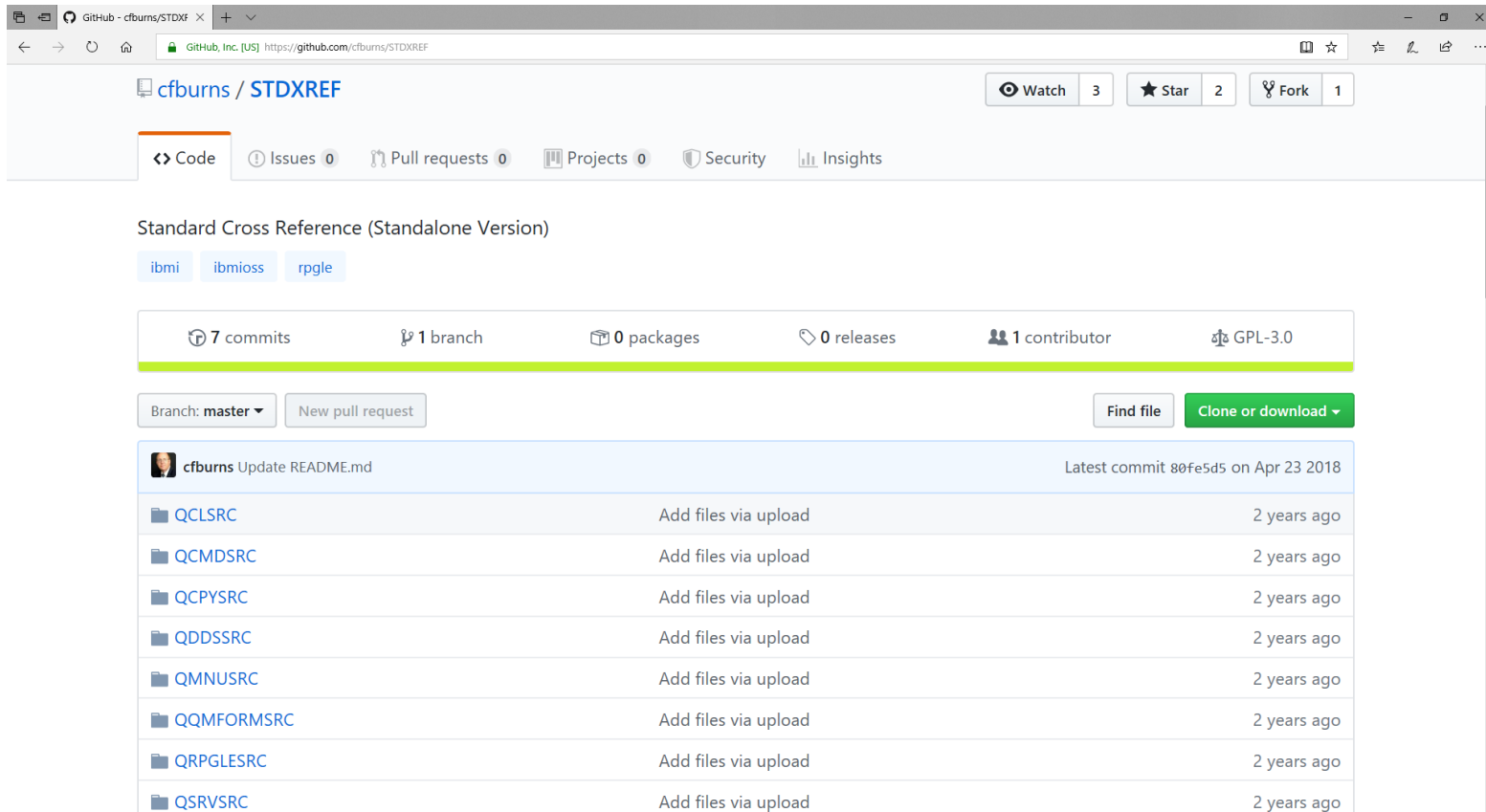
Reducing/eliminating the debt....

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- Replace hard coded IF statements with reusable Boolean expressions based on database files.
 - Shifts the maintenance to the user community.
- Replace compile time tables with expressions.
 - You'd be surprised how prevalent they still are.
- Replace constants that are subject to change.
 - Sounds like an oxymoron, but you know what I mean.
- Born of necessity, the Standard Cross Reference.
 - a.k.a. STDXREF, available on GitHub.
 - Not an index of naughty diseases.
 - Single point of maintenance for all simple reference tables.
 - Developed while trying to modernize applications fraught with...you guessed it...Hard Coding.
 - First step toward Inuendo concept.



On GitHub...



The screenshot shows the GitHub repository page for 'cfburns / STDXREF'. The repository is titled 'Standard Cross Reference (Standalone Version)'. It has 7 commits, 1 branch, 0 packages, 0 releases, 1 contributor, and is licensed under GPL-3.0. The latest commit is by 'cfburns' on Apr 23 2018, titled 'Update README.md'. The repository contains several subdirectories, each with an 'Add files via upload' button and a timestamp of '2 years ago':

Directory	Action	Timestamp
QCLSRC	Add files via upload	2 years ago
QCMDSRC	Add files via upload	2 years ago
QCPYSRC	Add files via upload	2 years ago
QDDSSRC	Add files via upload	2 years ago
QMNUSRC	Add files via upload	2 years ago
QQMFORMSRC	Add files via upload	2 years ago
QRPGLSRC	Add files via upload	2 years ago
QSRVSR	Add files via upload	2 years ago

STDXREF: Open source “table file” with management, lookup and verification functions. Provides for numeric, character and date arguments and results.



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STDXREF table level

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```

A - 192.168.197.25
File Edit View Communication Actions Window Help
Options: X=Select P=Print T=Table
Posn To:
Standard X-Ref Maint
STDXREFMN2 08:13:11
CFB 2/10/20

Op Xref Table Description
- SLOWPAYERS NOTORIOUSLY SLOW PAYING CUSTOMERS
- SVCCHRGPT A/R SERVICE CHARGE PERCENTAGES BASED ON TOTAL DUE

F3=Exit F6=Create F21=Print ENTER=Continue
M^ A 03/012
    
```





STDXREF table entry level

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```

A - 192.168.197.25
File Edit View Communication Actions Window Help
Table: SVCCHRGPCT Standard X-Ref Maint
Desc: A/R SERVICE CHARGE PERCENTAGES BASED ON TOTAL DU STDXREFMN2 08:14:57
Option: X=Select CFB 2/10/20

Op Argument Type Result
-----
0 <NUMR> 1.00000
 <CHAR>
 <DATE> Hidden: N
5000 <NUMR> 1.25000
 <CHAR> Hidden: N
 <DATE> Hidden: N
10000 <NUMR> 1.50000
 <CHAR> Hidden: N
 <DATE> Hidden: N

F3=Exit F6=Create F12=Cancel F21=Print F23=Delete Bottom
ENTER=Continue
MA A 08/002
    
```

Arguments (numeric, character or date)
versus Results (if any).





STDXREF table entry level

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```

A - 192.168.197.25
File Edit View Communication Actions Window Help
[Icons]
Table: SLOWPAYERS                               Standard X-Ref Maint
Desc:  NOTORIOUSLY SLOW PAYING CUSTOMERS        STDXREFMN2   08:17:21
Option: X=Select                                CFB         2/10/20

Op Argument      Type      Result
-----
158250           <NUMR>    1.75000
                <CHAR>
                <DATE>                                Hidden: N

159580           <NUMR>    2.00000
                <CHAR>
                <DATE>                                Hidden: N

F3=Exit   F6=Create   F12=Cancel  F21=Print   F23=Delete   Bottom
M[A]      A
08/002
192.168.197.25:23
    
```

Cool, we could even have variable rates by customer...if they are super slow payers.





Now let's revisit the snippet

```
// Calculate accounts receivable service charge.  Slow payers are
//   charged a higher rate on a case by case basis, even higher
//   in December due to slower mail and expensive Christmas parties.

if ValidXrefN('SLOWPAYER' : CustomerNo);

    SvcChargePct = XrefNumN('SLOWPAYER' : CustomerNo);

    if umonth = 12;
        SvcChargePct += 0.25;
    endif;

else;

    SvcChargePct = XrefNStepN('SVCCHGPCT' : TotalDue);

endif;
```

Shucks, even the December premium could be soft coded. How about a reference for A/R constant values, where the character argument is a key word. It would work like IBM i System Values. 😊

No more waiting for IT to get a

Tuit



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Lack of documentation



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Lack of documentation...

- Near universal practice of not writing down anything. Ever.
 - Or keeping it in one person's head forever.
- Let's be honest. Do you remember precisely what you did 2 years ago? And why?
 - New program business case and logic flow.
 - Modifications to existing programs.
 - Adjustments to system settings.
 - Strategic discussions with user community.
- Nobody seems to want to pay for documentation anymore.
 - In-house technical writers were early cost-cutting casualties.
 - Usually declined by customers on quotes from consultants.

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The debt that all lackers pay...

- One individual possesses too much intel.
 - Then they leave the company. Sometimes without warning.
 - Everything has to be relearned or rediscovered.
 - Critical steps don't get run, including fudging cheats.
 - Successors don't know where the land mines are buried.
- The wheel is perpetually reinvented.
 - Most don't know what tools and functions are available.
 - Results in multiple versions of the exact same thing.
 - Plus the associated lost productivity.
- Nobody knows how anything really works.
 - Makes modifications very risky.
 - Makes troubleshooting far more difficult.
 - And modernization? Fuggetaboutit!

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Reducing/eliminating the debt....

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- The HA plays a role here too. Accountability is key.
 - Requests in writing, on standard form, with a clear declaration of what is needed and WHY. No exceptions.
 - Better yet, in an online form.
 - Programmers add pseudocode explanations of programs added or modified. No exceptions.
 - Indexed for easy access from IT, management, auditors.
- Operational scripts maintained and executed online.
 - For example, month end closing steps.
 - No more footnoted Xerox copies of 1978 notes.
- Links to 3rd party software docs on user desktops.
 - Instead of calling IT, who in turn calls vendor, who simply reads out of their own online docs.
- Depth...and more depth.



On the clock



Customizations



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Customization...

- Gruesome practice of modifying third party application code to adapt to business policy.
 - Assumes you have licensed the source code.
- Often done to placate loud, whiny users who despise change in any way, and get into the C-level's ear.
 - “Make the new software package look and act just like our old home grown software”.
 - C-levels fold like a napkin because they don't want to hear the loud, whiny users who despise change.
- Often done down to the level/standard of the source.
 - Most ERP's were written in the 1980's. 'Nuff said.
 - Can dumb down and de-evolve the support staff's skills.
 - Many touch points per modification.



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Told you it was fugly !

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```

Columns . . . :   1 100                               Edit
SEU==>
***** Beginning of data *****
0001.00 MOD01 // A line of original vendor code.
0002.00 MOD01 // MOD02 Customer revised line of original vendor code.
0003.00 MOD02 Customer revised it again at a later date.
0004.00           A line of original vendor code.
0005.00 MOD03 // A line of vendor code.
0006.00 MOD03 Customer revised line of original vendor code.
0007.00 MOD03 New line of customer code.
0008.00           A line of original vendor code.
0009.00 MOD01 // A line of vendor code.
0010.00 MOD02 // MOD03 Customer revised line of original vendor code (2nd touch point).
0011.00 MOD03 Another customer revision to the same line of original vendor code
0012.00 MOD03 // A line of original vendor code. No longer applies due to previous MOD03 lines.
0013.00 MOD04 if condition // New line of customer code.
0014.00 MOD04     Rats, had to put back a line commented out by MOD03, under certain conditions.
0015.00 MOD04 endif // New line of customer code.
0016.00 MOD05 // A line of original vendor code.
0017.00 MOD05 Customer revised line of original vendor code.
0018.00 MOD02 New line of customer code (3rd touch point).
0019.00 MOD03 // A line of original vendor code. No longer applies due to previous MOD03 lines.
0020.00 MOD04 if condition // New line of customer code.
0021.00 MOD04     Rats, had to put this line back in too, under certain conditions.
0022.00 MOD04 endif // New line of customer code.

```





The debt that all customizers pay.....

- Loss of vendor support on modified programs.
 - “You touch it, you support it”.
 - Code cluttered with overlapping, cascading changes.
 - More difficult to separate the wheat from the chaff.
- Oh those darn unintended consequences.
 - Vendor spent years testing the software. You hacked it.
 - Ask me offline about “The Story of Ted”.
- Users become oblivious to what is stock function versus what is customized. Trust me, this is BAD.
- Mods tend to not be well documented, if at all.
- Cost of future upgrades goes WAY up.
 - Mods reapplication, re-engineering, testing(?).
- Speaking of which...

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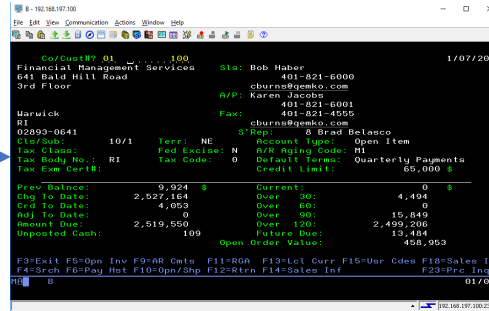
SMILING TED

MORE...





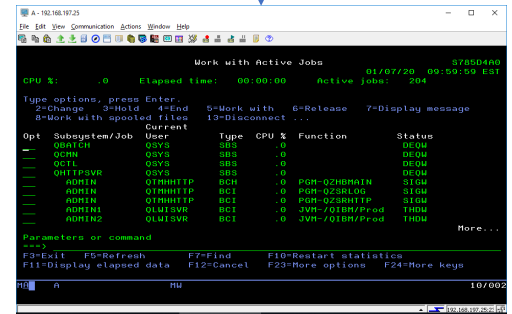
An over customized ERP costs too much to upgrade...



Gets you NOTHING !!!

Which can lock you into that ERP release indefinitely...

Which can lock you into your current OS release...



Causality loop part deux

Which means all those SWMA and ERP annual license fees...

Which can lock you into your current hardware...



RUNDOWN
SGT. SCHULTZ
POLITICS
US-219
RPTMOD
JUMBOTRON
PETERMAN
SPORTSCENTER
GROUND CHUCK
Q & A
THANKS
BOTTOM



Reducing/eliminating the debt.....

- A repeatable solution model called Decustomization.
 - Formerly known and promoted as Mods Externalization.
- Developed in 2004, coincidental with an ERP moving its code base from RPG/400 to ILE-RPG.
- Strategy that attacks the problem on multiple fronts.
 - Technical, Operational, Political and others.
- Educate users, managers and IT staff alike to prevent the problem from resurfacing.
- Objective to eliminate or dramatically simplify vendor code modifications in lieu of alternative or less intrusive approaches to achieve the desired benefit.
 - Associated 1 day workshop.
 - Spawned an open source utility.
 - Available webcast.

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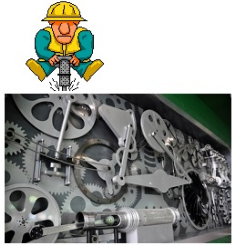
Q & A

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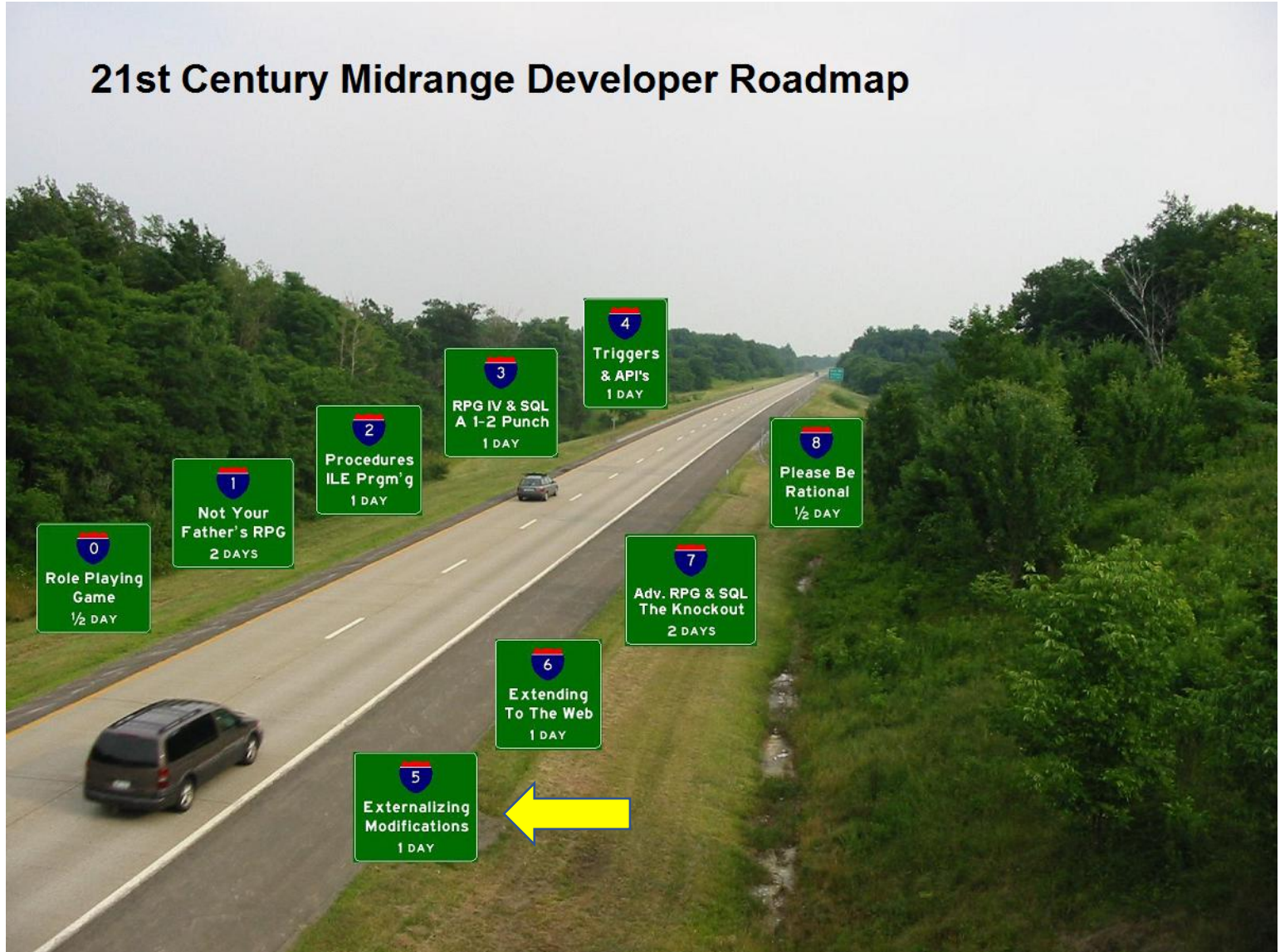
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21st Century Midrange Developer Roadmap



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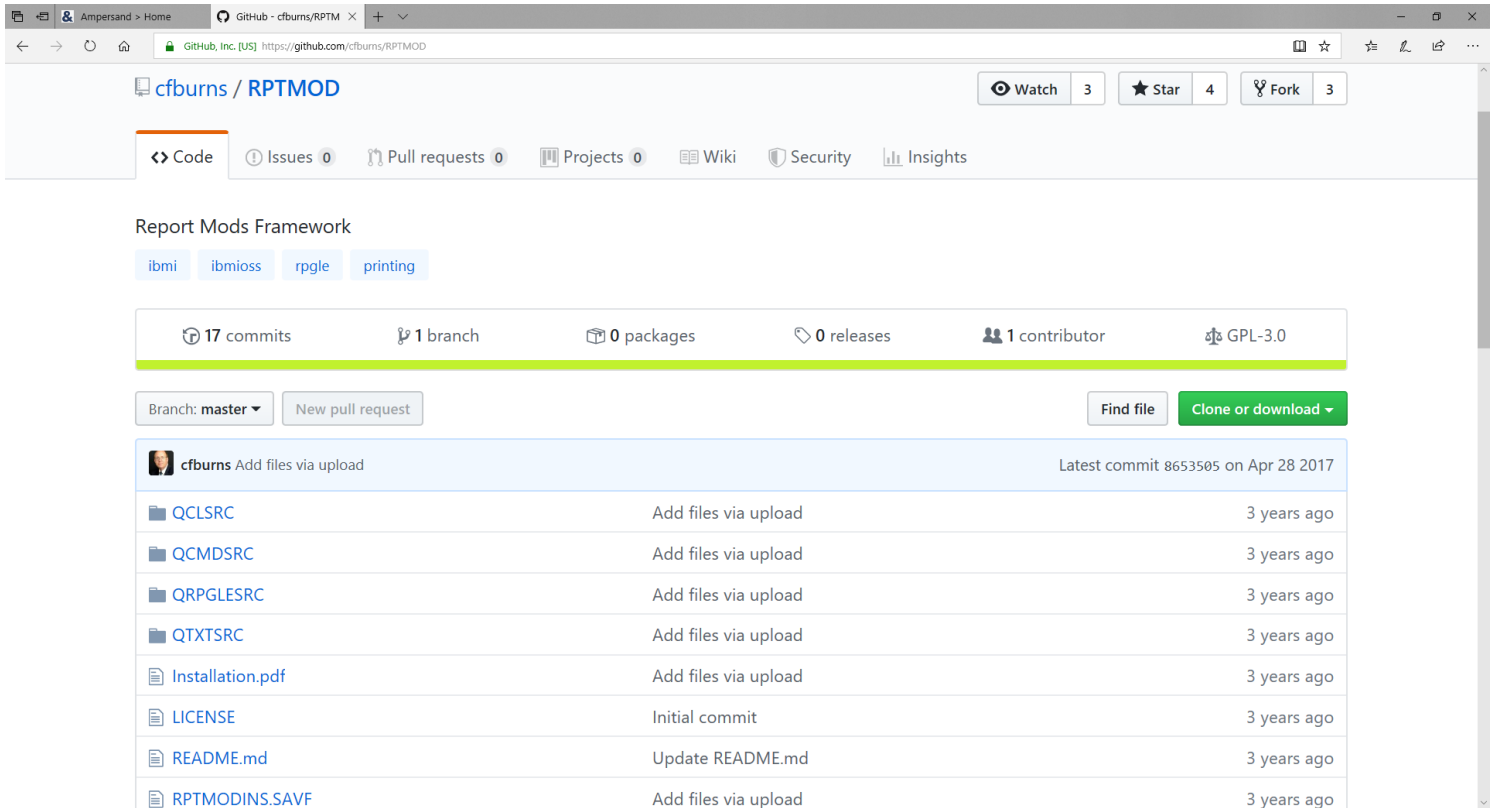
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On GitHub...



The screenshot shows the GitHub repository page for 'cfburns / RPTMOD'. The repository is a 'Report Mods Framework' with 17 commits, 1 branch, 0 packages, 0 releases, and 1 contributor. The license is GPL-3.0. The repository contains the following files and folders:

File/Folder	Description	Commit Date
QCLSRC	Add files via upload	3 years ago
QCMDSRC	Add files via upload	3 years ago
QRPGLESRC	Add files via upload	3 years ago
QXTSRC	Add files via upload	3 years ago
Installation.pdf	Add files via upload	3 years ago
LICENSE	Initial commit	3 years ago
README.md	Update README.md	3 years ago
RPTMODINS.SAVF	Add files via upload	3 years ago

RPTMOD: Open source utility to monitor output queues for spooled files needing content, media or attribute modifications. Yes, I said content modifications. 😊



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On the clock



1st and Forever



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Checking the scoreboard....

- Our business is run mostly by a 35 year old application developed in-house.
 - The original developer passed away 10 years ago.
 - We couldn't find a successor with old enough skills.
 - Nobody knows how it really works.
- We are swimming in technical debt, but nobody knows how much or where it all is.
- Our competitors all have state of the art web based applications, so they say.
 - Hence our C-levels want a pony too.
- It seems too far away and hopeless.

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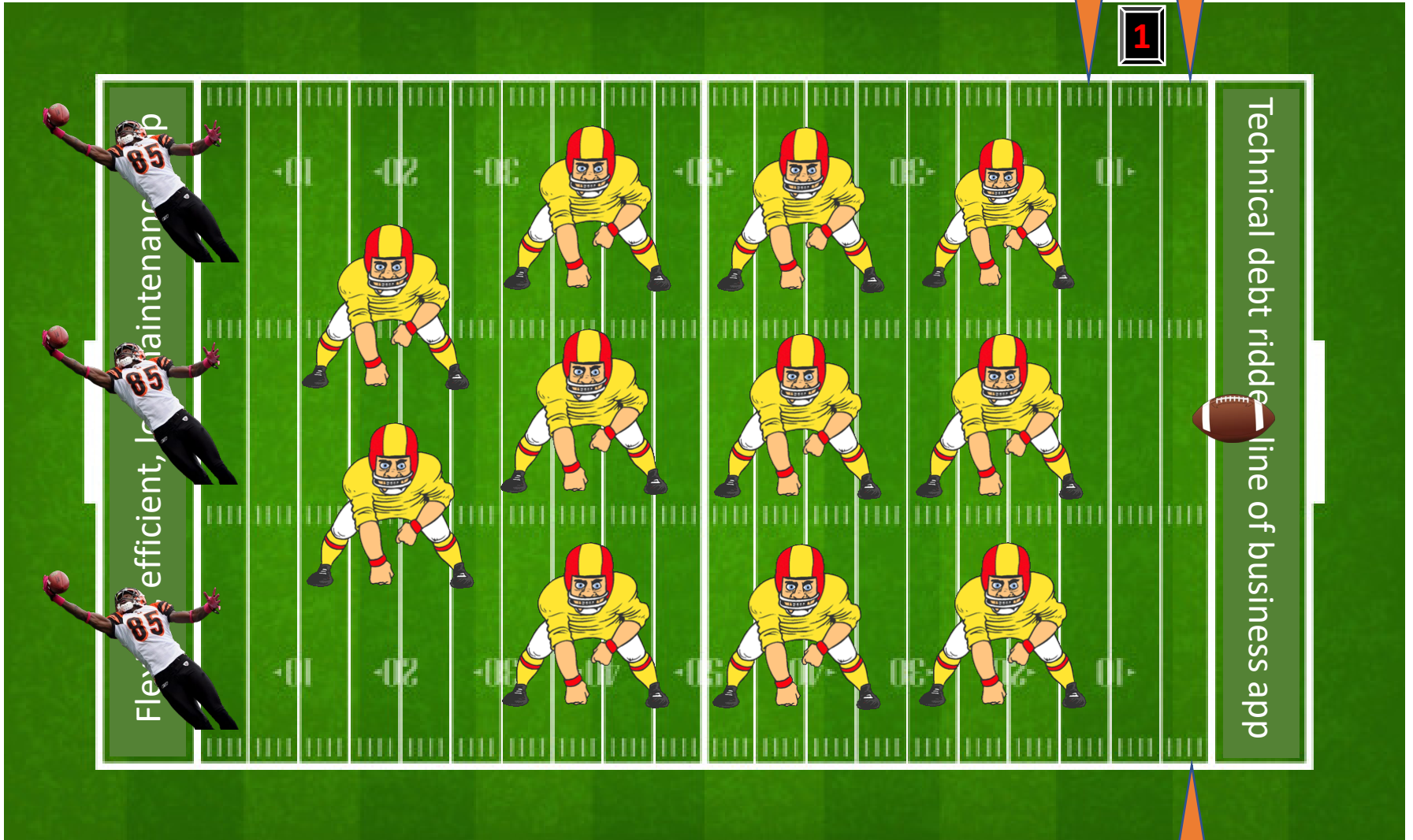


In football terms.....

- On the road, and after giving up another touchdown, they kicked off to us, we bobbled the kick and had to smother it at our own 2-yard line. 1st down.
- The crowd is loud in this end zone.
- We're trailing badly and the clock is not our friend.
- Our QB is rattled and has been running for his life.
- The end zone is 98 yards away.
- A whole lot can go wrong:
 - Give up a safety on a sack or a penalty.
 - Give up a touchdown on a turnover.
 - Go 3 & out and give them the ball back on our side of the field.

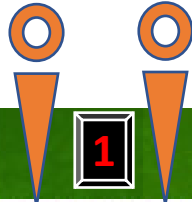
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Flexible, efficient, low maintenance app

Technical debt ridden line of business app



1





Who is number 85?.....

- These are software salespeople. They have a solution for every problem. And a sense of urgency.
- They bring the sexy flash, do the dance, whip out the cell phone after every touchdown, etc.
- They want you to drop back into your own end zone under duress and throw the long bomb.
 - While they wait at the goal line like center fielders.
 - This involves the ball flying over 100 yards in the air.
 - It typically doesn't end well.
- Even if by some miracle you pull it off, your defense needed a breather and didn't get it. So you likely give up another TD right after.
- This is not GEMKO's game plan.



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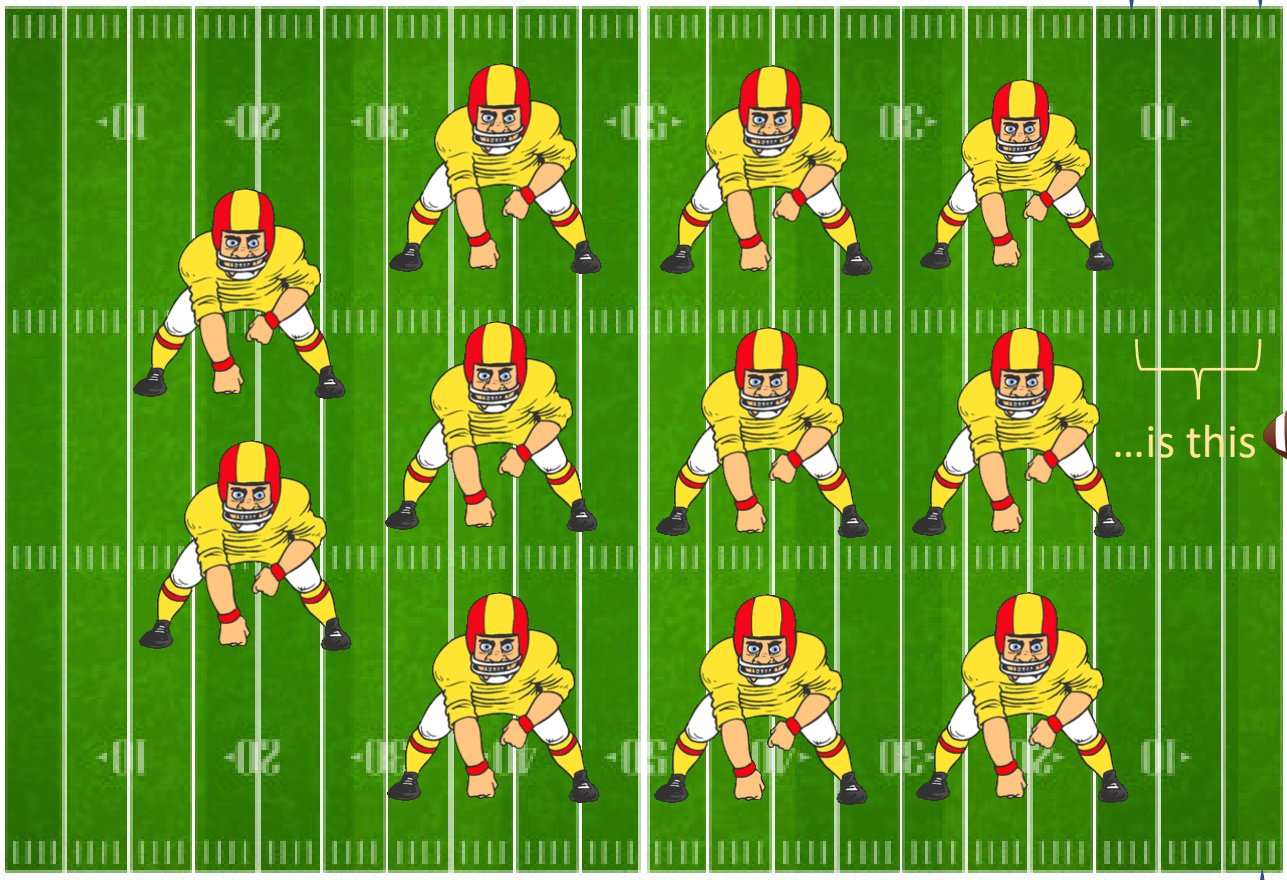
GEMKO's game plan.....

- Protect the football.
 - In business terms, protect the intellectual property that runs your business. And your reputation.
- Don't take irresponsible risks.
 - Your business cannot afford major disruption.
- Get a 1st down.
 - Ground and pound.
 - Build confidence.
 - Get out of the shadow of your own goal post.
 - Move the ball forward.
- Move the chains, rinse and repeat.
- Because the most important thing...

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Getting a 1st down involves.....

- Identifying an entity of data that is corrupt, missing, underperforming or inaccessible.
- Re-imagining and strengthening that data without disrupting the live system. Keep real time with triggers.
- Building business rules against that improved data.
- Gently retrofitting the application to use the re-imagined data for that lone entity.
 - Using modern programming constructs.
 - Read-only programs first, then update capable ones later.
 - Replaces traditionally non-productive code snippets.
 - Programs lose a little weight in the process.
- Learn from this set of downs.
 - What went well, not so well.
 - Leverage in the next set of downs.
 - It's a franchise, not just a game or a season.

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Summary.....

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- Technical debt is a scourge on businesses of all sizes and shapes.
- It will come due when you least expect it and can least afford it.
- It is just as much a PEOPLE problem as it is a technology problem.
- Only way to prevent or minimize it is through good, evolving practice, proper documentation and leveraging the best available technology (which you may already own). And some brutal honesty.
- GEMKO specializes in low risk game plans to help you escape from and pay down technical debt gracefully.
- Questions?



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Thank you for attending !



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Christopher F. Burns, Sr. (profile)
Inuendo – Data’s New Direction (group)



cfburns (profile)
Repositories: RPTMOD, Inuendo, STDXREF



<http://gemko.com>
<http://inuendo.us>



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