Limiting WIP

Slowing down to go faster

A problematic situation


KITCHEN

What happened?

WIP: why limiting work in progress makes sense

by David Lowe

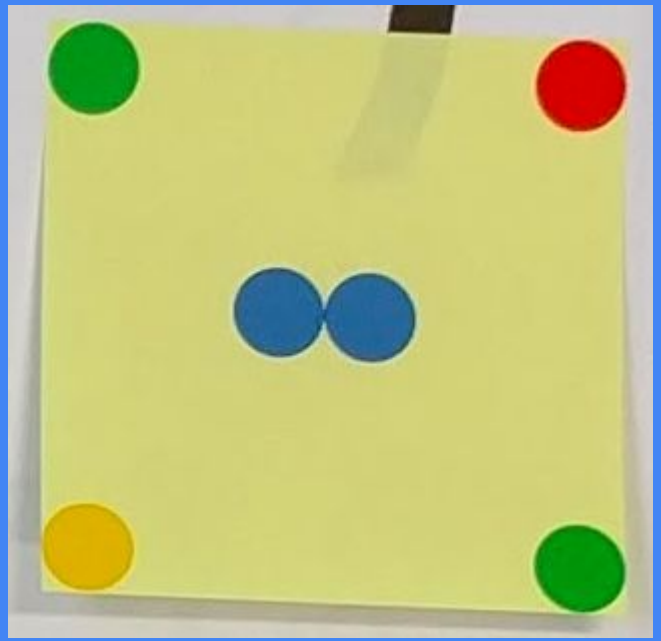
ScrumAndKanban.co.uk

What happened?

Now it’s your turn

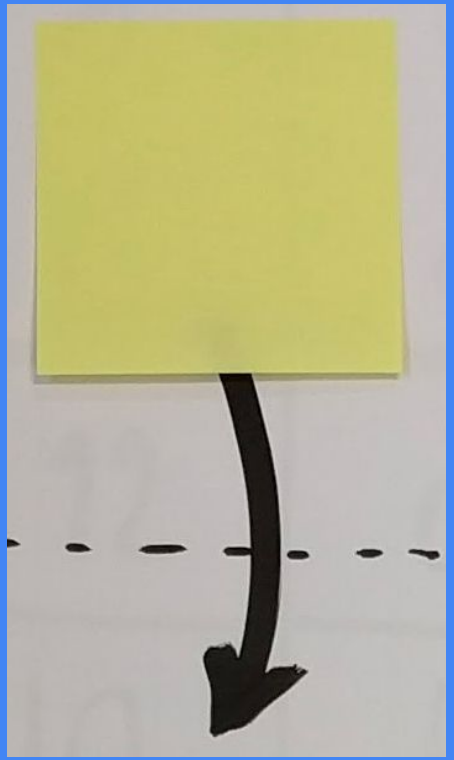
The . game

What we'll be making

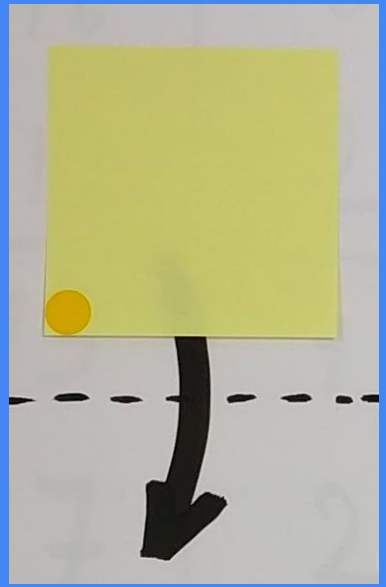


Meet the participants

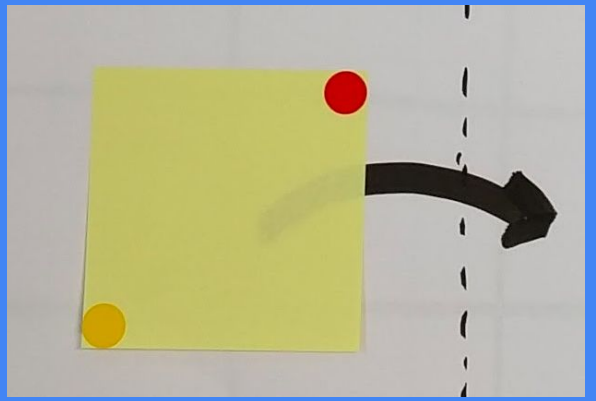
The business analyst



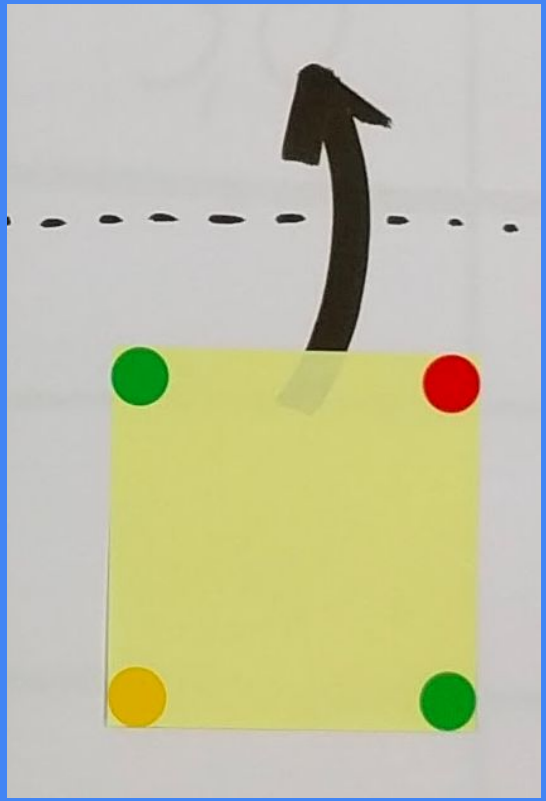
The functional analyst



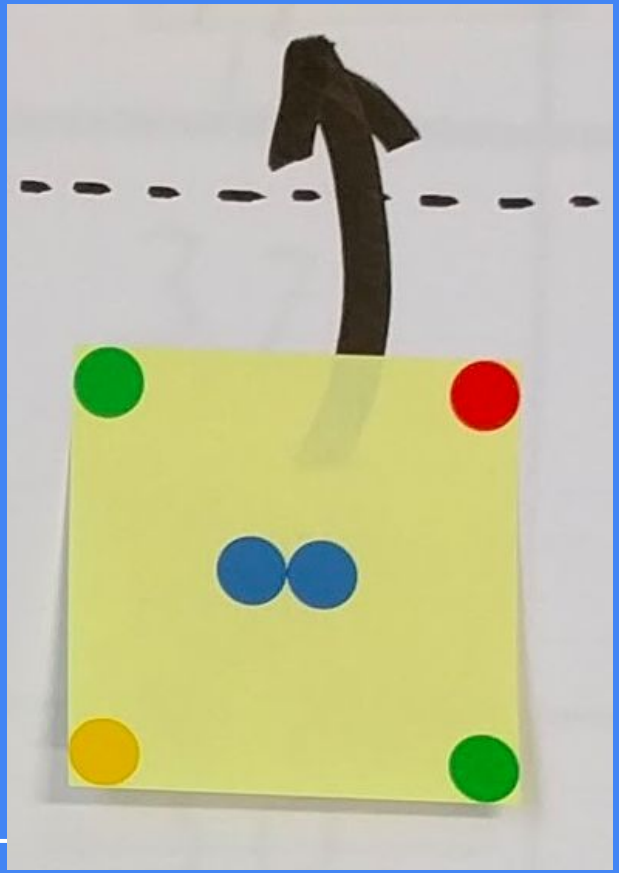
The designer



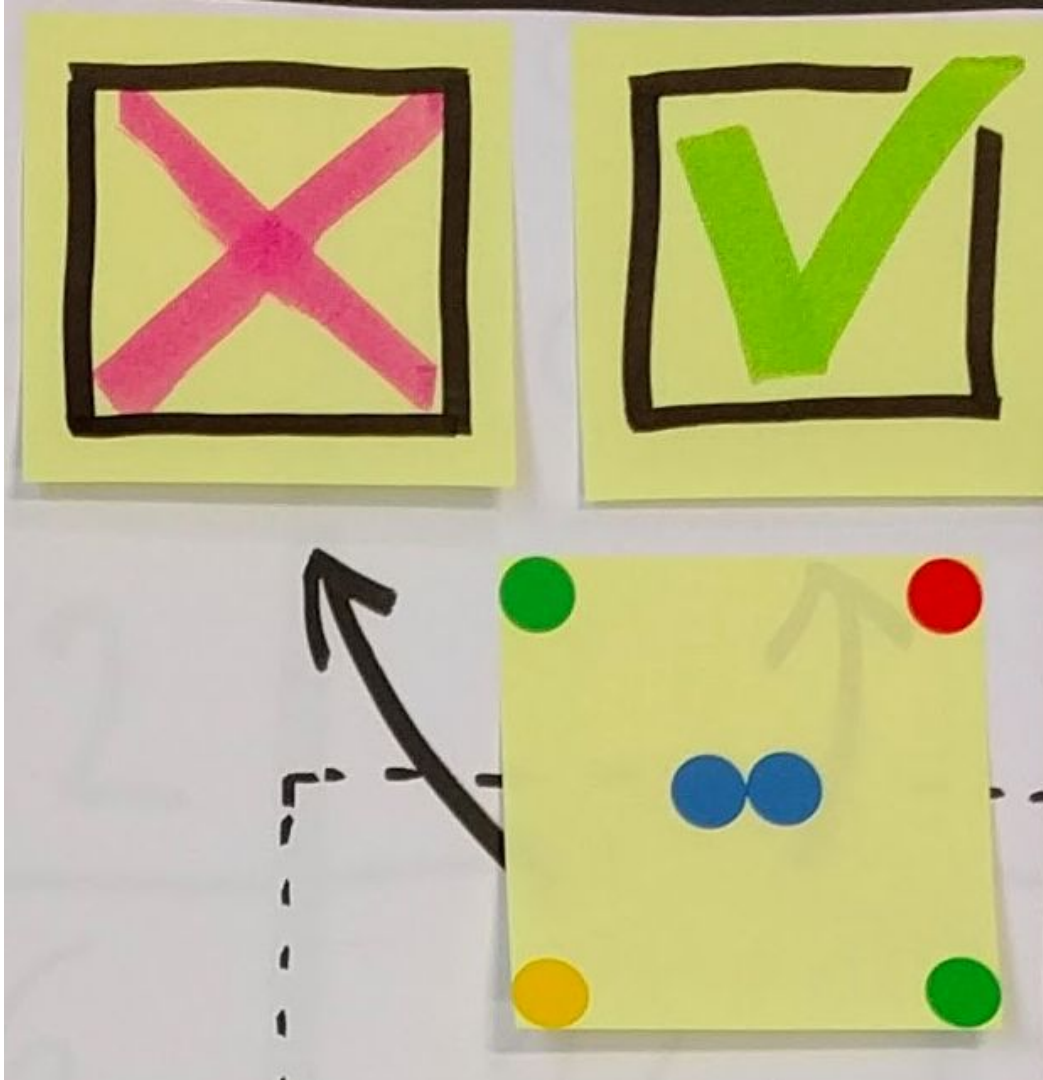
The UX designer



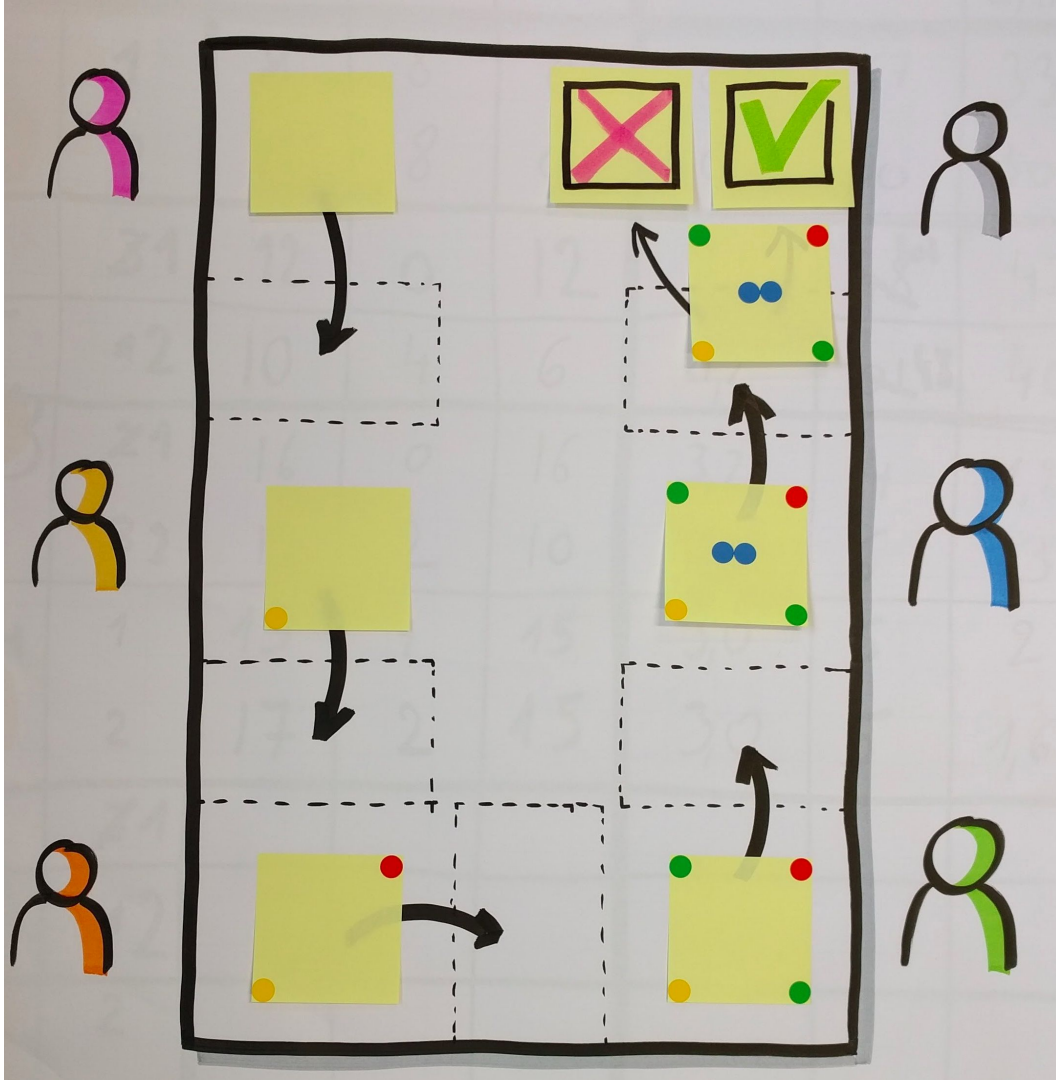
The developer

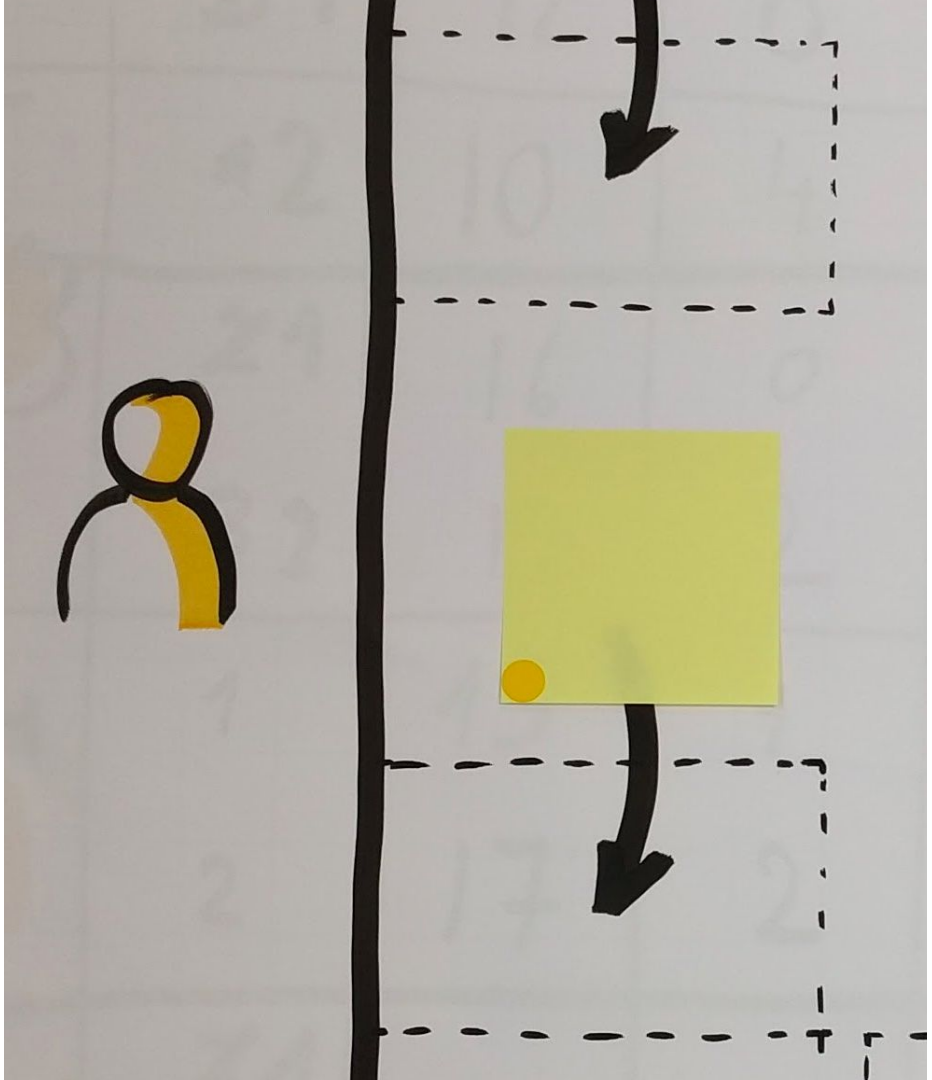


The tester



The whole process



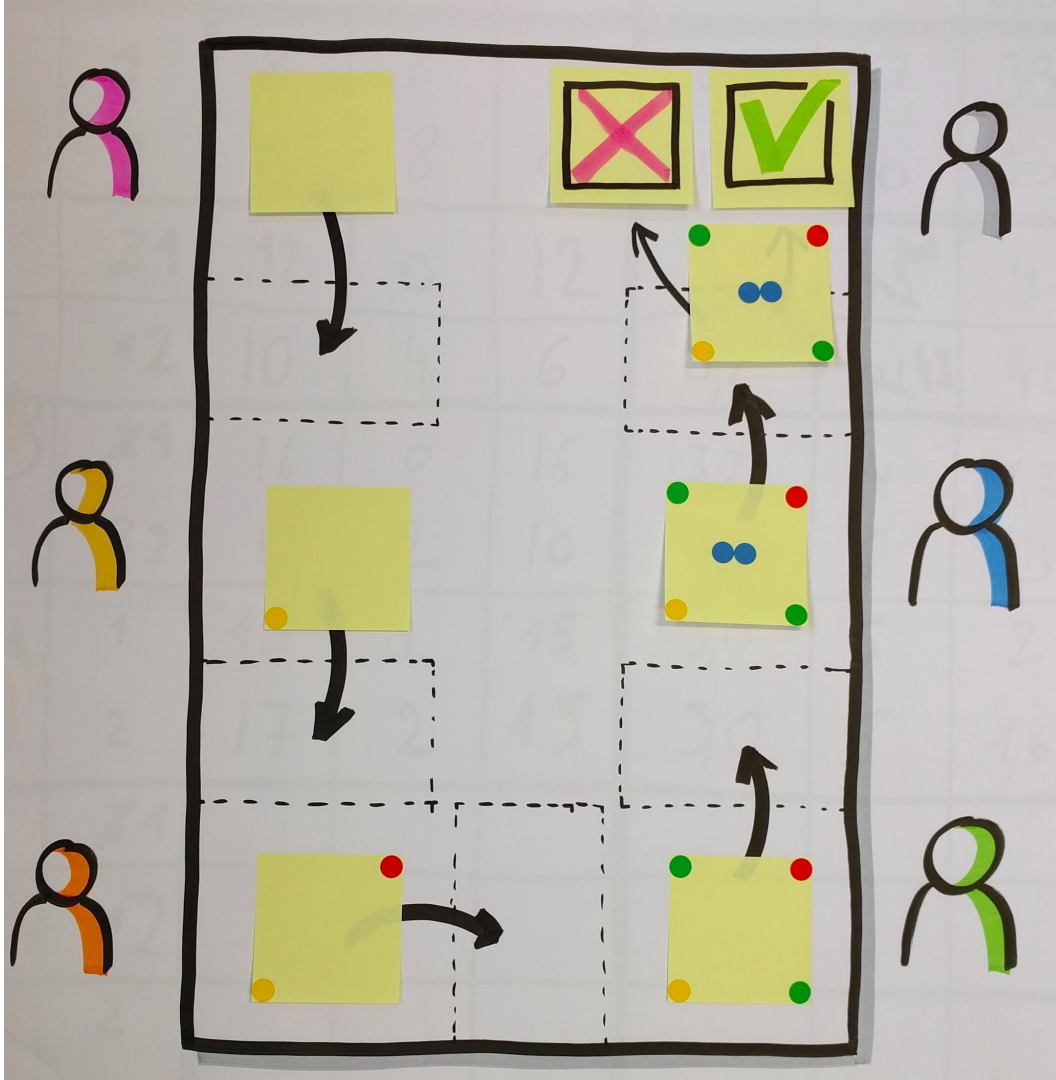


Your task:

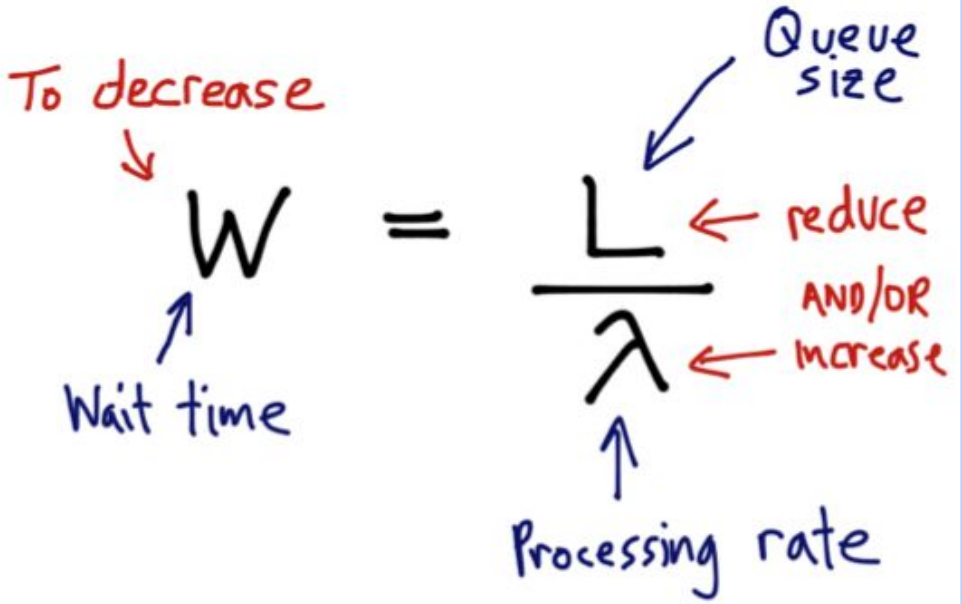
1) Take ONE batch from your IN box to your WORK area
2) Finish the batch
3) Put it in your OUT box
4) Go to 1)

Batches of 6

Round #1

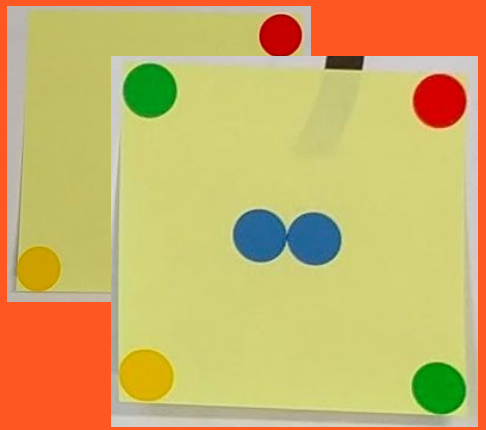


Results please


To decrease
W
Wait time
=
L
λ
Queue size
reduce
AND/OR
increase
Processing rate

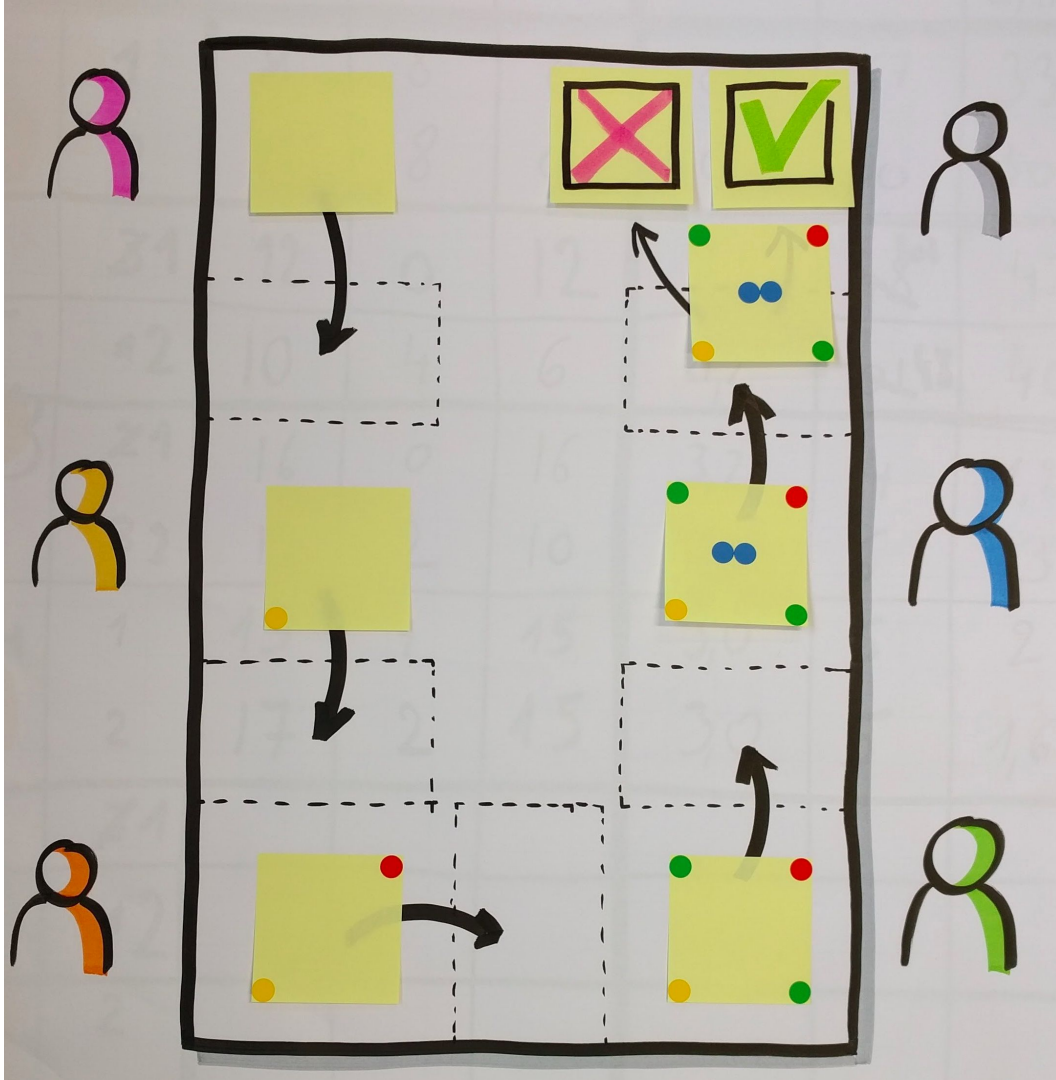
Little's law

Please cleanup the previous round



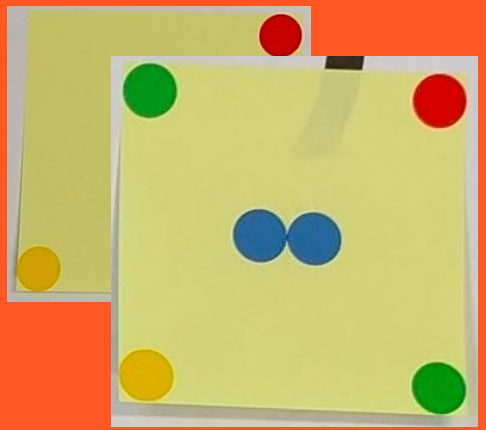
Batches of 2

Round #2



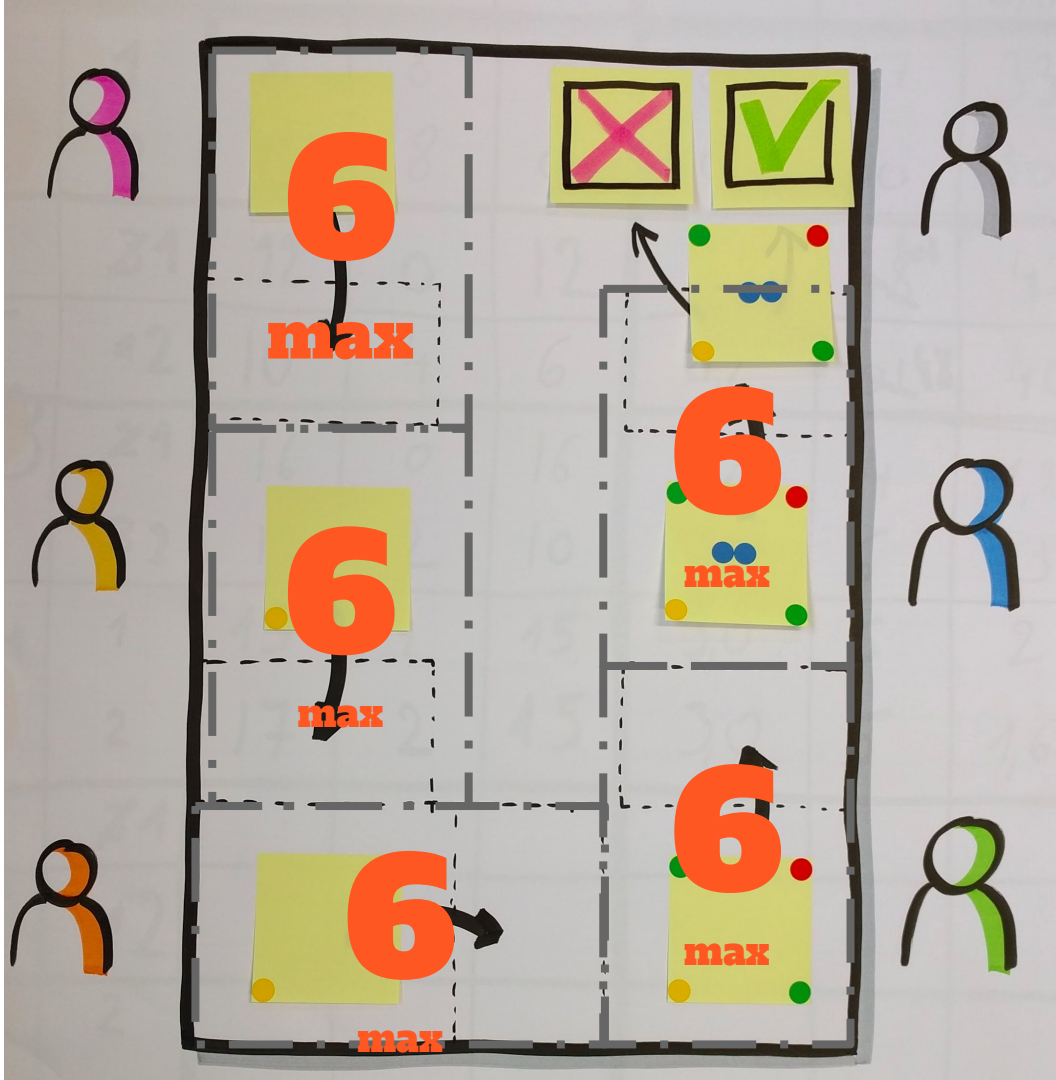
Results please

Please cleanup the previous round



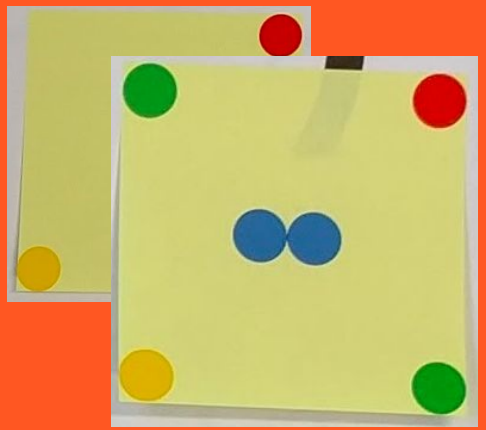
No batches, WIP of 6

Round #3



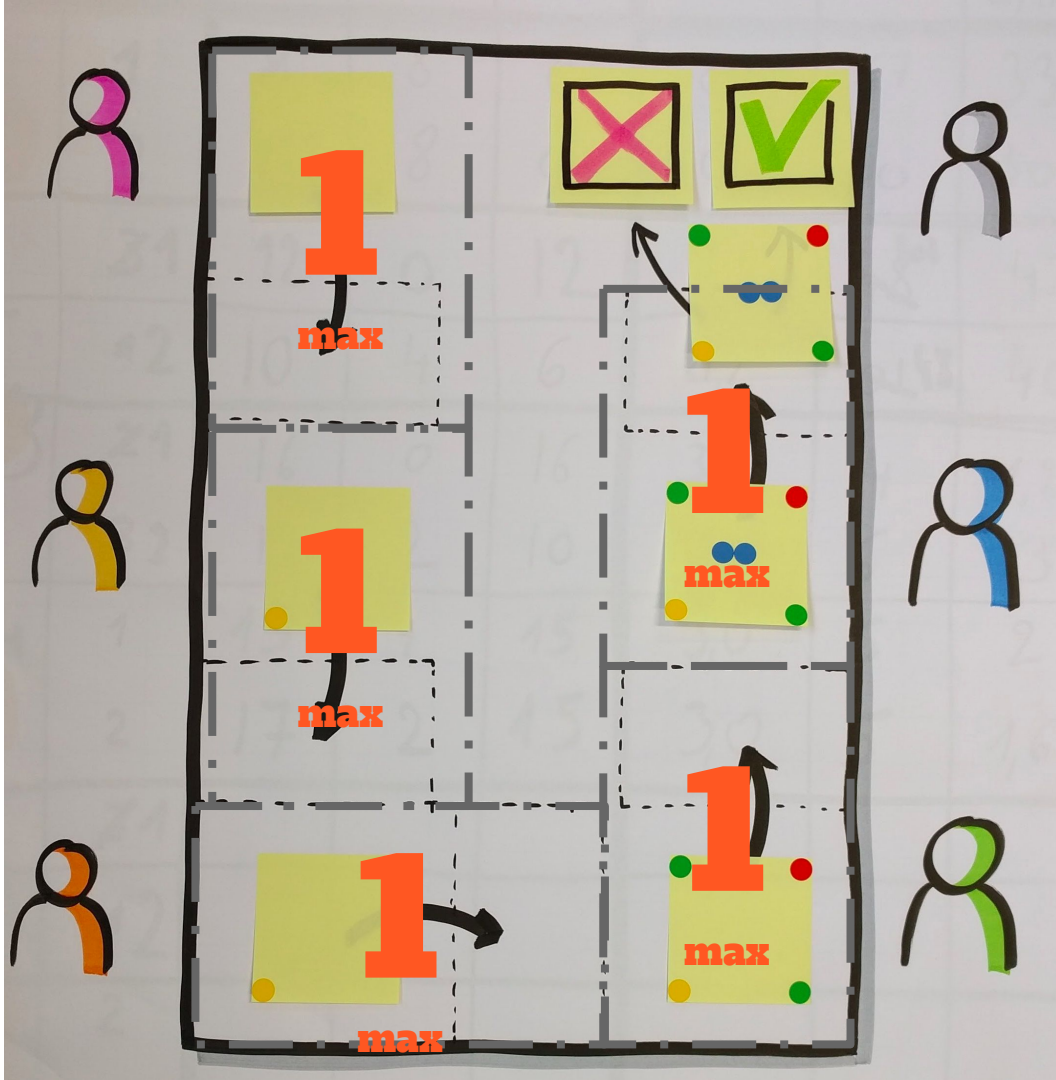
Results please

Please cleanup the previous round



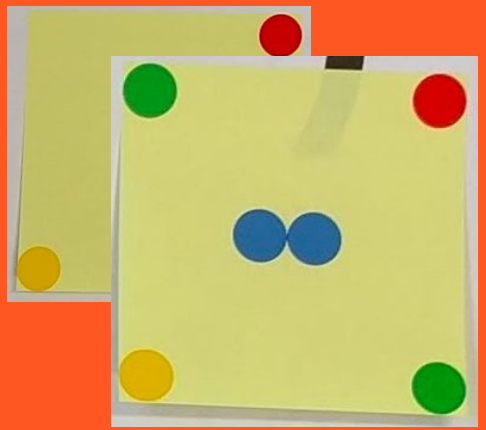
WIP of 1

Round #4



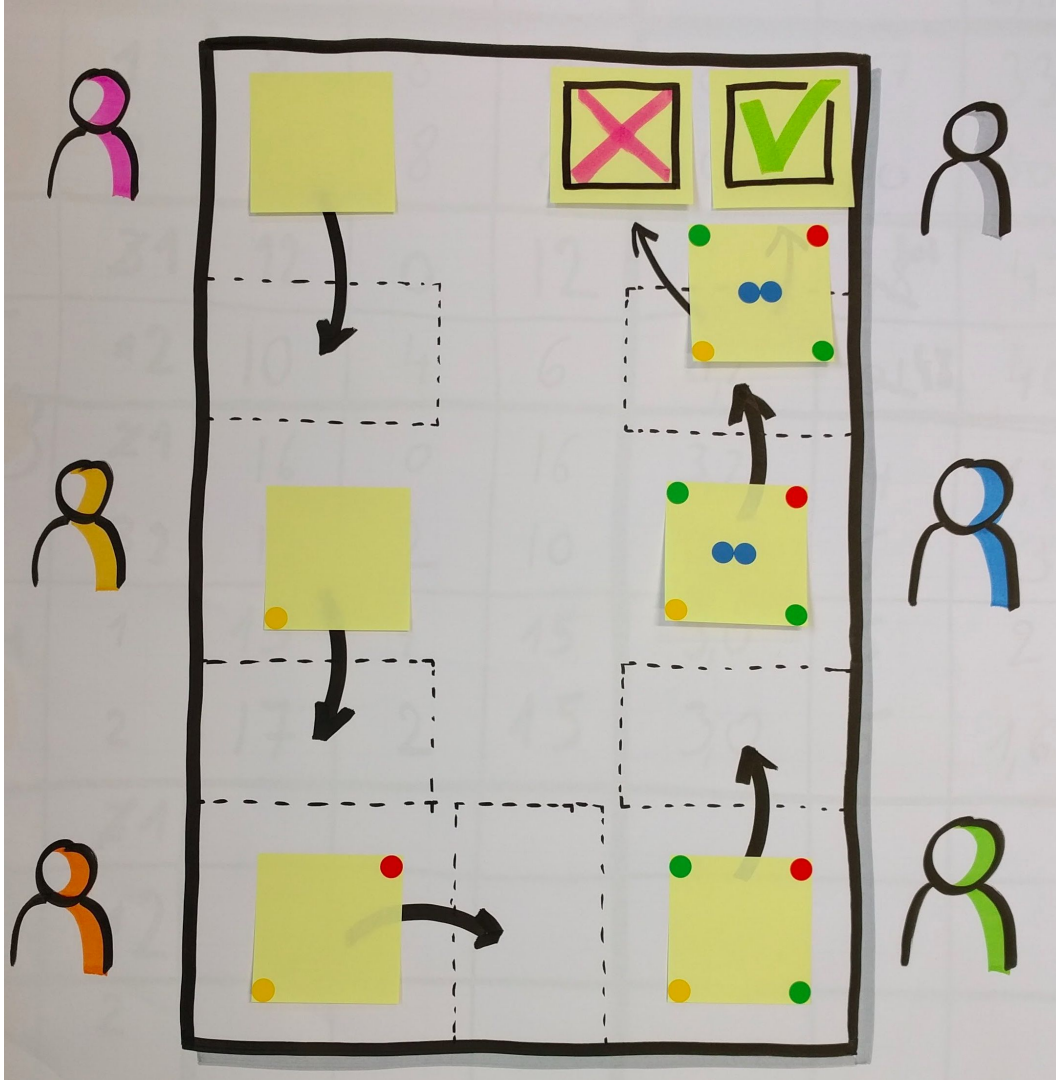
Results please

Please cleanup the previous round



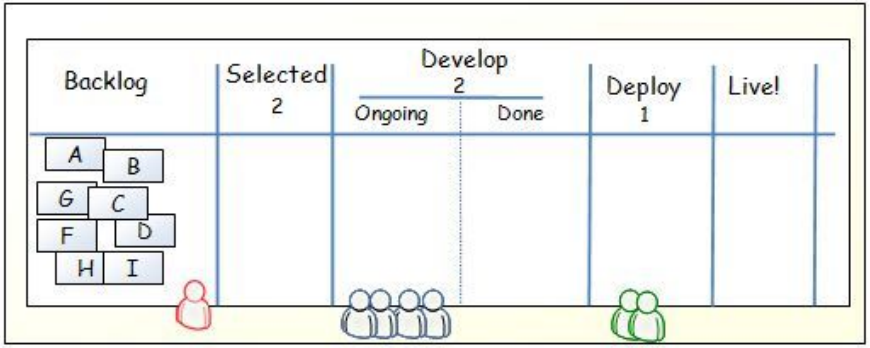
Choose your own strategy

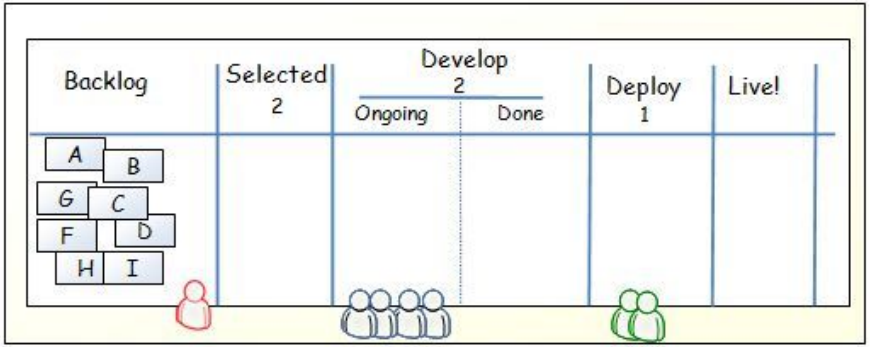
Change the batch size
Change the WIP limit
Overall WIP limit
In-place testing
Help bottlenecks (with 2x penalty)
WIP only upstream of bottleneck
...

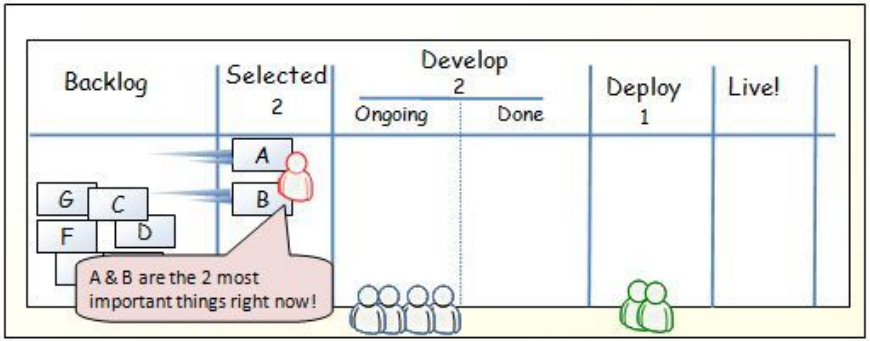


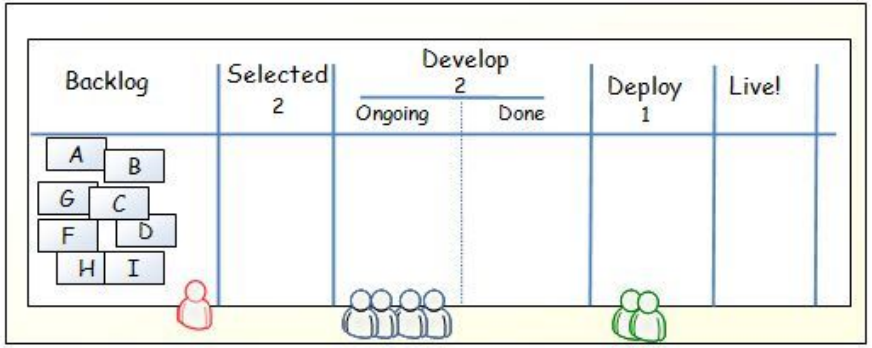
Results please

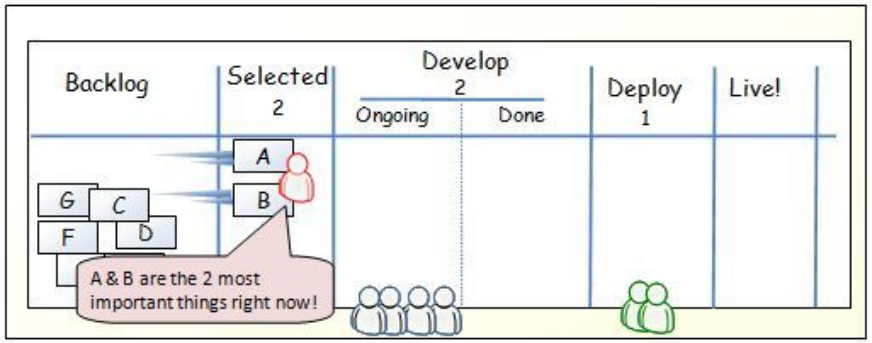
Henrik Kniberg's kanban land

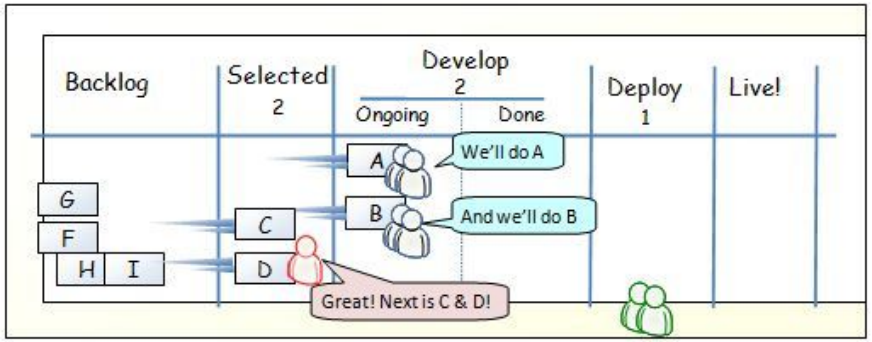

Backlog
Selected
2
Develop
2
Ongoing
Done
Deploy
1
Live!
A
B
G
C
F
D
H
I

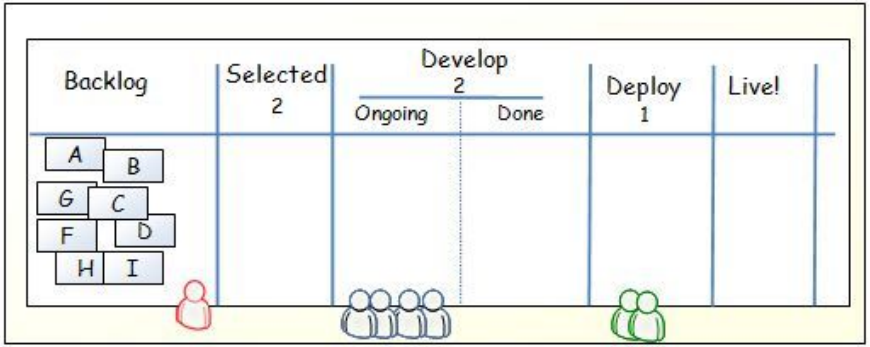

Backlog
Selected
2
Develop
2
Ongoing
Done
Deploy
1
Live!
A
B
G
C
F
D
H
I

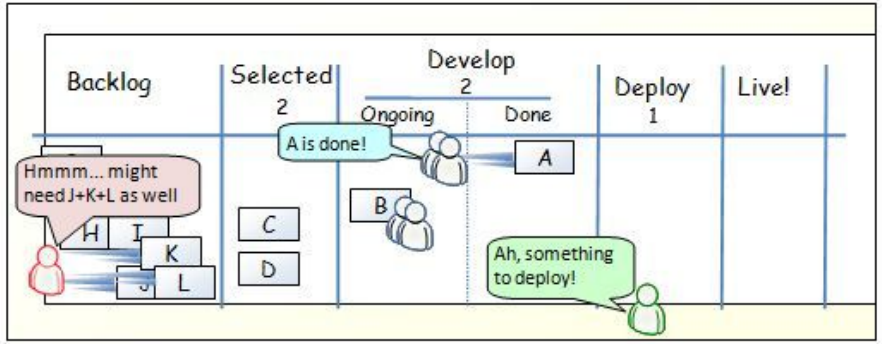

Backlog
Selected
2
Develop
2
Ongoing
Done
Deploy
1
Live!
A
B
G
C
F
D
A & B are the 2 most important things right now!

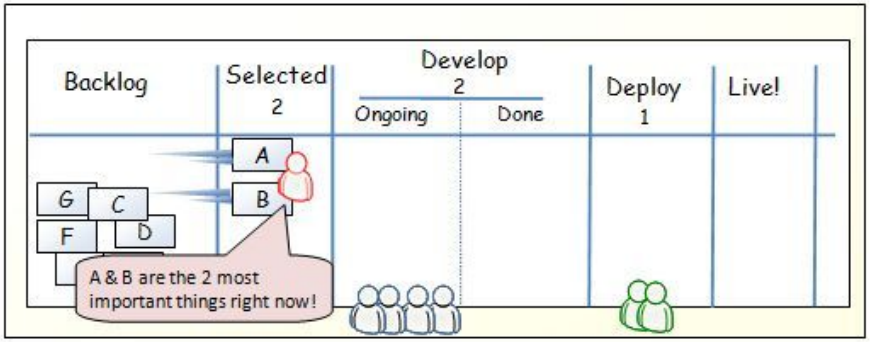

Backlog
Selected
2
Develop
2
Ongoing
Done
Deploy
1
Live!
A
B
G
C
F
D
H
I


Backlog
Selected
2
Develop
2
Ongoing
Done
Deploy
1
Live!
A
B
G
C
F
D
A & B are the 2 most important things right now!


Backlog
Selected
2
Develop
2
Ongoing
Done
Deploy
1
Live!
A
We'll do A
B
And we'll do B
G
F
H
I
C
D
Great! Next is C & D!


Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
A
B
G
C
F
D
H
I


Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
A is done!
A
Hmmm... might need J+K+L as well
B
C
D
H
I
K
L
Ah, something to deploy!


Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
A
B
G
C
F
D
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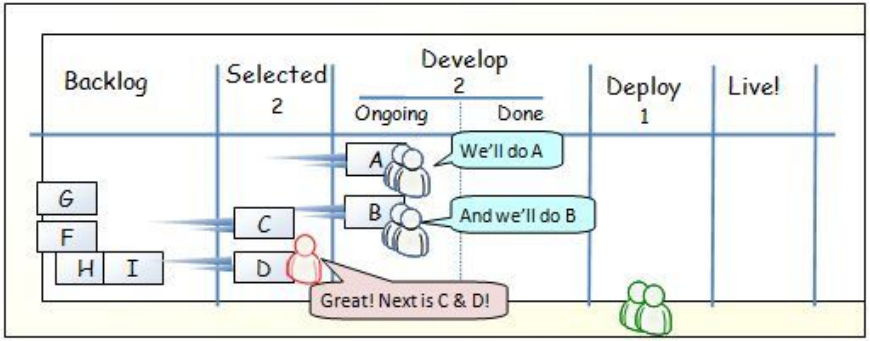
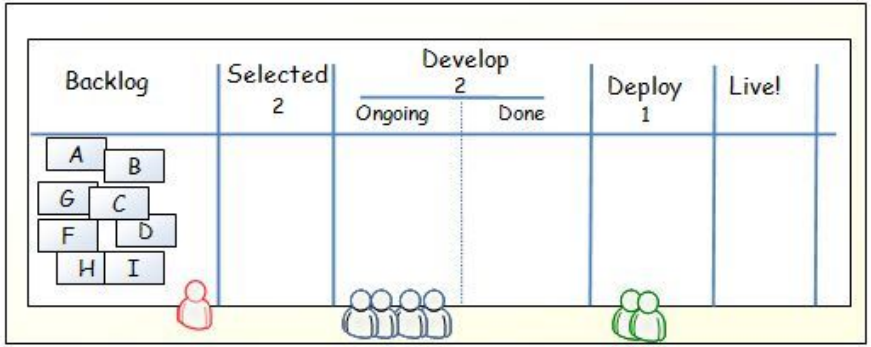
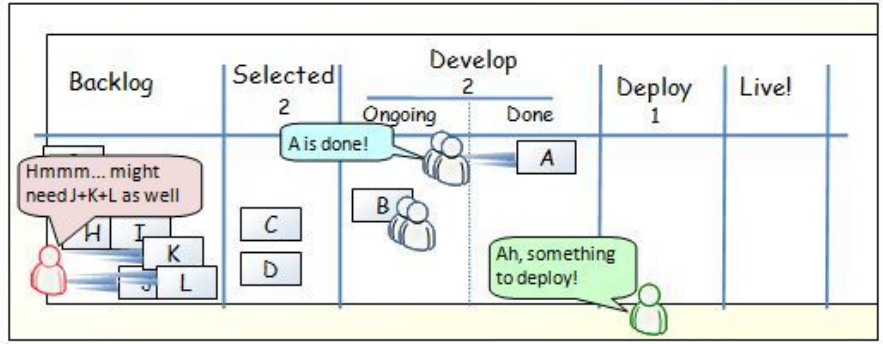
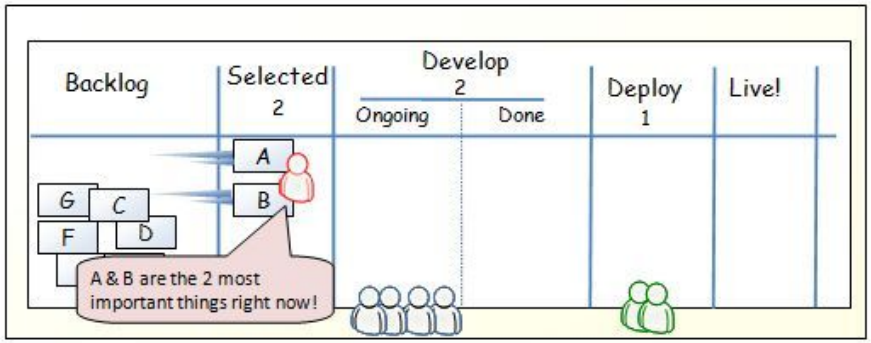

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
A
We'll do A
B
And we'll do B
G
F
C
H
I
D
Great! Next is C & D!


Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
A
B
G
C
F
D
H
I


Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
A is done!
A
Hmmm... might need J+K+L as well
H
I
K
L
C
D
B
Ah, something to deploy!


Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
A
B
G
C
F
D
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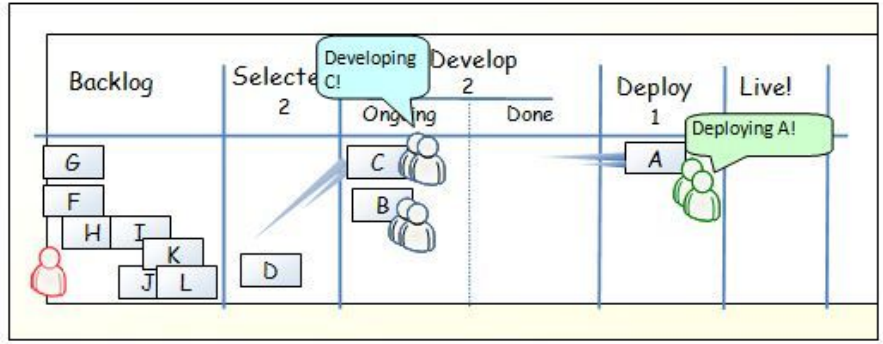
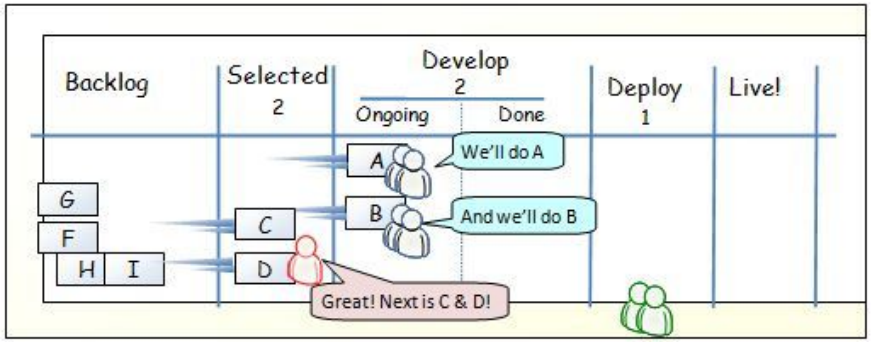
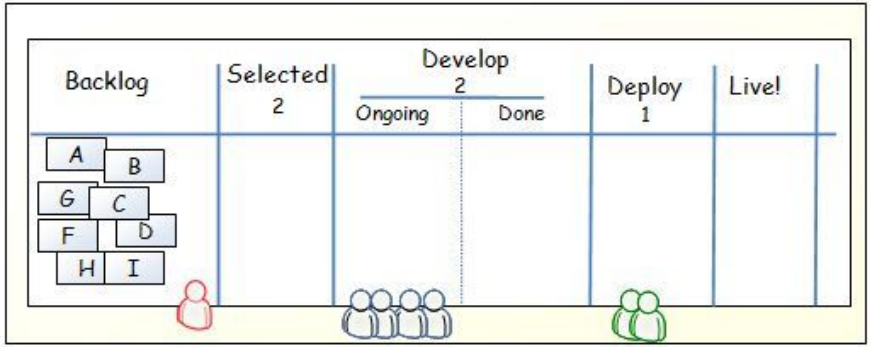
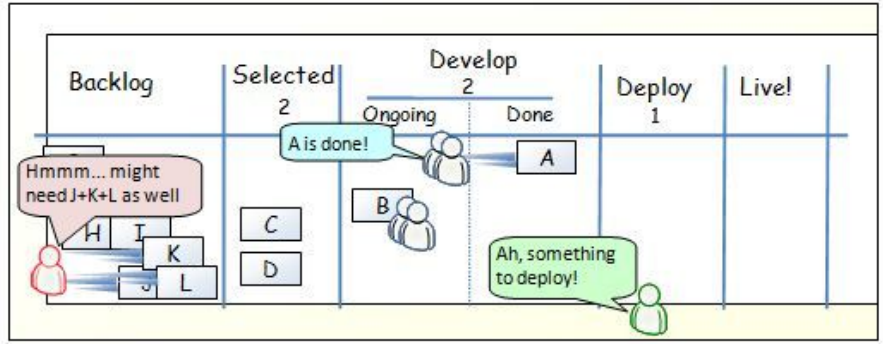
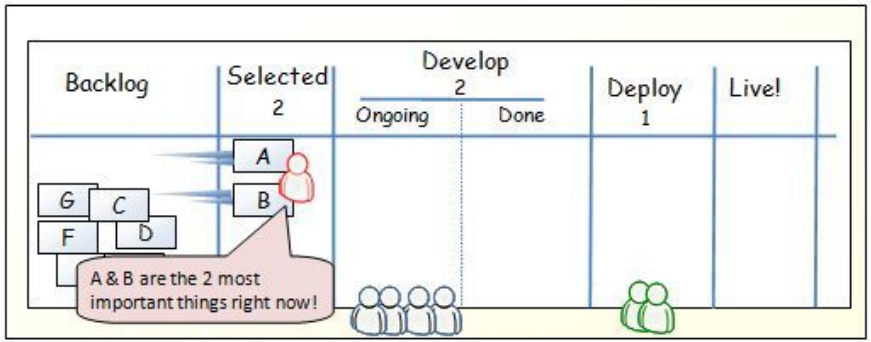
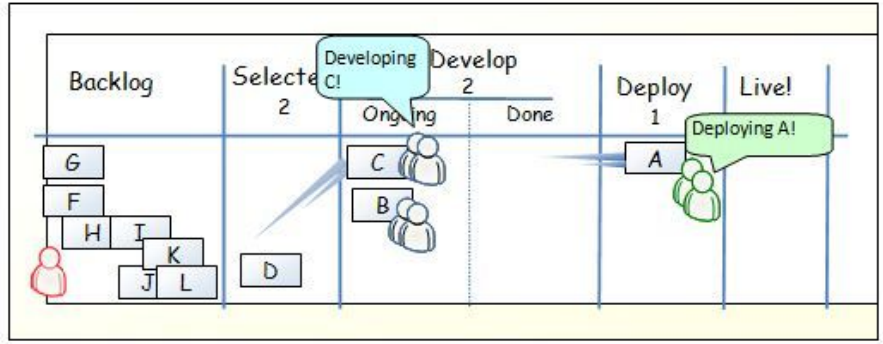

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
Developing C!
G
F
H
I
K
J
L
D
C
B
A
Deploying A!

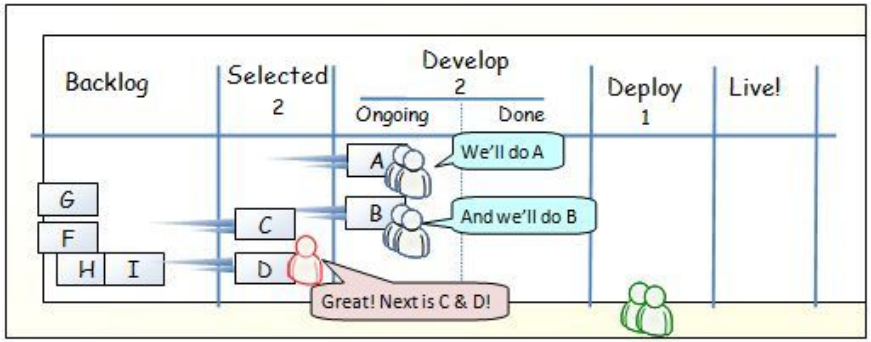

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
A
We'll do A
B
And we'll do B
G
F
H
I
C
D
Great! Next is C & D!

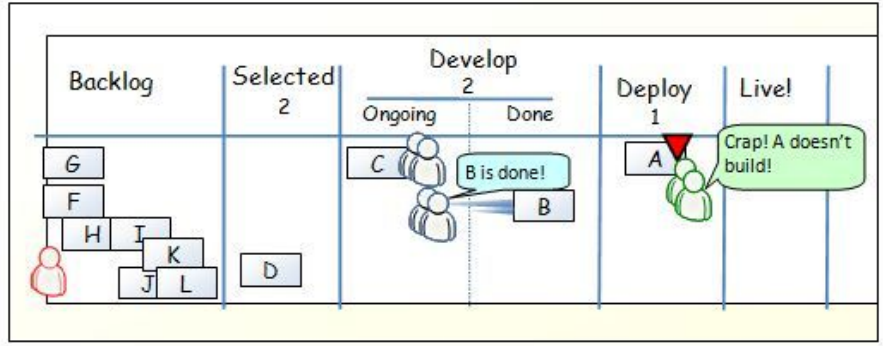

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
A
B
G
C
F
D
H
I

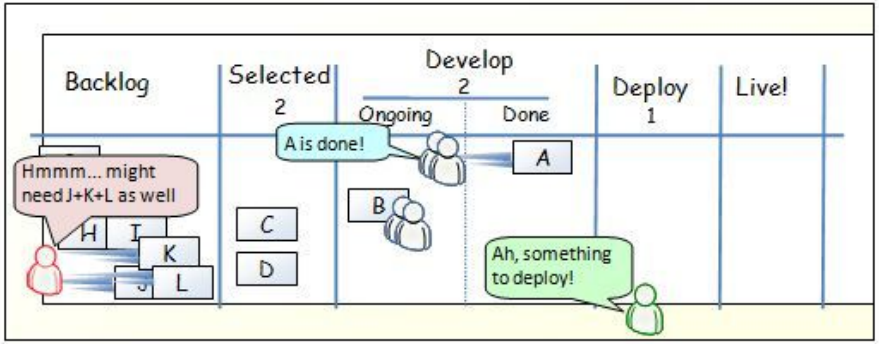

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
A is done!
A
Hmmm... might need J+K+L as well
B
C
D
H
I
K
L
Ah, something to deploy!

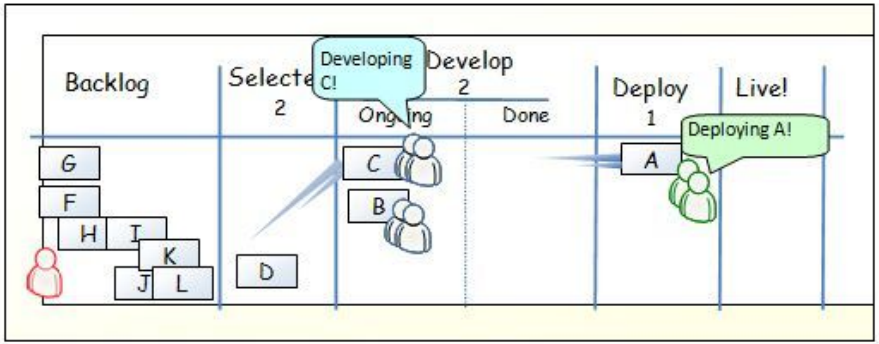

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
A
B
G
C
F
D
A & B are the 2 most important things right now!

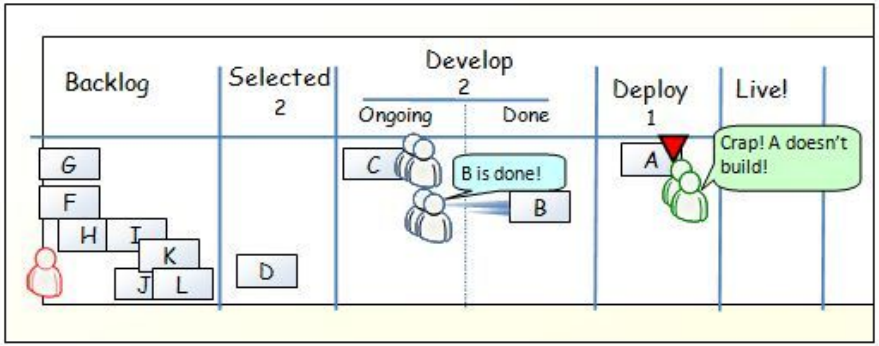

Backlog
Selected 2
Developing C!
Develop 2
Ongoing
Done
Deploy 1
Live!
Deploying A!
G
F
H
I
K
J
L
C
B
A
D

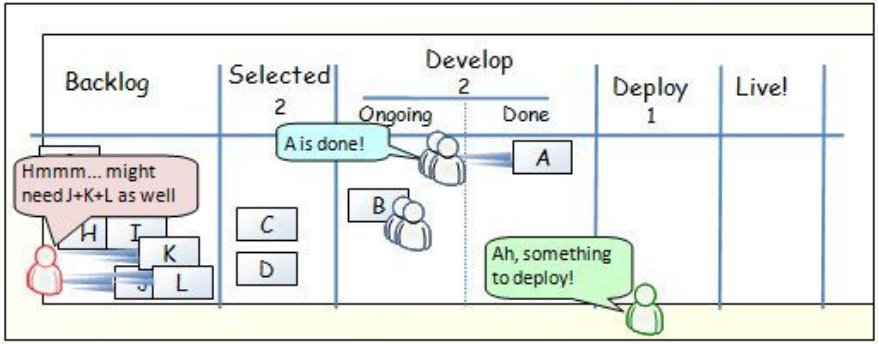

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
We'll do A
A
B
And we'll do B
G
F
H
I
C
D
Great! Next is C & D!

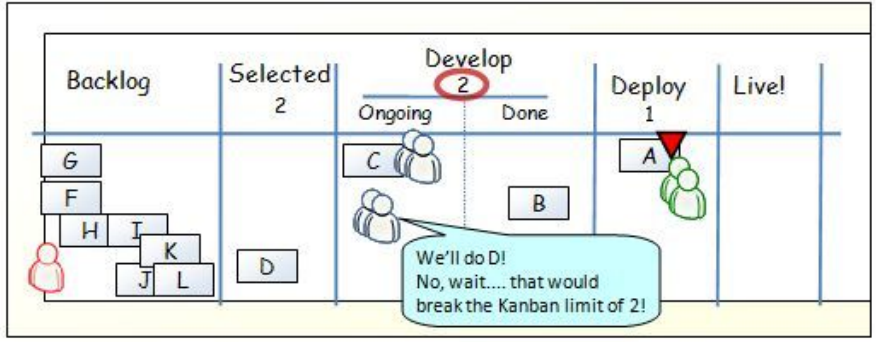

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
G
F
H
I
K
J
L
C
B is done!
B
D
A
Crap! A doesn't build!

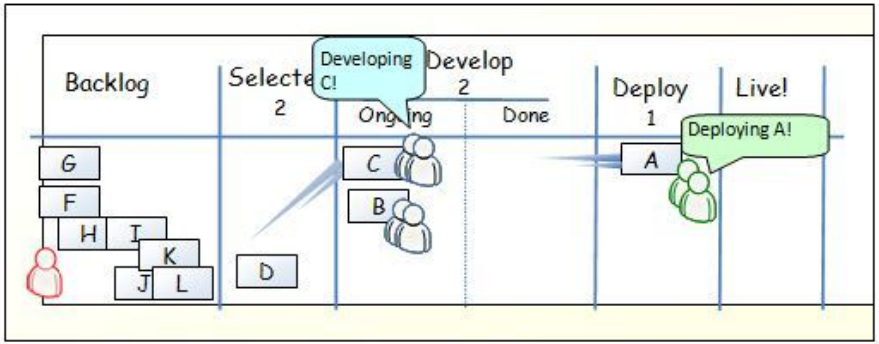

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
A is done!
A
B
C
D
H
I
K
J
L
Hmmm... might need J+K+L as well
Ah, something to deploy!

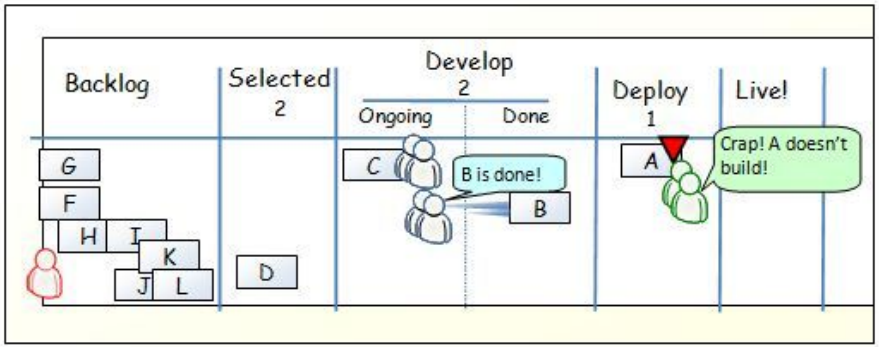

Backlog
Selecte 2
Developing C!
Develop 2
Ongoing
Done
Deploy 1
Live!
Deploying A!
G
F
H
I
K
J
L
C
B
A
D

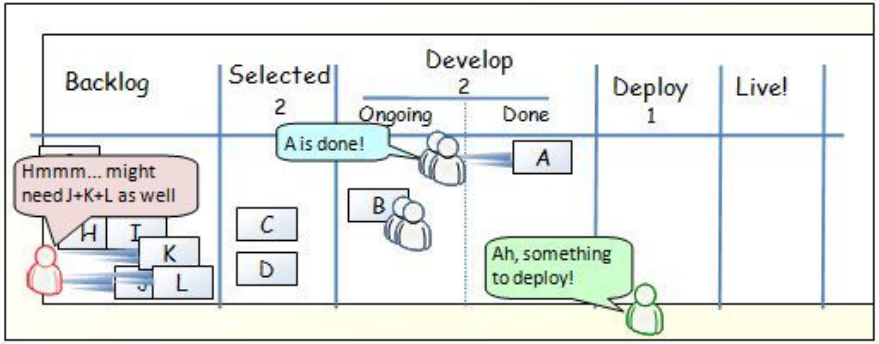

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
Crap! A doesn't build!
B is done!
G
F
H
I
K
J
L
C
B
A
D

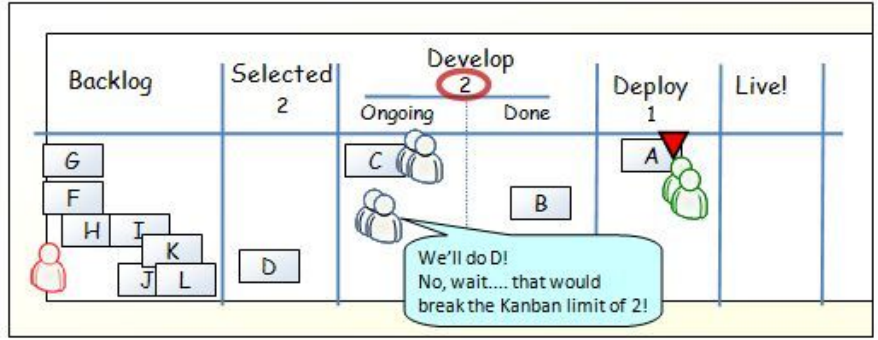

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
Hmmm... might need J+K+L as well
A is done!
A
B
C
D
H
I
K
J
L
Ah, something to deploy!

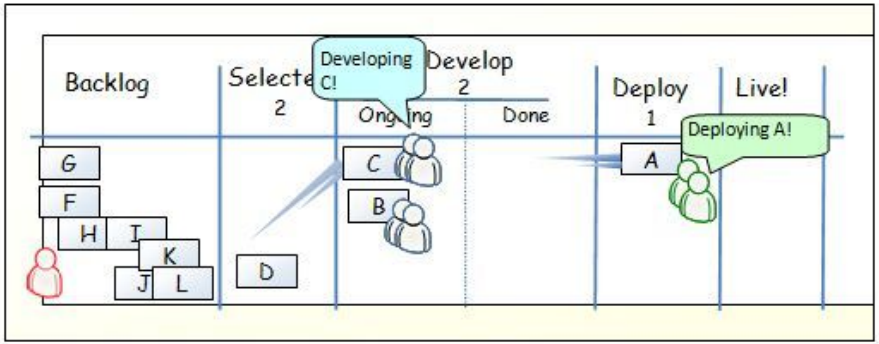

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
G
F
H
I
K
J
L
C
B
A
D
We'll do D!
No, wait.... that would break the Kanban limit of 2!

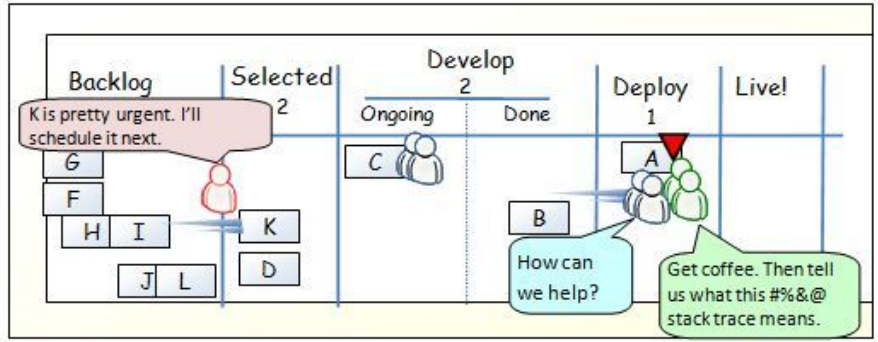

Backlog
Selected 2
Developing C!
Develop 2
Ongoing
Done
Deploy 1
Live!
Deploying A!
G
F
H
I
K
J
L
C
B
A
D

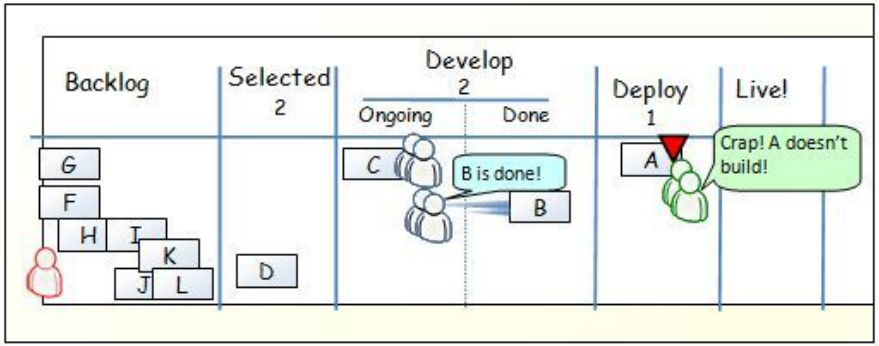

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
Crap! A doesn't build!
B is done!
G
F
H
I
K
J
L
C
B
A
D

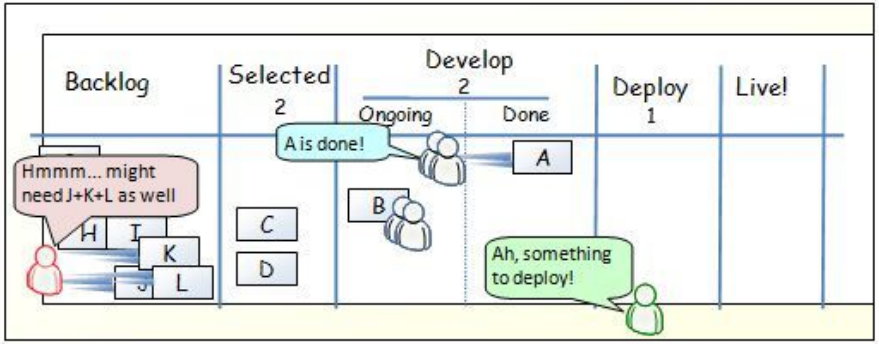

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
Hmmm... might need J+K+L as well
A is done!
Ah, something to deploy!
H
I
K
J
L
C
D
B
A

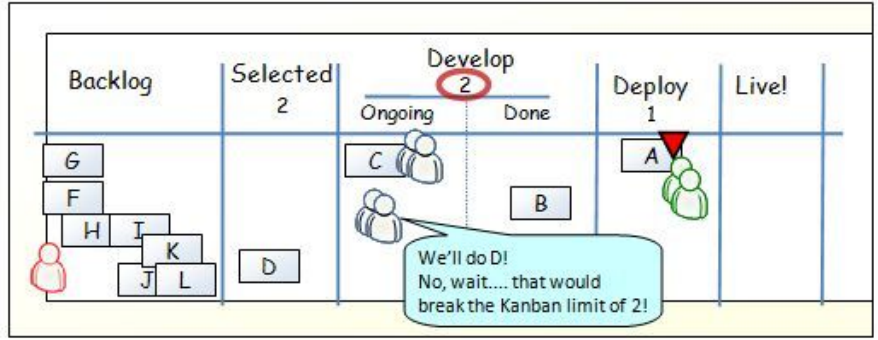

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
G
F
H
I
K
J
L
D
C
B
A
We'll do D!
No, wait.... that would break the Kanban limit of 2!

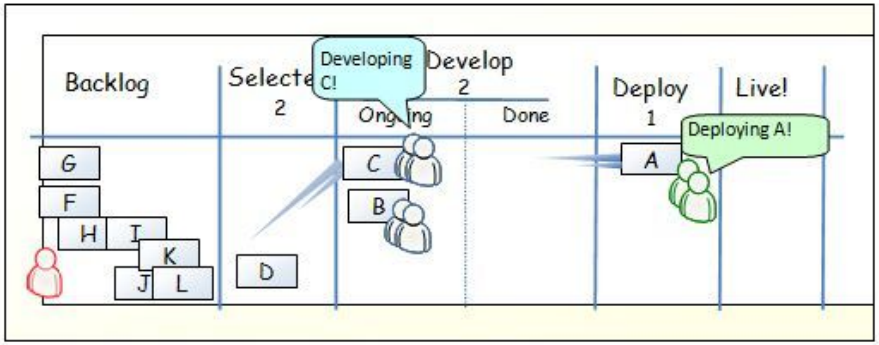

Backlog
Selected 2
Developing C!
Develop 2
Ongoing
Done
Deploy 1
Live!
Deploying A!
G
F
H
I
K
J
L
D
C
B
A

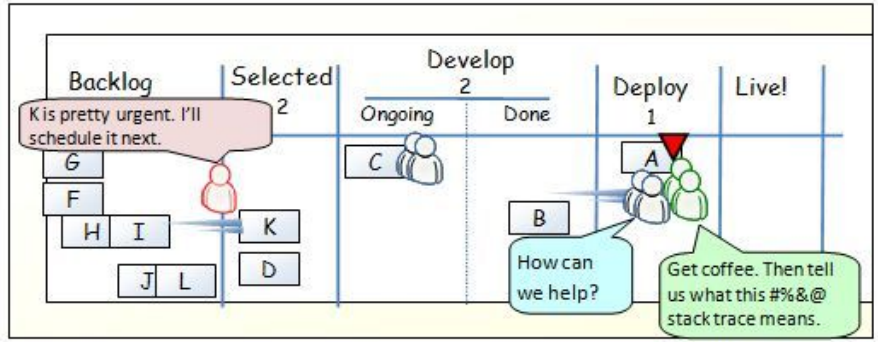

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
K is pretty urgent. I'll schedule it next.
How can we help?
Get coffee. Then tell us what this #%&@ stack trace means.
G
F
H
I
K
J
L
D
C
B
A

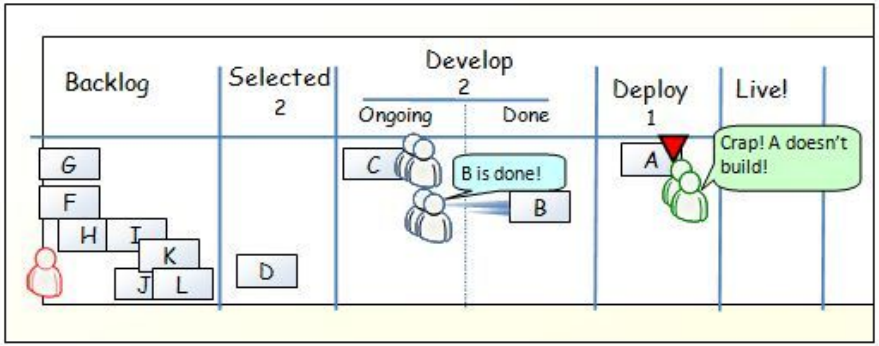

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
B is done!
Crap! A doesn't build!
G
F
H
I
K
J
L
D
C
B
A

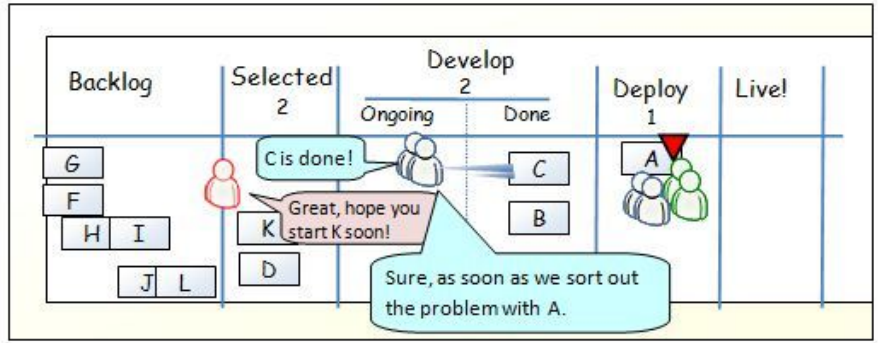

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
Hmmm... might need J+K+L as well
A is done!
Ah, something to deploy!
H
I
K
J
L
C
D
B
A

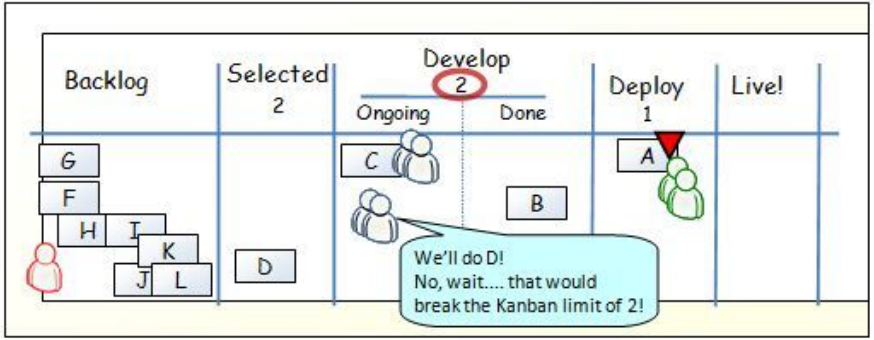

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
G
F
H
I
K
J
L
D
C
B
A
We'll do D!
No, wait.... that would break the Kanban limit of 2!

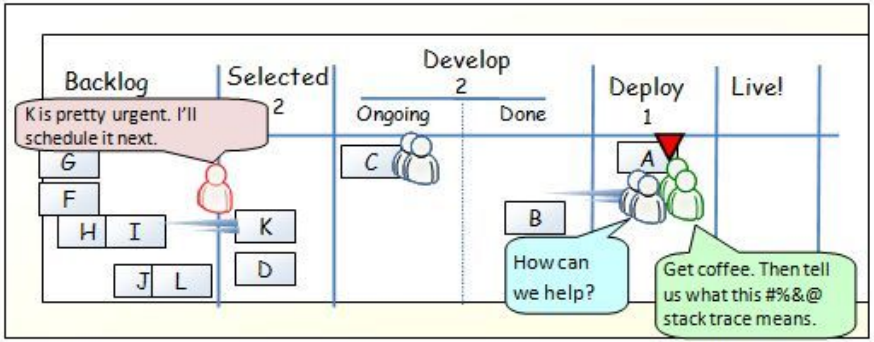

Backlog
Selecte 2
Developing C!
Develop 2
Ongoing
Done
Deploy 1
Live!
Deploying A!
G
F
H
I
K
J
L
D
C
B
A

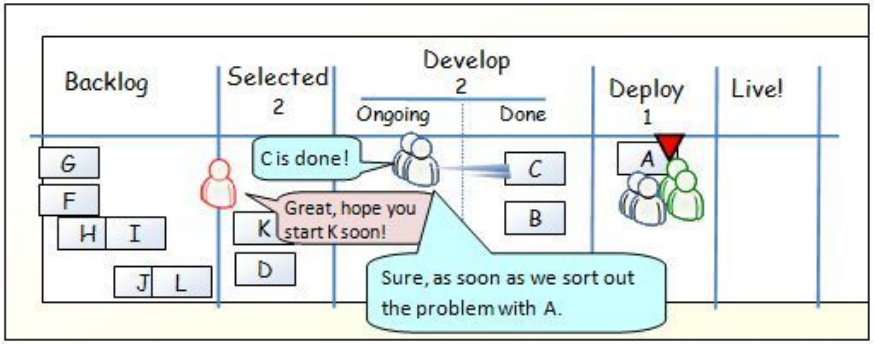

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
K is pretty urgent. I'll schedule it next.
How can we help?
Get coffee. Then tell us what this #%&@ stack trace means.
G
F
H
I
K
J
L
D
C
B
A

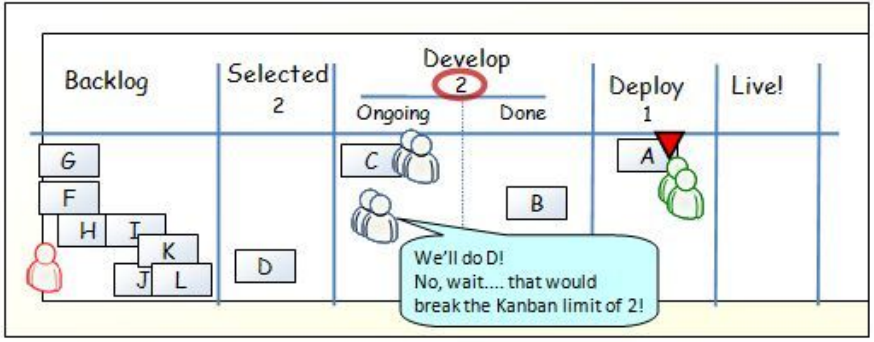

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
B is done!
Crap! A doesn't build!
G
F
H
I
K
J
L
D
C
B
A

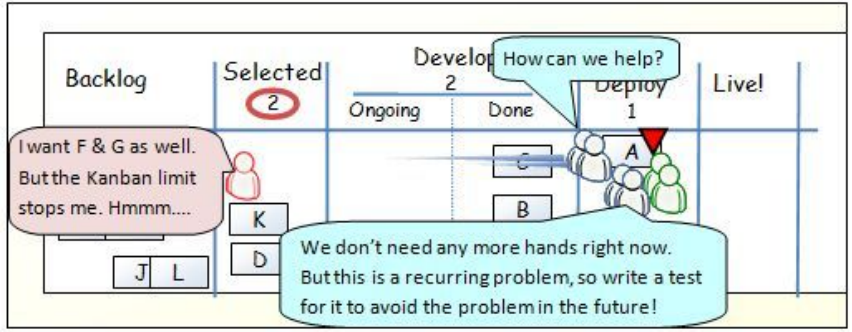

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
C is done!
Great, hope you start K soon!
Sure, as soon as we sort out the problem with A.
G
F
H
I
K
J
L
D
C
B
A

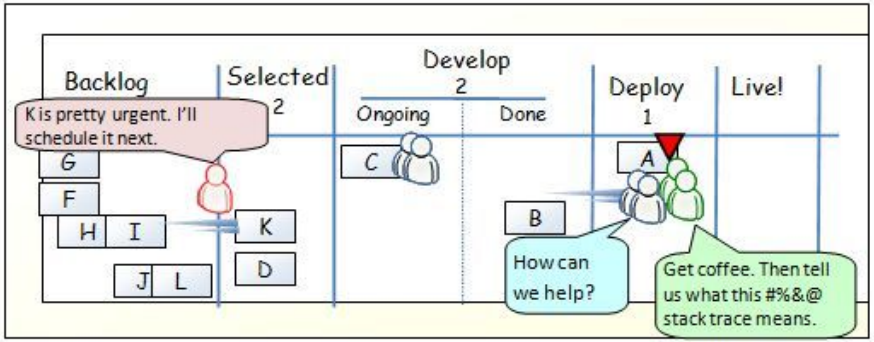

Backlog
Selected
2
Develop
2
Ongoing
Done
Deploy
1
Live!
G
F
H
I
K
J
L
D
C
B
A
We'll do D!
No, wait.... that would
break the Kanban limit of 2!

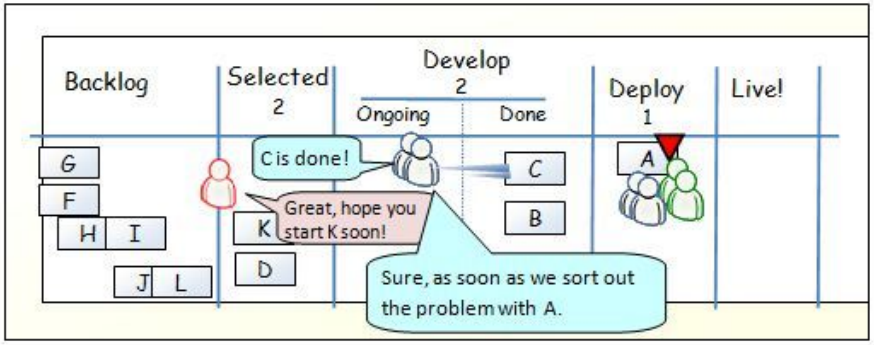

Backlog
Selected
2
Develop
2
Ongoing
Done
Deploy
1
Live!
K is pretty urgent. I'll
schedule it next.
G
F
H
I
K
J
L
D
C
B
A
How can
we help?
Get coffee. Then tell
us what this #%&@
stack trace means.

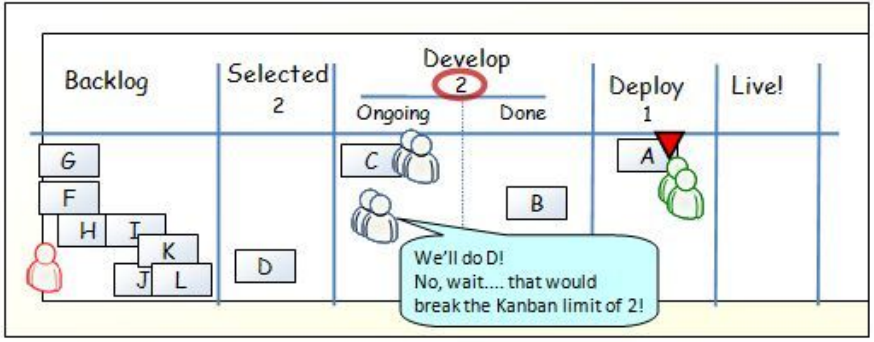

Backlog
Selected
2
Develop
2
Ongoing
Done
Deploy
1
Live!
C is done!
Great, hope you
start K soon!
G
F
H
I
K
J
L
D
C
B
A
Sure, as soon as we sort out
the problem with A.

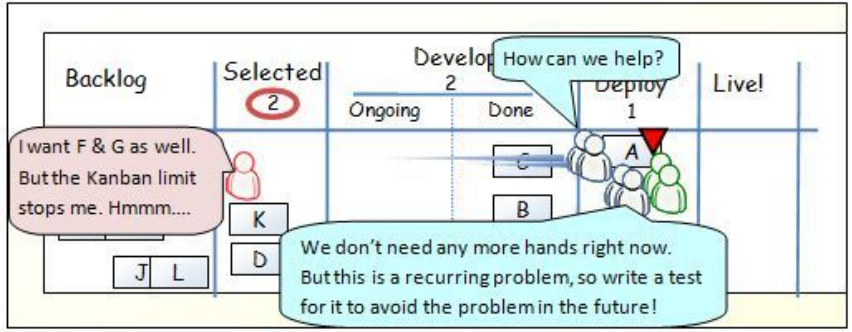

Backlog
Selected
2
Develop
2
Ongoing
Done
Deploy
1
Live!
G
F
H
I
K
J
L
D
C
B
A
We'll do D!
No, wait.... that would break the Kanban limit of 2!

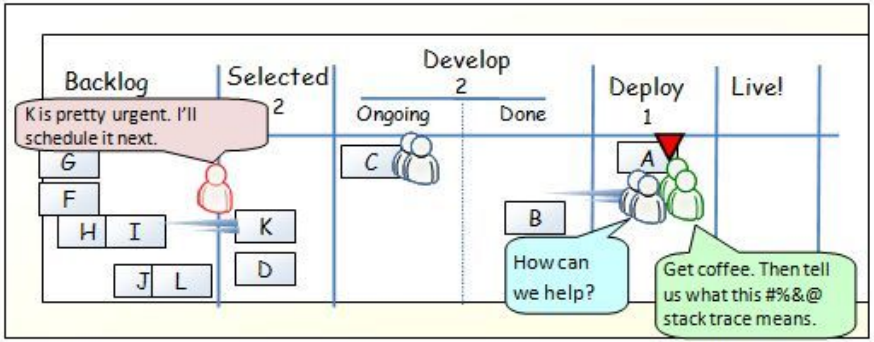

Backlog
Selected
2
Develop
2
Ongoing
Done
Deploy
1
Live!
How can we help?
I want F & G as well. But the Kanban limit stops me. Hmmm....
K
D
J
L
C
B
A
We don't need any more hands right now. But this is a recurring problem, so write a test for it to avoid the problem in the future!

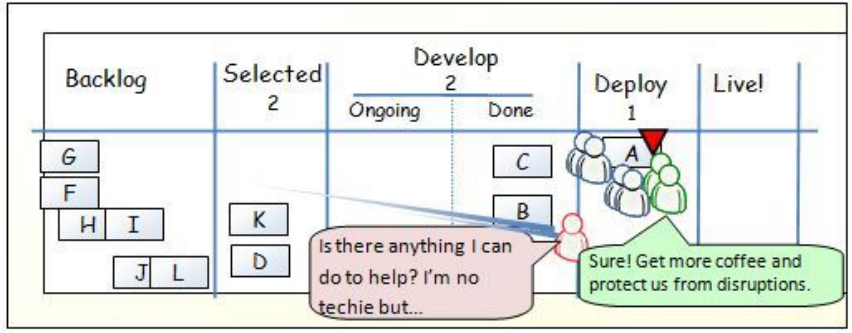

Backlog
Selected
2
Develop
2
Ongoing
Done
Deploy
1
Live!
K is pretty urgent. I'll schedule it next.
G
F
H
I
K
J
L
D
C
B
A
How can we help?
Get coffee. Then tell us what this #%&@ stack trace means.

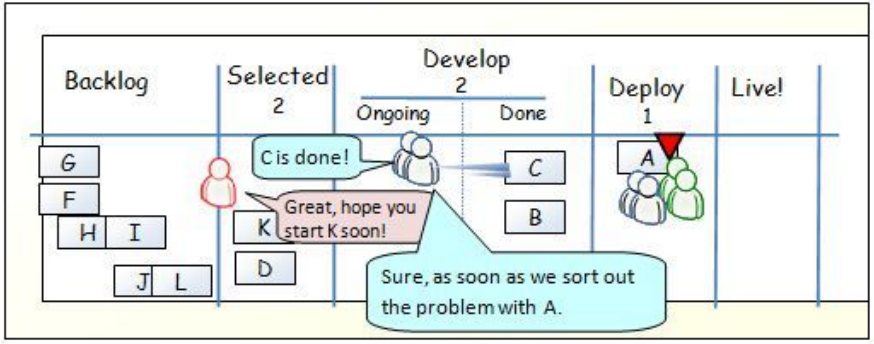

Backlog
Selected
2
Develop
2
Ongoing
Done
Deploy
1
Live!
C is done!
G
F
H
I
K
J
L
D
C
B
A
Great, hope you start K soon!
Sure, as soon as we sort out the problem with A.

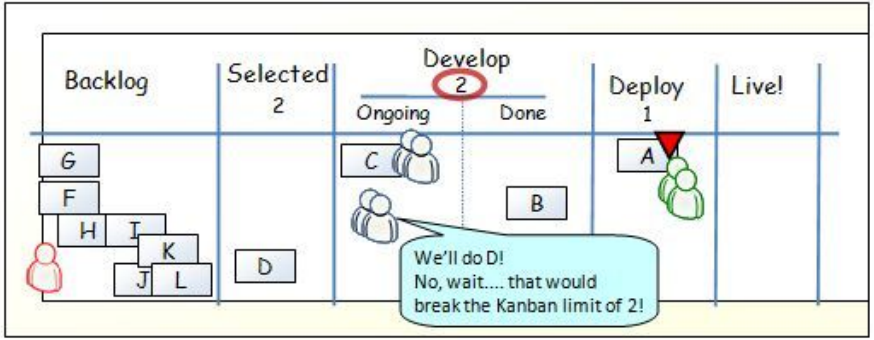

Backlog
Selected
2
Develop
2
Ongoing
Done
Deploy
1
Live!
G
F
H
I
K
J
L
D
C
B
A
We'll do D!
No, wait.... that would break the Kanban limit of 2!

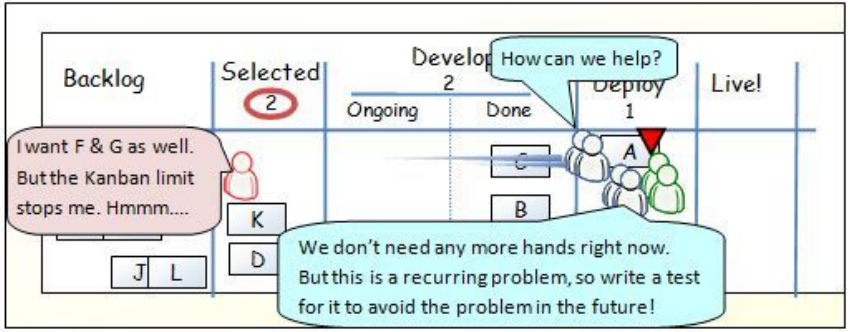

Backlog
Selected
2
Develop
2
Ongoing
Done
Deploy
1
Live!
How can we help?
I want F & G as well. But the Kanban limit stops me. Hmmm....
K
D
J
L
C
B
A
We don't need any more hands right now. But this is a recurring problem, so write a test for it to avoid the problem in the future!

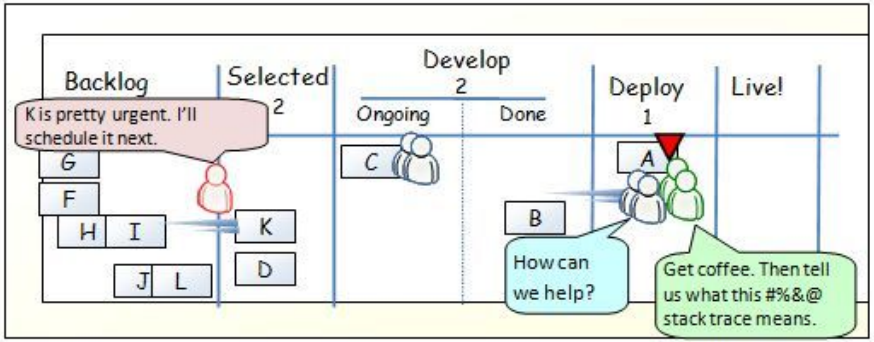

Backlog
Selected
2
Develop
2
Ongoing
Done
Deploy
1
Live!
K is pretty urgent. I'll schedule it next.
G
F
H
I
K
J
L
D
C
B
A
How can we help?
Get coffee. Then tell us what this #%&@ stack trace means.

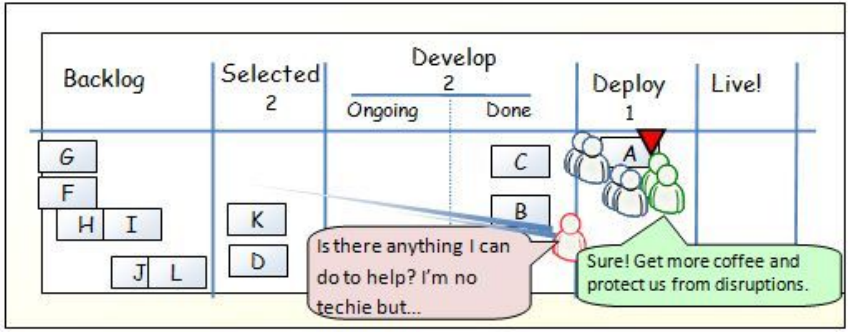

Backlog
Selected
2
Develop
2
Ongoing
Done
Deploy
1
Live!
G
F
H
I
K
J
L
D
C
B
A
Is there anything I can do to help? I'm no techie but...
Sure! Get more coffee and protect us from disruptions.

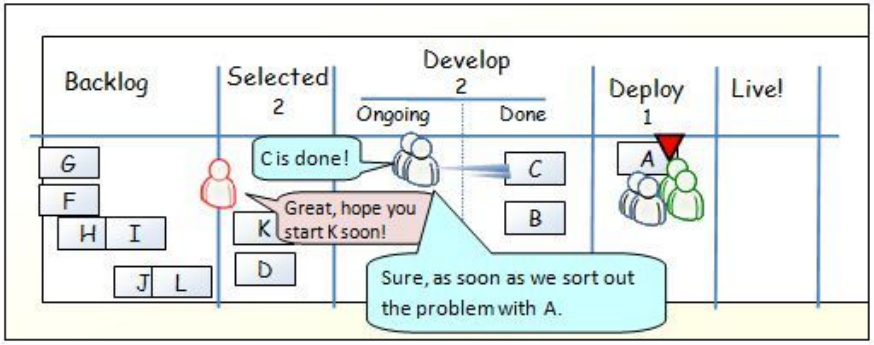

Backlog
Selected
2
Develop
2
Ongoing
Done
Deploy
1
Live!
C is done!
G
F
H
I
K
J
L
D
C
B
A
Great, hope you start K soon!
Sure, as soon as we sort out the problem with A.

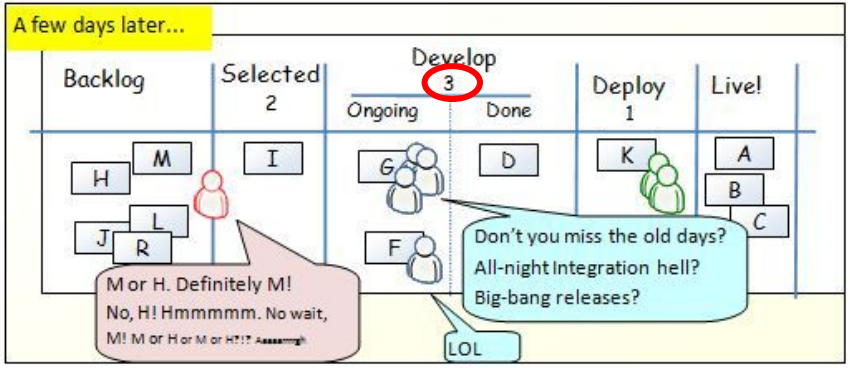

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
G
F
H
I
K
J
L
D
C
B
A
We'll do D!
No, wait.... that would break the Kanban limit of 2!


Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
How can we help?
I want F & G as well. But the Kanban limit stops me. Hmmm....
K
D
J
L
C
B
A
We don't need any more hands right now. But this is a recurring problem, so write a test for it to avoid the problem in the future!


Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
K is pretty urgent. I'll schedule it next.
G
F
H
I
K
J
L
D
C
B
A
How can we help?
Get coffee. Then tell us what this #%&@ stack trace means.

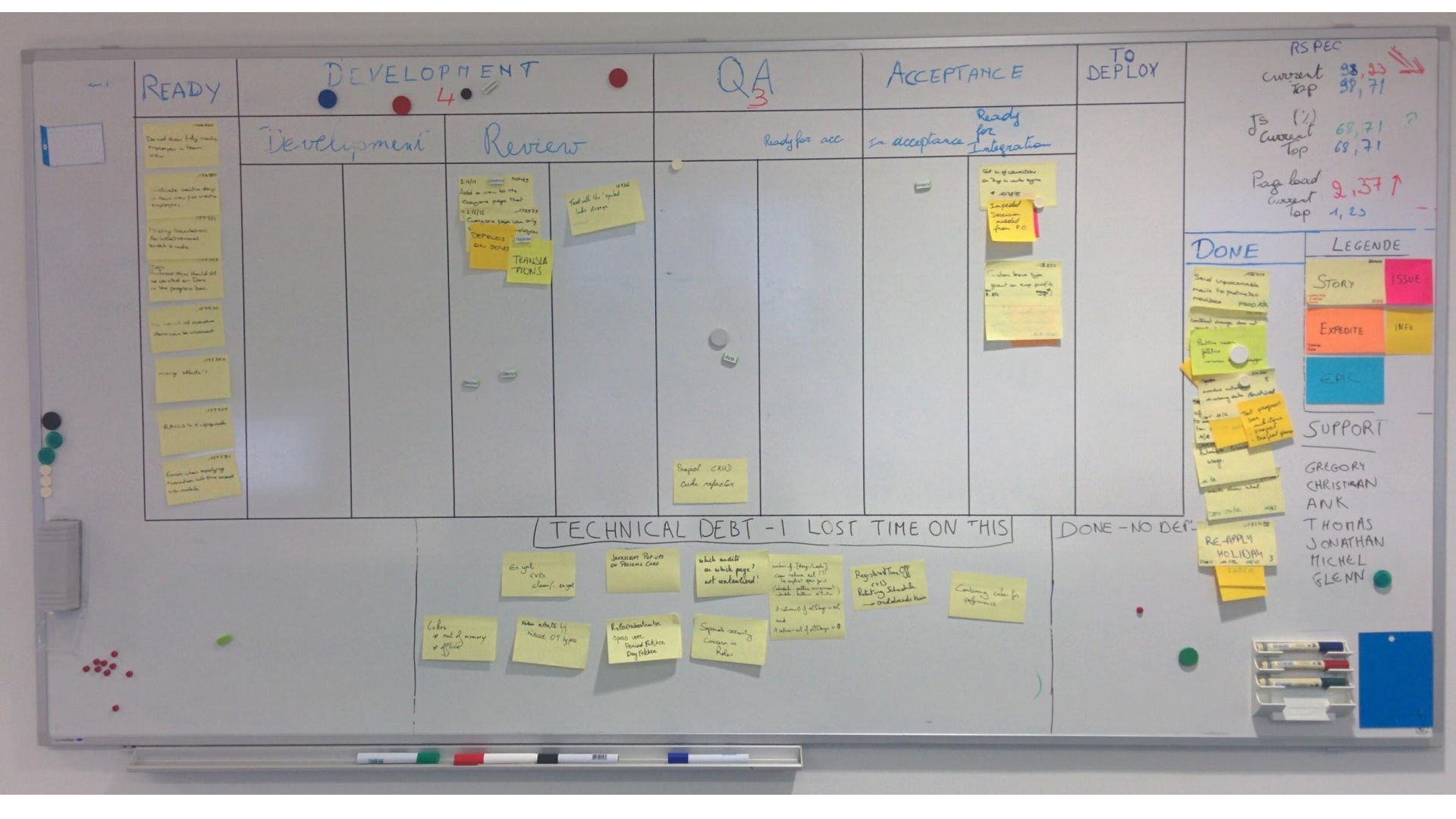

Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
G
F
H
I
K
J
L
D
C
B
A
Is there anything I can do to help? I'm no techie but...
Sure! Get more coffee and protect us from disruptions.


Backlog
Selected 2
Develop 2
Ongoing
Done
Deploy 1
Live!
G
F
H
I
K
J
L
D
C is done!
Great, hope you start K soon!
C
B
A
Sure, as soon as we sort out the problem with A.


A few days later...
Backlog
Selected 2
Develop 3
Ongoing
Done
Deploy 1
Live!
H
M
I
G
D
K
A
B
C
J
L
R
F
M or H. Definitely M!
No, H! Hmmmmm. No wait, M! M or H or M or H?!? Aaaaargh
Don't you miss the old days? All-night Integration hell? Big-bang releases?
LOL

How we work


READY
DEVELOPMENT 4
QA 3
ACCEPTANCE
TO DEPLOY
Development
Review
Ready for acc
In acceptance
Ready for Integration
RSPEC
current 98,33
top 39,71
JS (%)
current 68,71
top 68,71
Page load
current 2,37
top 1,23
DONE
LEGENDE
STORY
ISSUE
EXPEDITE
INFO
SUPPORT
GREGORY
CHRISTIAN
ANK
THOMAS
JONATHAN
MICHEL
GLENN
TECHNICAL DEBT - I LOST TIME ON THIS
DONE - NO DEPLOY
DEPENDS ON 30493
TRANSLATIONS

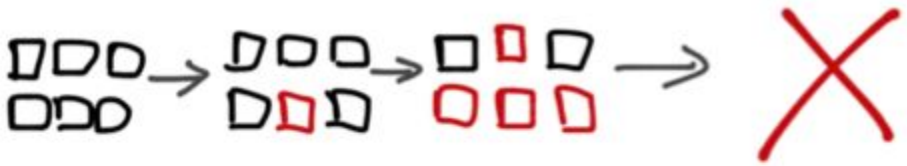

READY
DEVELOPMENT
4
QA
3
ACCEPTANCE
TO DEPLOY
Development
Review
Ready for acc
In acceptance
Ready for Integration
RSPEC
current 98,23
top 99,71
Js (%)
current 68,71
top 68,71
Pipeload
current 2,37
top 1,23
DONE
LEGENDE
STORY
ISSUE
EXPEDITE
INFO
EPIC
SUPPORT
GREGORY
CHRISTIAAN
ANK
THOMAS
JONATHAN
MICHEL
GLENN
TECHNICAL DEBT - I LOST TIME ON THIS
DONE - NO DEF
TRANSLATIONS
Project CRUD
Cache reporters
RE-APPLY HOLIDAY

LT: 10 days 91%
TP: 4,7/week

Other effects of limiting WIP

Reduced accumulation of errors

It’s a lot easier to fix code you just wrote, than to fix code you wrote a week ago



Improved focus

Todo

Todo

(Focussed expression)

But … it's a balancing act

Too low WIP limit creates unnecessary bottlenecks

Too high WIP limit encourages multitasking and/or longer lead times

The process changes over time, so should the WIP limits

Thank you...