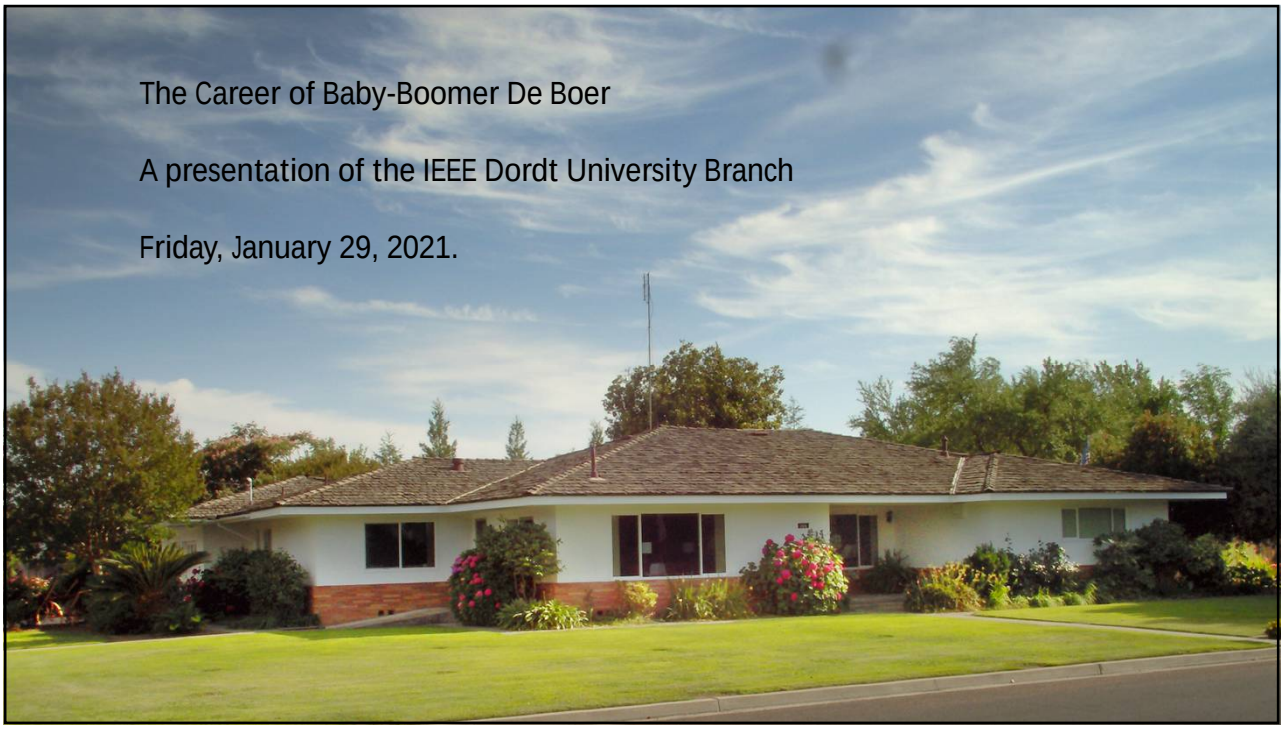

The Career of Baby-Boomer De Boer
A presentation of the IEEE Dordt University Branch
Friday, January 29, 2021.

1


Born in 1955, an era of national optimism
Memories of playing with construction toys

2

Born in 1955, an era of national optimism

Memories of playing with construction toys

After kindergarten, my parents became missionaries to Nigeria.



3

Born in 1955, an era of national optimism

Memories of playing with construction toys

After kindergarten, my parents became missionaries to Nigeria.

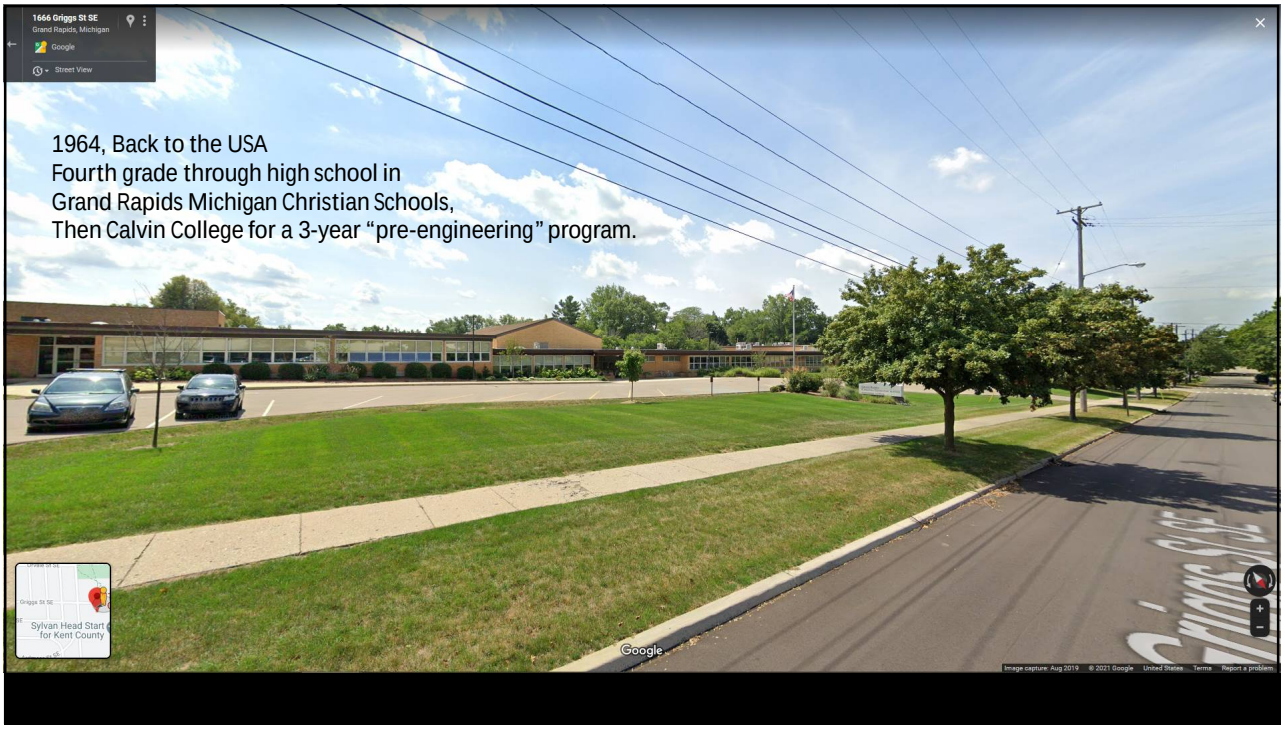
4


My dad became a missionary surgeon at Takum Christian Hospital,
a missionary hospital.
http://longshedsn.blogspot.com/2014/12/no4-takum.html

5


I was sent to Hillcrest School,
A boarding school in Jos, about 200 miles from Takum.
https://www.edusko.com/school/hillcrest-school

6


1666 Griggs St SE
Grand Rapids, Michigan
Google
Street View
1964, Back to the USA
Fourth grade through high school in
Grand Rapids Michigan Christian Schools,
Then Calvin College for a 3-year "pre-engineering" program.
Griggs St SE
Sylvan Head Start
for Kent County
Google

7


B.S.E.E.,
M.S.E.E. U of Michigan

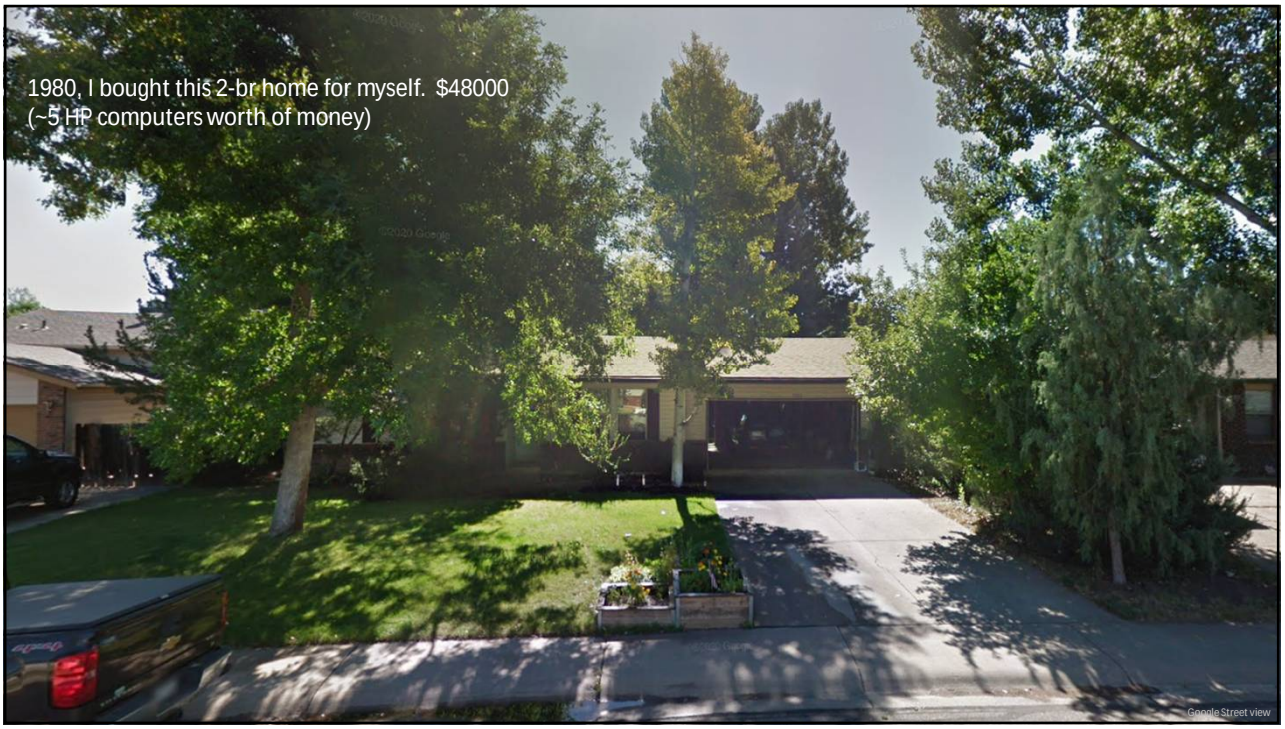
8


9


16-bit CPU, 5.7 MHz internal clock
64 kB standard, expands up to 253 kB
Hard drive: None
Floppy drive: 180 kB 8” optional, in separate case.
Tape drive: 217 Bytes/cartridge
Printer: 5x7 dot matrix thermal, built in, 2” wide.
(Many optional printers could be connected.)
OS: “HP Basic”

List price with no options: $9900. (in 1979)

10




11

## Polysilicon Link Fusing and Detection Circuit

The redundant rows and columns on HP's 128K-bit NMOS dynamic RAM chip are programmed to replace defective rows or columns by fusing polysilicon links on the chip. Special circuitry is included on the chip to do this and to detect fused polysilicon links. This circuitry is illustrated in Fig. 1.

When fusing polysilicon links, a special power supply, $V_{BLOW}$, is connected to the fusing circuit, the link is addressed, and a voltage pulse is applied to the pulse pad. The resulting current through the link and FET Q3 fuses the link open. During normal operation, the pulse pad and $V_{BLOW}$ are driven to ground by FETs Q1 and Q2 to disable the pulse circuitry.

To determine if a link is fused open or not, its resistance is compared to a polysilicon reference resistor. In the worst case, the link resistance must be only a factor of three different from the reference for reliable detection. The reference resistor is designed to be about five times the resistance of an unfused link, regardless of process variations. This design provides higher link fusing yield and greater reliability.

When power is first applied, POP (power on preset) becomes high, $\overline{POP}$ is low. The resulting voltage at node $\overline{F}_x$ is approximately equal to $V_t$ (threshold voltage) if the link is intact, but is greater than $V_t$ if the link is open. The currents through matched depletion FETs Q5 and Q6 depend strongly on the difference of resistances of the link and the reference resistor, and thus generate a corresponding voltage differential at nodes $F_x$ and $\overline{F}_x$.

After system power up, POP goes low and $\overline{POP}$ goes high. The differential voltage between $F_x$ and $\overline{F}_x$ is then amplified and the circuit latches. Complementary outputs are then present at nodes $F_x$ and $\overline{F}_x$. Depletion capacitor C1 stabilizes the voltage at node 1 during the transition from POP to $\overline{POP}$ in case there is some deadtime or overlap between these signals. The resistances of the link and the reference become insignificant factors once the circuit latches.

-Douglas F. DeBoer

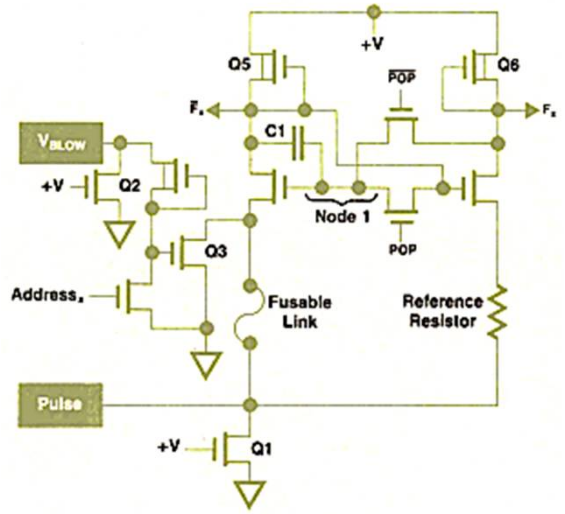
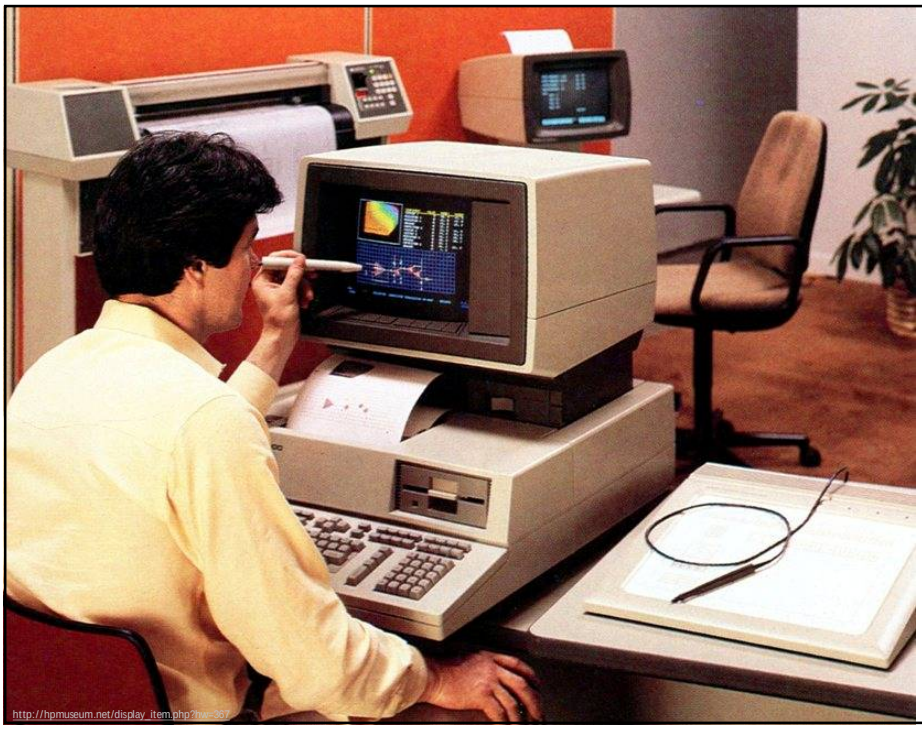



**Fig. 1.** *Link fusing and detection circuit used on the 128K-bit NMOS RAM chip.*



12




1982

HP 9020
Later re-branded as
HP 9000 series 520

32-bit CPU
10 MB hard drive
360 kB 5.25" floppy drive
0.5 MB RAM, up to 1.5 MB
Built in printer optional
Monitor: choice of
Mono, Color, Hi Res Color
Mouse: none, but optional
light pen.

Net weight: 137 to 194 lbs!

$28250 and up.

Couldn't build 'em fast enough.

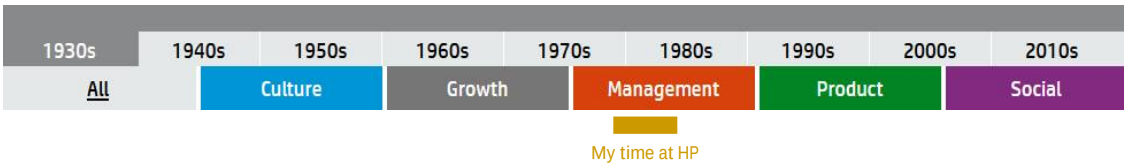
13

What became of HP? It has split into various more manageable independent parts.
As things grow they get more complicated. Steve Ciarcia (Byte Magazine), "spinning an egg."
https://circuitcellar.com/how-it-all-began/

My division decided not to upgrade from an n-MOS process to a CMOS process.
Instead, purchased CPUs and memory chips from Japan (the China of that time).
The computer business was maturing and moving to the Pacific Rim of Asia.
I was considering that I should transfer within HP to some other division with better prospects.

Then in April 1984 a phone call from my friend, Nolan Van Gaalen.
Dordt is starting an engineering program.
I decided to interview.
I was hooked.
I quit HP and moved to Sioux Center. (Still a bachelor)

HP Timeline




30 years from now, what will be the "timeline" of. . . Your life, your company, your family, your church. . .

https://www8.hp.com/us/en/hp-information/about-hp/history/hp-timeline/timeline.html
https://pixabay.com/photos/egg-yolk-egg-fried-eggs-raw-yellow-3139318/

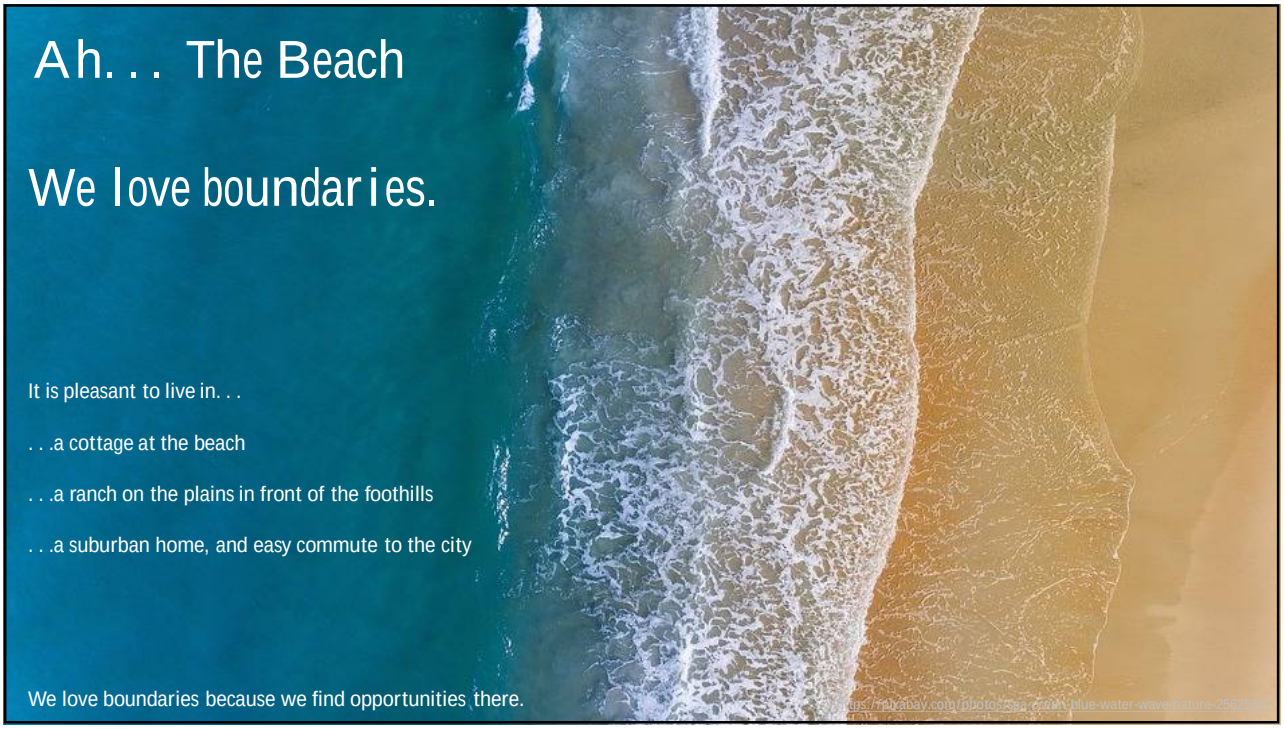
14

July, 1984—arrived at Dordt.
1987 Married Susan. Began preparing for ABET accreditation.
1988, first child, Naomi.
Fall, 1990 became department chair, successful ABET visit.
August 1991, stepped down from department chair.
Leave-of-absence to get a Ph.D. (in EE at the University of Colorado at Colorado Springs),
Sept. 1991, ABET accreditation is granted, retroactive to the class of 1990.
1993 Susan is diagnosed with cancer while giving birth to our second daughter, Kimberly.
1994, back at Dordt.
1996, Susan died of cancer.
1998, Married Marge, gained 4 step-children. Now have 13 grandchildren via Susan and Marge.
1998-2003, chair of the department again
2002-2003, chair of the Siouxland Section of the IEEE
2019 to present, IEEE Region 4 Grants Applications Chairperson

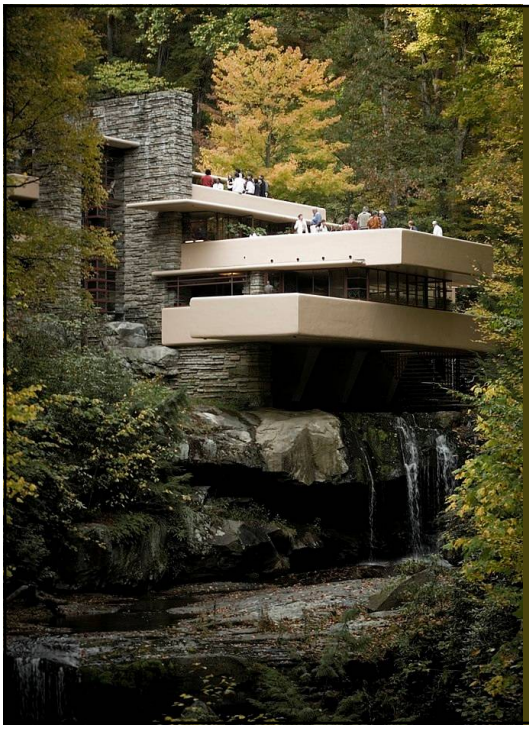
Hearing from my former students has been my greatest pleasure to look back on.
What you will do for others is more important than almost anything—keep that in mind.

Next greatest pleasure has been the creative contributions I've experienced with the courses, the department, IEEE, my church, advising local industry. . . There is no end of interesting things to do.

15




16



Modernism

. . . to live in a house built on top of a waterfall.

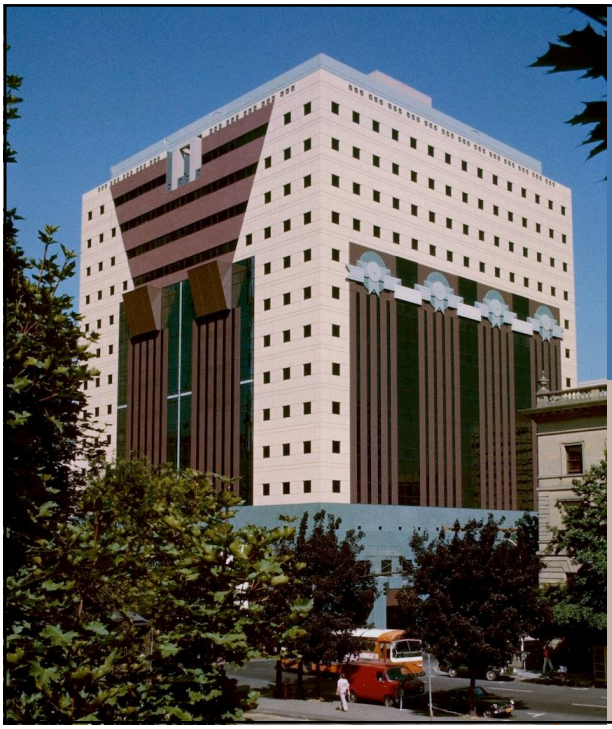
1.) The universe real.

2.) The universe exists in an orderly, lawful, rational, beautiful pattern.

3.) The universe is approachable. There is utility in studying it.

https://commons.wikimedia.org/wiki/File:Wrightfallingwater.jpg

17



Post-Modernism

. . . to work in an office that puts the diversity of the city at your feet.

1.) The universe is infinitely diverse.

2.) The universe is mysterious, there are many ways of knowing it.

3.) The universe is worth studying because we are of the universe.

18


Critical (Racial) Theory

. . . to live in a fractured world with historic and horrific social boundaries now obscured yet still present.

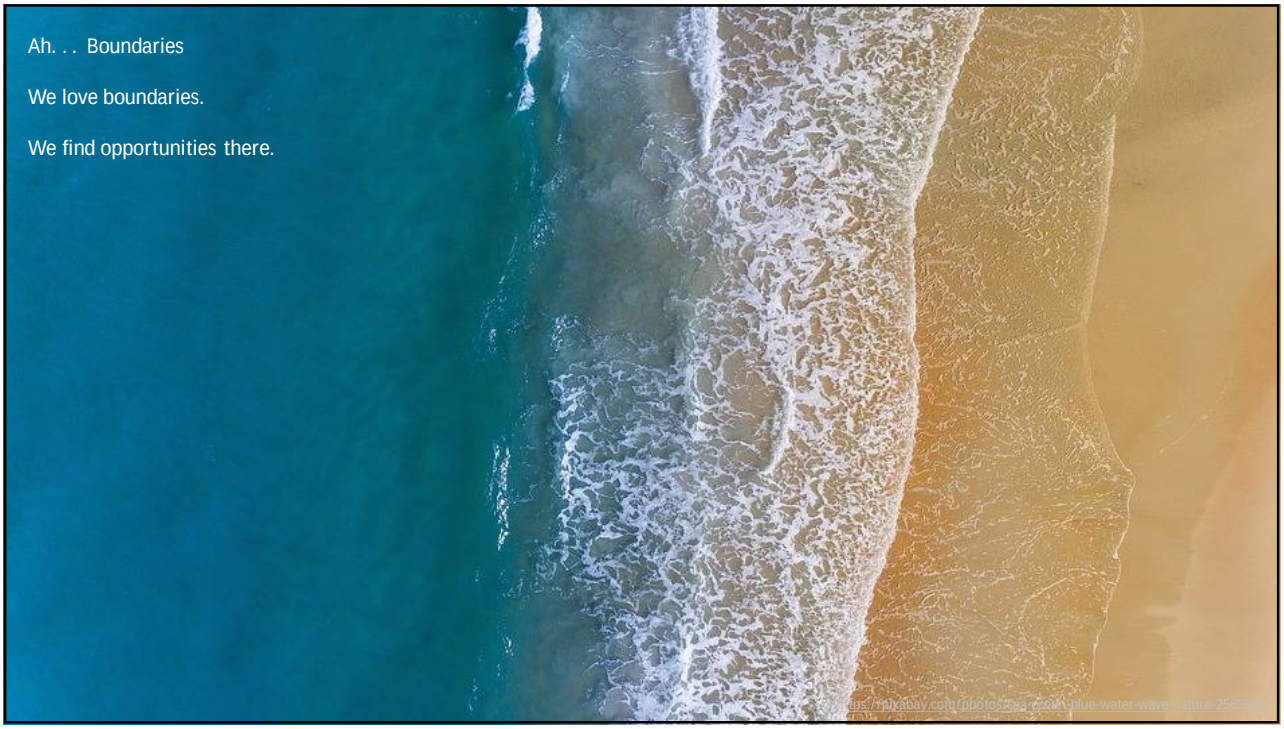
1.) The universe is no more real than as it is defined by those in power.

2.) Reason is unreliable. The universe cannot possibly be fully understood.

3.) The universe needs to be deconstructed and reconstructed.

"Virginian Luxuries" is in the Public Domain

19



Ah. . . Boundaries

We love boundaries.

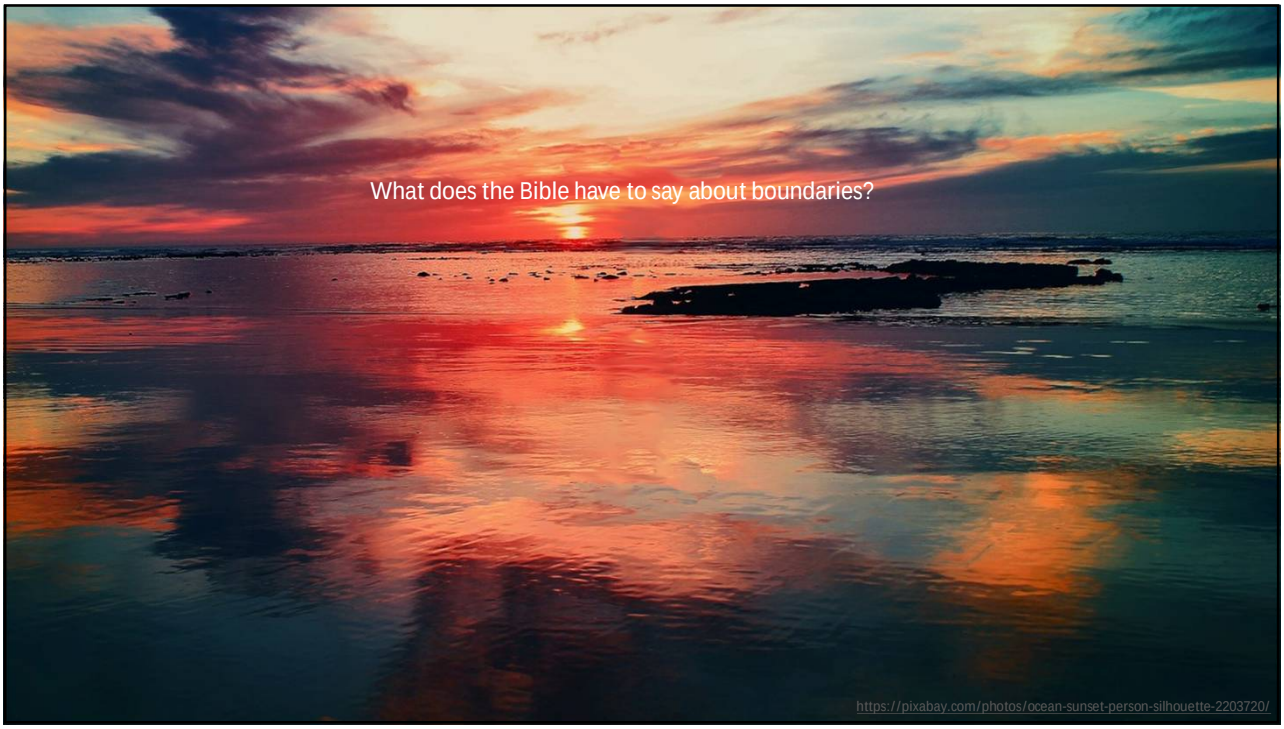
We find opportunities there.

https://pixabay.com/photos/sea-ocean-blue-water-wave-nature-2562933/

20


*Ah. . .*
*Let's take our shoes off*
*Let's walk in the surf*
*Let's feel the sand squish between our toes.*
*What is there to fear?*
*What could possibly go wrong with a little walk?*

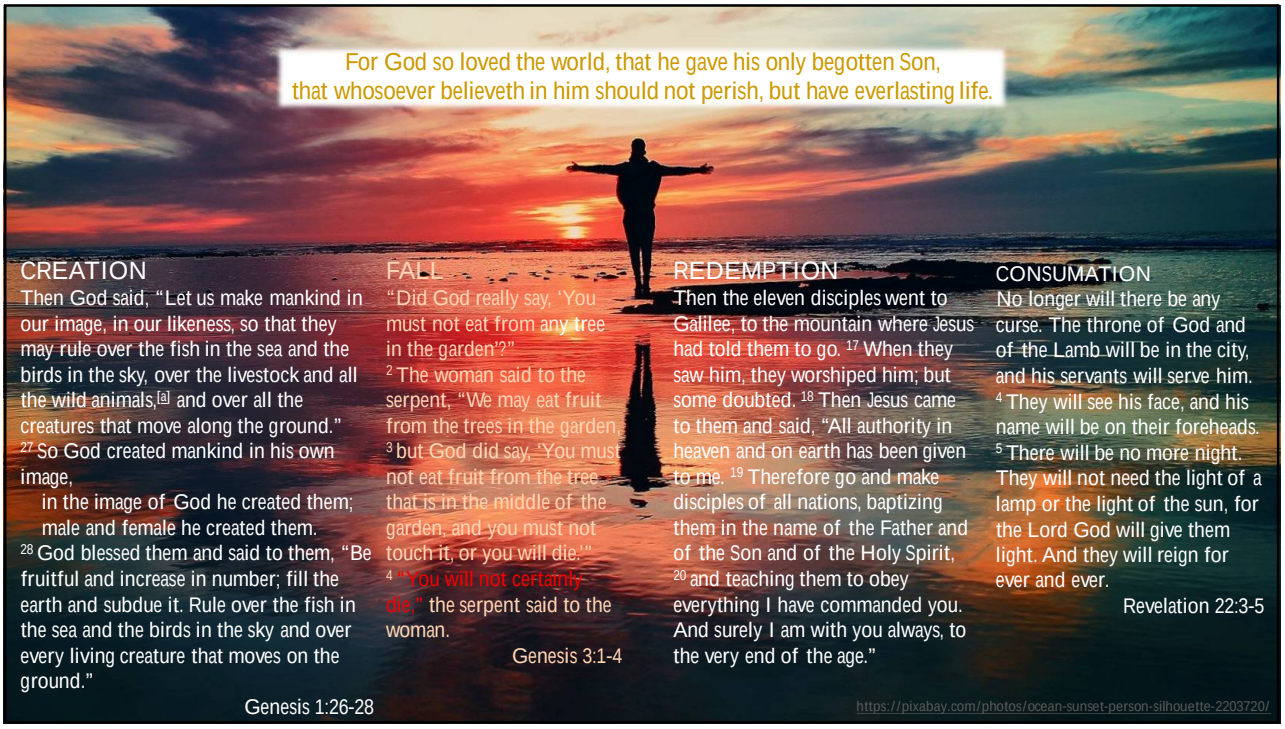
21


What does the Bible have to say about boundaries?
https://pixabay.com/photos/ocean-sunset-person-silhouette-2203720/

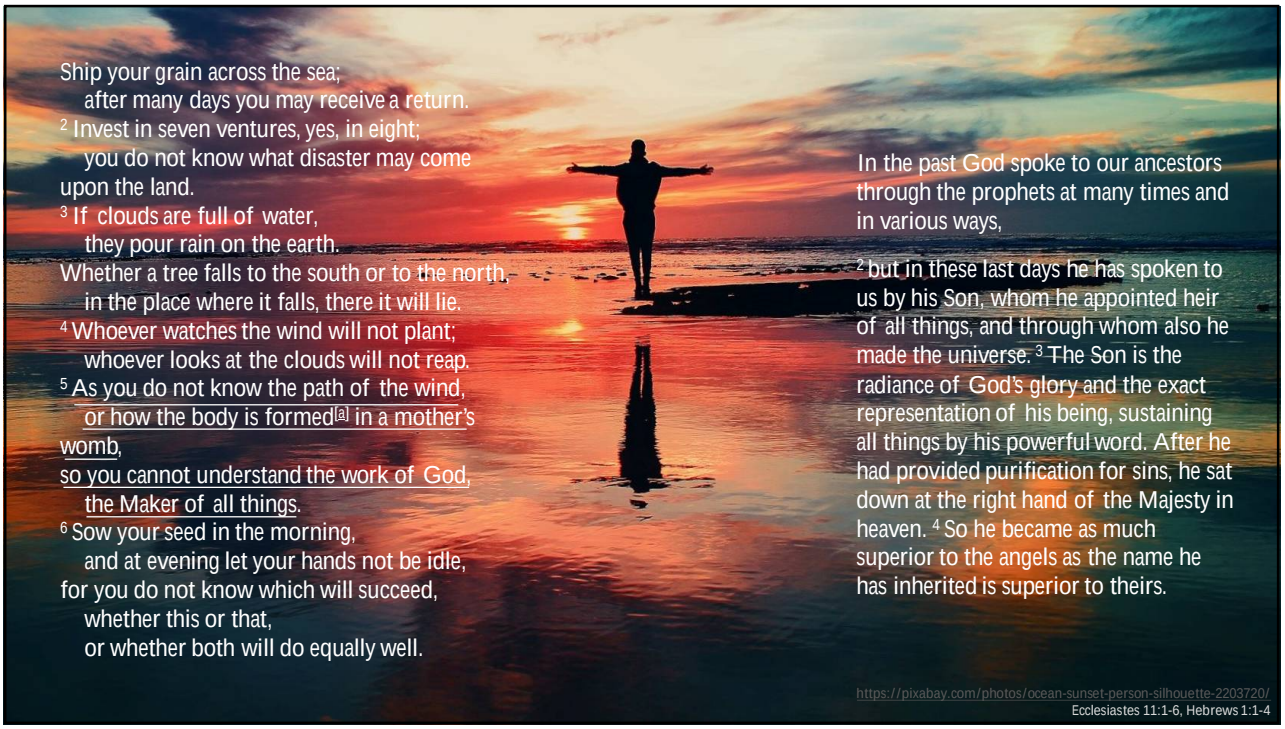
22


For God so loved the world, that he gave his only begotten Son,
that whosoever believeth in him should not perish, but have everlasting life.
This is a story of life and love—the ultimate soap opera!
https://pixabay.com/photos/ocean-sunset-person-silhouette-2203720/

23


For God so loved the world, that he gave his only begotten Son,
that whosoever believeth in him should not perish, but have everlasting life.
CREATION
Then God said, "Let us make mankind in our image, in our likeness, so that they may rule over the fish in the sea and the birds in the sky, over the livestock and all the wild animals,[a] and over all the creatures that move along the ground."
27 So God created mankind in his own image,
in the image of God he created them;
male and female he created them.
28 God blessed them and said to them, "Be fruitful and increase in number; fill the earth and subdue it. Rule over the fish in the sea and the birds in the sky and over every living creature that moves on the ground."
Genesis 1:26-28
FALL
"Did God really say, 'You must not eat from any tree in the garden'?"
2 The woman said to the serpent, "We may eat fruit from the trees in the garden,
3 but God did say, 'You must not eat fruit from the tree that is in the middle of the garden, and you must not touch it, or you will die.'"
4 "You will not certainly die," the serpent said to the woman.
Genesis 3:1-4
REDEMPTION
Then the eleven disciples went to Galilee, to the mountain where Jesus had told them to go. 17 When they saw him, they worshiped him; but some doubted. 18 Then Jesus came to them and said, "All authority in heaven and on earth has been given to me. 19 Therefore go and make disciples of all nations, baptizing them in the name of the Father and of the Son and of the Holy Spirit,
20 and teaching them to obey everything I have commanded you. And surely I am with you always, to the very end of the age."
CONSUMATION
No longer will there be any curse. The throne of God and of the Lamb will be in the city, and his servants will serve him.
4 They will see his face, and his name will be on their foreheads.
5 There will be no more night. They will not need the light of a lamp or the light of the sun, for the Lord God will give them light. And they will reign for ever and ever.
Revelation 22:3-5
https://pixabay.com/photos/ocean-sunset-person-silhouette-2203720/

24


Ship your grain across the sea;
after many days you may receive a return.
2 Invest in seven ventures, yes, in eight;
you do not know what disaster may come
upon the land.
3 If clouds are full of water,
they pour rain on the earth.
Whether a tree falls to the south or to the north,
in the place where it falls, there it will lie.
4 Whoever watches the wind will not plant;
whoever looks at the clouds will not reap.
5 As you do not know the path of the wind,
or how the body is formed[a] in a mother's
womb,
so you cannot understand the work of God,
the Maker of all things.
6 Sow your seed in the morning,
and at evening let your hands not be idle,
for you do not know which will succeed,
whether this or that,
or whether both will do equally well.
In the past God spoke to our ancestors
through the prophets at many times and
in various ways,
2 but in these last days he has spoken to
us by his Son, whom he appointed heir
of all things, and through whom also he
made the universe. 3 The Son is the
radiance of God's glory and the exact
representation of his being, sustaining
all things by his powerful word. After he
had provided purification for sins, he sat
down at the right hand of the Majesty in
heaven. 4 So he became as much
superior to the angels as the name he
has inherited is superior to theirs.
https://pixabay.com/photos/ocean-sunset-person-silhouette-2203720/
Ecclesiastes 11:1-6, Hebrews 1:1-4

25


The ultimate boundary: the gift of life (vis-à-vis death) via Christ's work in creation, the incarnation and the resurrection.
What can be more glorious than life in Christ?
https://pixabay.com/photos/ocean-sunset-person-silhouette-2203720/
Ecclesiastes 11:1-6, Hebrews 1:1-4

26

Let us pray:

Our Father in heaven,

How amazing it is that you have created life and loved us enough to save us.

May we do your will, bringing a foretaste of heaven to our world.

Thank you for your providence, even for Dordt University.

As we enter into new phases of our lives grant that we may be
imaginative and
faithful, and
humbly respectful of our boundaries.

May we live in the light of your love and not be overwhelmed by the “isms” of our time.

Forgive us our sins and deliver us from evil.

In Jesus Name, Amen.

27