

Agile and Sustainable

A Pragmatic Approach to Sustainable Tech

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<http://MakingSoftwareGreener.com>



<http://SustainableITManifesto.org>

About "Kelly"

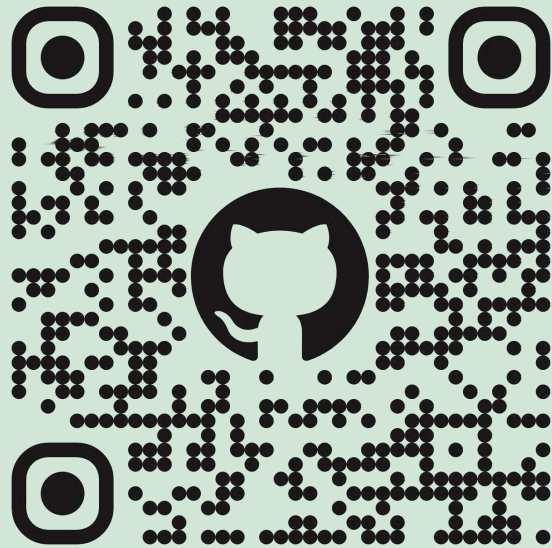


- **Wears lots of hats:** Dad, Cat Slave, Mentor, Speaker, IT Professional, Handweaver, Game Designer, Novice Photographer, Leader, Cook, & Renaissance Person in Training
- **Can be found:** Online, wandering parks with a camera, behind a loom, playing/designing tabletop games, and conferences near you.
- Recent transplant to Northern Colorado



Slides Available

<https://github.com/aetherical/agile-and-sustainable>



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The slides for the talk will be available in a couple of formats -- plain and annotated; the annotated ones have notes and more information available.

Why am I here?

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Ikigai

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Understanding Sustainability in IT

Definition: Practices that meet current tech needs without compromising future resources.



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Importance: Ethical responsibility, economic benefits, regulatory compliance.

3 Step Plan For Sustainability

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I'd like to propose a very simple and easy to follow three step plan to promote sustainability.

Our Plan

1. Talk about sustainability
2. ???
3. Save the World



The Ostrich Effect



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Unfortunately, it's not a a problem which a simple three step plan can solve. So, let's step back and examine a more realistic and approach.

*Let me explain....
No, there is too much. Let me sum up.
-- Inigo Montoya*



There's a lot to cover in talking about an Agile approach to sustainability -- far more than can be covered in a talk. To that end, let's establish a starting point and go over the concepts at a high level.

If you take away nothing else today

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The main points of the talk are, as follows:

Be Pragmatic

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It's been said that the perfect is the enemy of the good. It's no less true when approaching sustainability. Rather than creating an elaborate plan with lots of complexity, it's better to address and talk about things which we can do *now* in order to make an immediate affect -- a win, if you will.

Once you have a win, it's easier to gain support from others and build a larger initiative and grow from there.

Make better choices

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As IT professionals we have the ability to make choices about how we go about implementing solutions. There is very seldom a *best* solution -- we have choices and need to balance the costs associated with implementations. It's important in order to understand the associated costs and make our decisions based upon these costs and limitations. Sometimes it's as simple as making a *good* choice over a *bad* choice.

With time, practice, and experience we'll be better able to identify better choices.

Reduce pain points and make small gradual improvements

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Just like agile development, agile sustainability should have short cycles -- there's much less risk involved with smaller changes and you'll also be able to see and/or isolate the impact individual changes make, which will help to prioritize other changes/improvements.

It's a Journey

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Agile sustainability is very similar to DevOps in that they both take time and effort and, frankly, are never really done.

Why Sustainability Matters



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The Global Context

- Climate change
- Scarce resources

The IT Impact



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Energy Consumption

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- Crypto
- AI
- "General" Computing

E-waste

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- Cell phones

Carbon footprint

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- IT is targeted to account for 14% of the world's carbon footprint

Other Resources

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Water

Trees

Pollution



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Environmental

- Climate change
- Greenhouse gas emissions
- Biodiversity loss
- Deforestation/reforestation
- Pollution mitigation
- Energy efficiency
- Water management

Social

- Employee safety and health
- Working conditions
- Diversity
- Equity and inclusion
- Conflicts and humanitarian crises

Governance

- Corporate governance:
- Preventing bribery
- Corruption
- Diversity of Board of Directors
- Executive compensation
- Cybersecurity and privacy practices
- Management structure.

Regulations

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- SEC
- EU

Why ESG Matters to IT

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- IT's role in corporate ESG reporting
- Challenges and opportunities for IT in ESG integration

*We are uncovering better ways
of developing software and
hardware by doing it and
helping others do it. Through
this work, we have come to
value...*

The Sustainable IT Manifesto



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Energy Efficiency over Raw Performance

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Prioritizing energy conservation, whether in the design of software algorithms or the architecture of hardware components, even if it means potentially sacrificing top-tier performance.

Resource Efficiency over Resource Abundance

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Using resources like processing power, memory, and material components efficiently, reducing waste in both software and hardware production.

Long-term Sustainability over Short-term Gains

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Making decisions in software and hardware design and development that favor lasting positive impacts on the environment, even if they don't provide immediate financial benefits.

Holistic Impact Awareness over Siloed Focus

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Understanding and considering the broader impact of decisions, whether they pertain to software logic or hardware assembly, and recognizing their interconnectedness.

Return to Environment over Return on Investment

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While profitability is essential, we should weigh the environmental benefits and contributions against the exclusive pursuit of financial returns.

Inclusive Collaboration over Isolated Decision Making

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Including diverse perspectives, from software engineers to hardware technicians, to ensure that environmental considerations are comprehensively addressed.

Adaptive Planning over Fixed Roadmaps

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Flexibility in planning, allowing for adjustments based on new information or changing environmental contexts in both software and hardware fields.

Transparent Reporting over Selective Disclosure

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Being open and honest about the environmental impacts, both in software's energy consumption and the environmental cost of hardware production.

Continuous Environmental Learning over Static Knowledge

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Committing to ongoing learning about environmental impact and sustainability, from understanding the energy costs of running software to recognizing the carbon footprint of hardware manufacturing processes.

Community and Ecosystem Wellbeing over Individual Benefits

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Recognizing the importance of overall wellbeing and the impact of our software and hardware decisions on communities and ecosystems.

Eco-friendly Materials over Cheap Alternatives

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When designing hardware, choosing materials that are sustainable, recyclable, or have a minimal environmental impact, even if they are costlier.

Device Longevity over Planned Obsolescence

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Designing hardware that is durable and long-lasting, reducing the need for frequent replacements and thereby reducing electronic waste.

Everyone Contributes to Sustainability

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Agile Practitioner / Scrum Master

Facilitate sustainability discussions &
encourage continuous improvement



Analyst

Data center optimizations & tracking
sustainability metrics

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DevOps

Energy-efficient infrastructure & follow
"The Three Ways"

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<http://SustainableITManifesto.org>

Developer

Energy-efficient coding & serverless computing.

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End-user Support

Educate users, recommend energy-efficient settings and practices



Hardware Engineer/Designer

Design energy efficient hardware components & minimize environmental impact



Leadership

Set clear organizational goals around sustainability & make decisions that promote long-term sustainability over short-term gains



Manager

Sustainable project management &
ethical vendor selection

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Product Owner

Set a clear vision for product &
prioritize green aligning features/tasks



Quality Assurance (QA) Tester

Identify inefficiencies in software &
collaborate to ensure product is both
functional and green



Systems Architect

Ensure systems can support green practices

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Practices

(not an exhaustive list)

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*I often say that when you can measure
what you are speaking about, and
express it in numbers, you know
something about it*
-- Lord Kelvin



- Have good metrics; this helps compliance & lets you track improvements

Good DevOps Practices

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- The Three Ways
- Infrastructure as Code
- Metrics

Cloud Optimization

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- Use services that adjust according to demand.
- Use servers more efficiently

Energy-Efficient Hardware

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Invest in tech with longer life-cycles and lower energy consumption.

E-waste Management

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Proper disposal and recycling of IT equipment.

Sustainable Coding

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- Streamlined and efficient code reduces processing demand.
- Choose good algorithms
- Language choice matters

Comparison of Languages Performing a Bubble Sort

Language	1000 Elements	10000 Elements	100000 Elements	1000000 Elements
C ¹	0.00s	0.24s	32.26s	55m 30.74s
Static C ²	0.00s	0.24s	32.27s	55m 28.6s
Golang	0.00s	0.05s	11.09s	19m 47.46s
Java	0.13s	0.47s	12.83s	21m 0.46s
Python ³	0.05s	4.74s	8m 3.46s	18h 18m 0.5s
Ruby ⁴	0.11s	7.25s	12m 1.23s	20h 49m 2s
Ruby ⁵	0.11s	7.34s	12m 2.73s	

1. Dynamically Linked
2. Statically Linked
3. Average of 2 runs for 1000000 elements
4. Preallocated array; the array is created before it is populated. 1 run of 1000000 elements.
5. Dynamically allocated array; the elements are appended and the array resizes as needed 1 run of 1000000 elements..



Green Hosting Options

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Choose providers committed to renewable energy.

Smart Testing

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Do you really need to do a full regression every time code is checked into the system

Resource Management

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- How many copies of data
- Network Traffic

Continuous Improvement

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- Find a pain point & reduce pain
- Measure the Impact
- Rinse & Repeat

Benefits of Sustainable IT

- Reduced Operating Costs
- Avoiding Regulatory Complications
- Positive Environmental Impact
- Enhanced Company Reputation



Conclusion

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**Sustainability in IT
is not just a trend,
but a
responsibility.**

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**Every IT
professional plays
a pivotal role.**

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Small steps can lead to significant change.

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**Only you can
promote
sustainability**

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Code Green Workshop: Reducing Carbon Footprint and Costs in IT

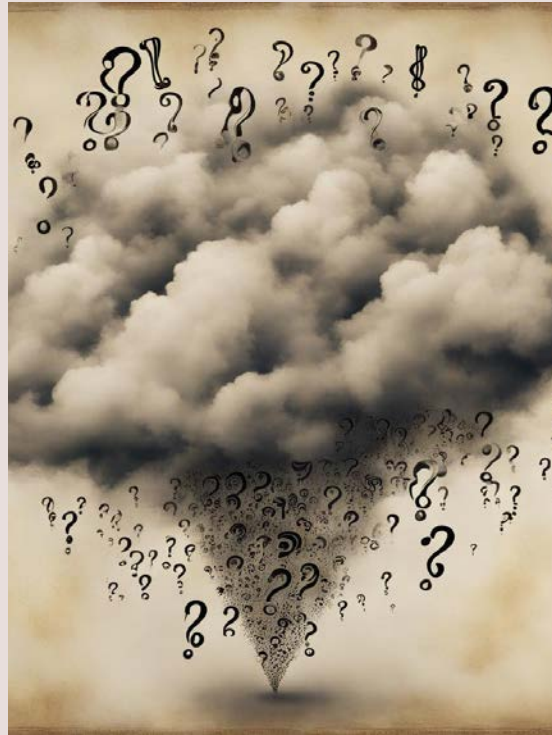


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Questions?



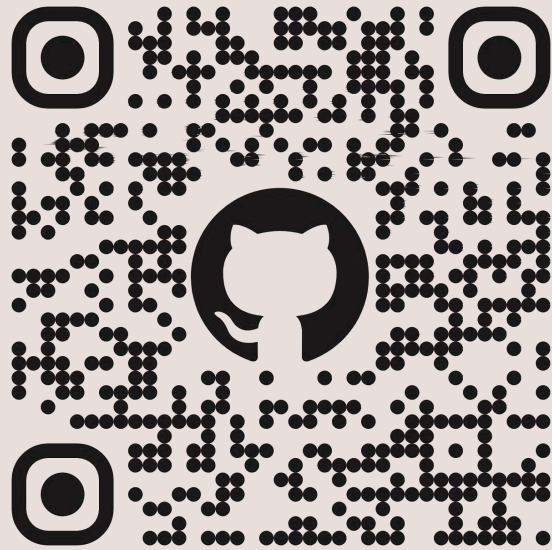
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Thank You

<https://github.com/aetherical/agile-and-sustainable>



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Organizations & Events

- [Green Computing Foundation | Making IT Sustainable](#)
- [Green Software Foundation | GSF](#)
- [SustainableIT.org](#)
- [Decarbonize Software | Coming in November 2023](#)
- [Sustainable IT Meetup](#)



Tools

- [Cloud Computing And Sustainability Tools | Amazon Web Services](#)
- [Cloud Computing And Sustainability Tools | Amazon Web Services](#)
- [Website Carbon Calculator v3 | What's your site's carbon footprint?](#)
- [Carbon Footprint \(US\) - Greenly](#)
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More Resources

- [Greening Software](#)
- [The Sustainable IT Manifesto](#)
- [Green Software Ingrained in the Corporate Fabric - Meet Savannah Goodman of Google](#)
- [The Three Ways: The Principles Underpinning DevOps I Gene Kim](#)

<http://MakingSoftwareGreener.com>



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More Resources

- [Bridging the gap: Sustainability cannot be a siloed approach](#)
- [Optimizing your AWS Infrastructure for Sustainability, Part I: Compute | AWS Architecture Blog](#)
- [Understanding your customer carbon footprint tool overview - AWS Billing](#)
- [Estimating AWS EC2 Instances Power Consumption | by Benjamin DAVY | Teads Engineering | Medium](#)



More Resources

- Are you aware of your digital carbon footprint? - Capgemini UK
- Introduction to ESG
- You Can't Manage What You Can't Measure | Growthink
- You Are What You Measure
- On the perpetuation of ignorance: system dependence, system justification, and the motivated avoidance of sociopolitical information



More Resources

- [The Ostrich Effect : NPR](#)
- [Promoting International Cooperation for Sustainable IT Methods](#)
- [Making Software Greener: An Introduction to Sustainable Software Practices](#)
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