BEST PRACTICES WHITE PAPER

Balanced Solutions with the Three-Circle Model

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Creating solutions to customer problems is a complex balancing act. Effective solutions only result from the balanced integration of three fundamental perspectives: *Business*, *Usage*, and *Technology*. Organizations that take a purely user-driven approach are at risk of developing solutions that lack technological or economic viability. Technology-driven organizations risk developing solutions that are not useful or desirable, or that are lack economic viability.

Contents

Introduction

Creating solutions to customer problems is a complex balancing act. Effective solutions result only from the balanced integration of three fundamental perspectives: **Business**, **Usage**, and **Technology**. Organizations that take a purely user-driven approach are at risk of developing solutions that lack technological or economic viability. Technology-driven organizations risk developing solutions that are not useful, desirable, or economically viable.

Each perspective is characterized by a trio of attributes:

> **Business**: A solution must be *marketable*, *profitable*, and *affordable* by the organization that creates it.
>
> **Usage**: A solution must be *desirable*, *usable*, and *useful*.
>
> **Technology**: a solution must be *manufacturable*, *functional*, and *consumable* by its ecosystem and according to societal and cultural norms.

The three fundamental perspectives combine to form the Venn diagram shown in Figure 1.

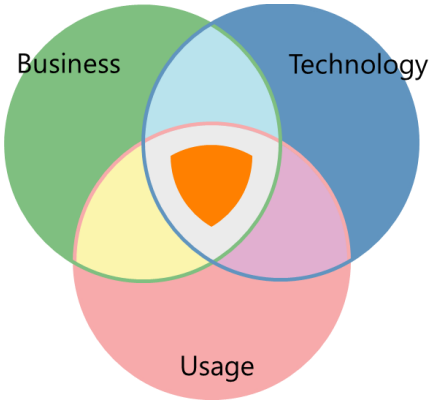


Figure 1

Compelling solutions are found in the center region, balancing Business, Usage, and Technology.

Figure 1 is a deceptively simple diagram that we will elaborate and explore throughout the rest of this white paper.

The Three-Circle Model:

- Serves as a solution development ontology that is appropriate across a range industries and organizations
- Provides a standardized vocabulary for solution design and development

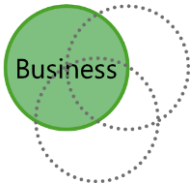
- Informs the organizational design, core competencies, and interdisciplinary collaborations needed for successful solution development
- Guides diagnosis and treatment of various organizational issues related to roles and responsibilities, specialties, collaboration, specification content, and more
- Forms the basis for the Dynamic Solution Life Cycle (DSLC)

The DSLC, described in its own section later in this white paper, is not "just another life cycle." Unlike most life cycles, the DSLC does not prescribe the activities, methods, or practices used to create the solution. Instead, the DSLC's milestones are based on the knowledge and tangible results the team must demonstrate about the solution at each stage of development.

The Three-Circle Model and the DSLC can be applied regardless of whether an organization uses traditional sequential development, Agile or Lean development, or a hybrid life cycle. The model has proved valuable in settings from startups to multinational enterprises, in both for-profit and nonprofit environments.

Individual circles

Business



The *Business*[1] circle represents the **economic viewpoint** on a solution.

The *Business* perspective includes economic success criteria for the system, value network descriptions, and associated business models. The *Business* circle also represents the economic aspects of interdisciplinary concerns, such as *Market* and *Production*.

Examples of data that would be captured within the *Business* circle across its three characteristic attributes include the following:

- **Marketable**: Total Available Market (TAM), Average Selling Price (ASP), Market Segment Share (MSS), ecosystems and value networks, brand implications, and relationships to other branded products.
- **Profitable**: Payback period on required investments, Return on Investment (ROI), Net Present Value (NPV), and business models.
- **Affordable**: Development and manufacturing costs, resource constraints.

The flow of investment

The *Business* circle contains the **flow of investment** (Figure 2).

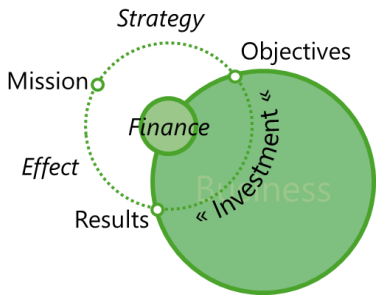


Figure 2

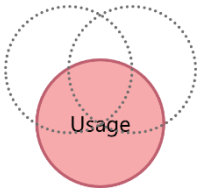
Strategy helps transform the organization's *Mission* into *Objectives*. These *Objectives* are the basis for *Investment* that yields *Results*. These *Results* are compared against the *Objectives* to understand the *Effect* on business. Cumulative, often compounded *Effects* can influence and change the organization's *Mission* over time. All these activities are governed by *Finance* disciplines, which form the basis of business models.

Example: Amazon* began by selling books, but successive changes to the company's mission, strategy, and investments have expanded its offerings to

[1] Throughout the remainder of this white paper, italicized and capitalized terms denote specific usage within the model as part of the solution taxonomy and ontology. For example, *Business* represents the circle in the model, where business denotes the generic use of the term.

include a vast array of consumer goods, online audio and video streaming, audio books, branded consumer electronics, and cloud infrastructure services. From this example we can see that the flow of investment is a cycle rather than a straight line. Over time, successive investment cycles can fundamentally alter an organization's mission.

Usage



The *Usage* circle represents the **conceptual viewpoint** on a solution. This refers to the way people think about both a solution and the problems it solves—or, in a popular phrasing, the "jobs" the customer "hires" the solution to do.

The *Usage* perspective describes the people who will use the solution, their conceptual models of the solution (also known as "mental models"), and the resulting usage models. The *Usage* circle also represents the conceptual aspects of interdisciplinary concerns, such as *Market* and *Design*.

Examples of data that would be captured within the *Usage* circle across its three characteristic attributes include the following:

- **Desirable**: Connection to human values, willingness to pay, and aesthetics.
- **Usable**: Ease of use, intuitiveness, ease of learning, reliability.
- **Useful**: Goals, needs, tasks, fit with users' conceptual models and physical abilities, confidentiality, integrity, and availability.

The flow of experience

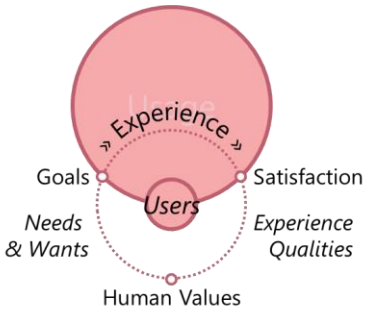


Figure 3

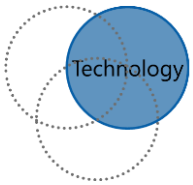
The *Usage* circle contains the **flow of experience** (Figure 3). *Human Values* generate *Needs & Wants* that lead people to set *Goals* for solution use. These *Goals* shape the user's *Experience*,[2] which yields some level of *Satisfaction* in relation to the *Goals*. *Experience Qualities*—the qualities that the experience creates—are key to interpreting

[2] *Experience* is a user's thoughts, attitudes, emotions, and perceptions before, during, and after use. See ISO 9421-210.

Satisfaction in relation to underlying *Human Values*.[3] All these activities are centered on *Users* and usage models.

Example: Human values surrounding online privacy and security have changed radically since 2000. At that time, Intel* suggested it could improve integrity and security in the nascent digital economy by using a unique serial number on a PC's CPU to track e-commerce transactions. The industry and popular outcry was intense and involved a complaint to the United States Federal Trade Commission among other actions.[4] But, just a decade later, most individuals happily carried a smartphone that knew their identity, tracked their location and movements 24x7, and remembered personal and financial data such as credit card information and transaction history. With increased experiences, users substantially changed their needs, wants, and goals for using a device online. Cycles of experience have altered human values and affected the balance between security and privacy. This evolution continues today.

Technology



The *Technology* circle represents the **implementation viewpoint** on a solution.

The *Technology* perspective includes implementation architecture, workloads,[5] and performance characteristics. Also represented are the implementation aspects of interdisciplinary concerns, such as *Design* and *Production*.

Examples of data that would be captured within the *Technology* circle across its three characteristic attributes include the following:

- **Consumable**: Compatibility with current infrastructure and services, acceptability by community and personal standards.
- **Functional**: Effectiveness and fitness for use.
- **Manufacturable**: Alignment with production capabilities, required competencies, and supply chain readiness.

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[3] For example, a user might feel satisfaction in having expended effort to solve a puzzle within a game but would feel frustration if forced to think in similar ways by trouble-shooting a product.

[4] For example, https://www.wired.com/1999/01/intel-on-privacy-whoops/ (accessed April 2018).

[5] *Workload* refers to the amount and type of work the solution must process in some way.

The flow of workload

The *Technology* circle contains the **flow of workload** (Figure 4). Fundamental *Parameters and Assumptions*[6] help determine appropriate *Heuristics* (rules of thumb) that lead to *Targets*[7] for the solution. The *Targets* are assessed on the *Workload*, which yields some level of *Performance*. *Tolerance*[8] is key in judging *Performance* as well as validating the underlying *Heuristics*, *Parameters*, and *Assumptions*. All these activities are based on the discipline of *Engineering*.[9]

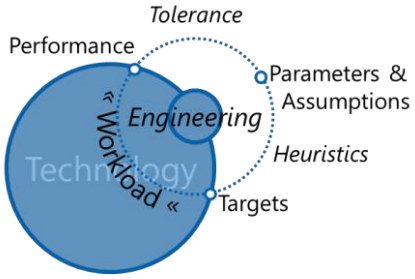

Figure 4

Example: A university has various workloads, including students, courses, meals, admission applications, transcript requests, etc. These workloads are the focus of engineering across the university's colleges, departments, and facilities. Suppose the university establishes a parameter for maximum enrollment of 15,000. The university could adopt a heuristic that all first- and second-year students must live on campus. The university might also assume that no more than 50% of third- and fourth-year students will opt to live on campus due to the supply and pricing of local off-campus housing. The targets for on-campus living space, dining hall capacity, etc., are easily determined. The system's performance against these targets, along with its tolerance to expected and unexpected variation in workload, serves to validate the chosen heuristics as well as informing any necessary modifications to the parameters and assumptions.

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[6] Parameters and assumptions include the underlying domains, properties, and constraints, along with various associations and cause-effect relationships.

[7] *Targets* are desired numeric performance levels for the solution. For example, the stopping distance for an automobile.

[8] *Tolerance* is the technology's ability to cope with expected and unexpected change and variation. Tolerance helps judge the chosen heuristics' validity and whether the existing parameters and assumptions are correct.

[9] *Engineering* is the application of heuristics, under uncertainty, to create the best possible change within the available resources. See *Discussion of the Method*, Billy Vaughn Koen, Oxford University Press 2003.

Summary

The following table summarizes the viewpoints, flows, and focus areas for Business, Usage, and Technology:

Circle:	**Business**	**Usage**	**Technology**
Viewpoint:	Economic	Conceptual	Implementation
Flow:	Investment	Experience	Workload
Focus:	Finance	User	Engineering

Two-circle overlaps

The Three-Circle Model contains three regions where a pair of circles overlap (see Figure 1 again). This section names and explains each overlapping region in detail.

Value

The overlap between *Business* and *Usage* must unite a solution's economic and conceptual perspectives, tying *Investment* (Figure 2) to *Experience* (Figure 3). The concept that best describes this intersection is *Value*.

Value can be defined in two main ways:

1. The importance, worth, merit, or usefulness of something. For example, a device can have valuable features.
2. A principle or a behavior standard. For example, honesty and generosity are valued in people.

The *Value* region is concerned with *Market* relationships. The *Value* region's details are shown in Figure 5.

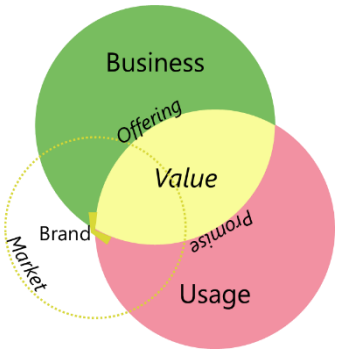

Figure 5

A solution can be thought of as a *Promise*[10] made by the business in the form of an *Offering*.[11] *Value* is the area between this *Offering* and *Promise*. The *Offering* and *Promise* are both related to the solution's *Brand*,[12] which is the *Market* cycle's focus. *Market* is both noun and verb, referencing the thing and the activity. The *Market* cycle unites the outside world with the solution's economic and conceptual aspects, expressed as *Value* and focused on *Brand*.

Example: A theatre offers movies for viewing, creating the promise of a good entertainment experience in exchange for the purchase of a ticket. Some theatres now market other specific offering elements as part of their brand, such as wine and craft beer, "living room" theatre seating, and exceptional sound and video quality. These anticipated experience elements create a conceptual value proposition for customers, who

[10] A *promise* is the anticipation of value created in the mind of a customer by marketing, user experience, and brand.

[11] An *offering* consists of a product, service, or combination made available for sale by a business to a customer.

[12] A *brand* is a combination of physical, functional, and emotional attributes, and includes a name and a symbol.

then can estimate whether the ticket's economic cost is worth paying in exchange for the offering.

> *"Authentic marketing is not the art of selling what you make but knowing what to make. It is the art of identifying and understanding customer needs and creating solutions that deliver satisfaction to the customers, profits to the producers and benefits for the stakeholders."* —Philip Kotler

Capability

The overlap between *Usage* and *Technology* must unite the solution's conceptual and implementation perspectives, tying *Experience* (Figure 3) to *Workload* (Figure 4). The concept that best describes this intersection is *Capability*.

Capability is the ability of a system to perform some meaningful action in pursuit of a user's goals, described in terms of how the user understands the activity.

The *Capability* region is concerned with *Design* relationships. The *Capability* region's details are shown in Figure 6.

Users interact with the *Technology* that enables a *Capability* via an *Interface*, and *Technology* is made useful to users by way of *Affordances*.[13] Thus, *Capability* is the space between *Interface* and *Affordance*. *Interface* and *Affordance* are related to *Utility*,[14] which is the *Design* cycle's focus. *Design* is both noun and verb, referencing the thing and the activity. *Design* unites the outside world with the solution's conceptual and implementation aspects, expressed as *Capability* and focused on *Utility*.

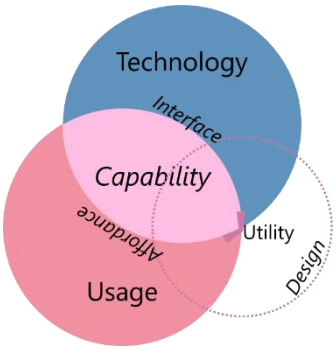

Figure 6

Example: Autonomous driving is an emerging capability for automobiles. This capability affords the driver with various forms of utility, such as the opportunity to do other work or be entertained during trips. Autonomous driving relies on many

[13] An *Affordance* is an action that an individual can perform in his or her environment using the system.

[14] *Utility* is the ability of a system to satisfy needs or wants. It can be thought of as "usable usefulness."

technologies, including LIDAR, cameras, and software that the driver interacts with via interfaces such as gauges, warning lights, switches, and touch screens.

> *"Design is a system that takes technology and fills out human needs, so it's the bridge between technology and people."* —Don Norman

Ingredient

The overlap between *Technology* and *Business* must unite the solution's implementation and economic perspectives, tying *Workload* to *Investment*. The concept that best describes this intersection is *Ingredient*.[15]

The *Ingredient* region is concerned with *Production* relationships. The *Ingredient* region's details are shown in Figure 7.

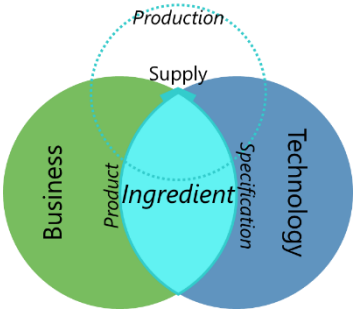

Figure 7

Ingredients can be thought of in a business sense as collections in the form of named *Products*. *Ingredients* can also be thought of more technically according to their *Specifications*, such as a Bill of Materials (BOM). The *Product* and *Specification* aspects are related to *Supply*, which is the *Production* cycle's focus. *Production* references both the thing and the activity.[16] *Production* unites the outside world (especially the supply chain) with the solution's implementation and economic aspects, expressed as *Ingredients* and focused on *Supply*.

Example: A mill that produces flours and meals relies on various technologies for processing, grinding, mixing, sifting, and packaging grains and seeds. It produces various products containing ingredients, including the package and its contents. A product's contents can be the results of a recipe that serves as the contents' specification. The production cycle is linked to various supply chains for raw materials and also to distribution networks related to sales.

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[15] *Ingredient* is a near-synonym for component, but component is used by many people only for physical parts of a system. Also, using Ingredient allows for unique first letters for all seven model regions: B, U, T, V, C, and I. Using "Component" would create two "C" terms (with *Capability*). Abbreviating the regions in written and verbal communication is common among teams using the model.

[16] Common English use forces a break in the verb-noun pattern here. "Produce" would be the analogous term to *Market* and *Design*, but the noun form of "produce" is specific to fresh fruits and vegetables. *Production* is the best alternative.

Summary

The following table contains the intersections, borders, cycles, and focuses for Value, Capability, and Ingredient:

Region:	**Value**	**Capability**	**Ingredient**
Intersection:	Business, Usage	Usage, Technology	Technology, Business
Borders:	Offering, Promise	Interface, Affordance	Product, Specification
Cycle and Focus:	Market, focused on Brand	Design, focused on Utility	Production, focused on Supply

Three-circle integration

The central *Solution* region combines and unites all six other regions: *Business*, *Usage*, *Technology*, *Value*, *Capability*, and *Ingredient*. It also merges the economic, conceptual, and implementation viewpoints, imposing the entire set of nine characteristics on the *Solution* simultaneously (Figure 8).

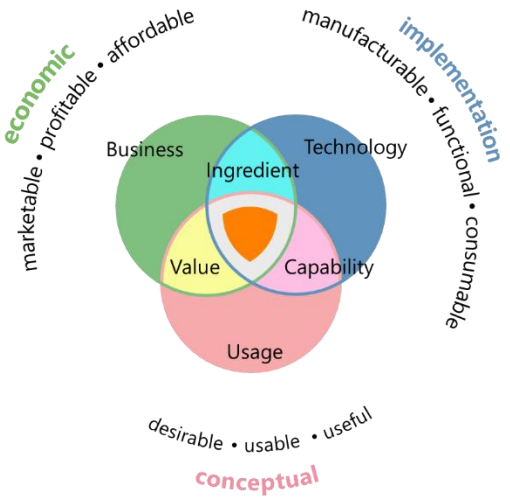


Figure 8

Three-circle integration requires many cross-disciplinary and cross-specialty activities, including these:

- Business models must be related to usage models and implementation architectures to ensure the solution is coherent across the three fundamental dimensions.
- The solution's *Value*, *Capability*, and *Ingredients* must be analyzed to ensure that the *Ingredients* are both necessary and sufficient to generate the *Capability* that is associated with *Value*.
- The solution's *Investment*, *Experience*, and *Workload* must be analyzed to ensure the solution's overall feasibility and effectiveness.
- The solution's *Market*, *Design*, and *Production* cycles must be coordinated to ensure that market activities are in sync with both design and production activities in order to avoid missed opportunities, broken promises, and failed commitments.

The Three-Circle Model supports a system-of-systems approach and can be applied at various levels of abstraction. Often, a solution's *Ingredients* can be viewed as solutions themselves, providing a solution for some smaller part of a larger problem. For example, a single restaurant could be the model's focus at one level, while that single restaurant is just one ingredient of a broader solution consisting of a national franchise with hundreds of outlets, unified supply chain and marketing, etc.

> *"When you build a product, you make a lot of assumptions about the state of the art of technology, the best business practices, and potential customer usage/behavior."* —Steven Sinofsky

The Dynamic Solution Life Cycle

If we imagine the *Business*, *Usage*, and *Technology* circles converging over time to create the solution (Figure 9), the Three-Circle Model becomes the basis for the Dynamic Solution Life Cycle.

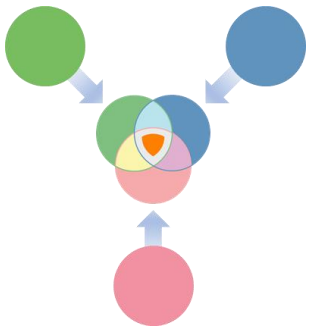


Figure 9

The DSLC divides the circles' convergence and eventual divergence into five discrete solution states: Opportunity, Concept, Candidate, Solution, and Obsolescence. The states are defined in Table 1.

A solution moves through these states based on a consistent *Vision* that pulls the team forward.

Opportunity: An idea, event, or situation with favorable characteristics in *Business*, *Usage*, and *Technology*.

Concept: One or more abstract renderings of a potential solution suitable to guide additional work.

Candidate: One or more feasible, detailed realizations of a possible solution with validated *Value*, *Capability*, and *Ingredients*.

Solution: An integrated set of products and services that solves a customer problem and meets the opportunity's requirements.

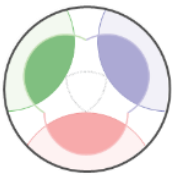
Obsolescence: The end of support, with reuse and recycling of the solution as appropriate.

Table 1

Organizations can use the graphics for each solution state to help establish an effective set of milestone criteria for a tailored solution life cycle within their specific circumstances and environment.

A brief description of each state follows.

The Opportunity milestone

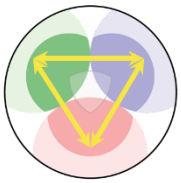


An opportunity exists whenever favorable circumstances exist in the *Business*, *Usage*, and *Technology* domains.[17] This information is typically found in portfolios, roadmaps, and models created by the organization. An understanding of detailed *Value*, *Capability*, and *Ingredient* information is not required at the Opportunity stage, but it is common for some of that information to be available as constraints from previous or competing solutions.

The overall *Solution* scope is not yet well-defined, nor are the details of that scope known. Those things are determined in the Concept and Candidate phases that follow.

[17] When using the unrestricted term *opportunity*, all three domains should have favorable circumstances. When only a single domain is involved, it is best to term it a *business* opportunity, *technology* opportunity, etc., until more is known.

The Concept milestone



Concept definition involves establishing coherence among *Business*, *Usage*, and *Technology*. This includes the many interrelationships and dependencies among the three perspectives. A first interdisciplinary assessment of *Value*, *Capability*, and *Ingredients* is also important.[18]

Most organizations have specialists who focus on *Business*, *Usage*, or *Technology* individually. Examples include business analysts, user interface designers, and technologists. But many organizations lack *an individual* who understands the interrelationships and coherence among *Business*, *Usage*, and *Technology*. This cross-disciplinary understanding is essential for accurately generating and comprehending *Value*, *Capability*, and *Ingredient*.

The Candidate milestone

Candidate definition includes establishing that the *Ingredients* that make up the solution align with the required *Capabilities* and that those *Capabilities* are aligned with the solution's *Value*. This work requires teams to have an individual whose responsibility is the coherence and traceability among *Value*, *Capability*, and *Ingredients*. Without this understanding, the eventual solution runs a strong risk of being incoherent. For example, the chosen *Ingredients* might be inadequate to provide the solution's full *Value*, or the *Ingredients* might provide unnecessary *Capability* that does not add any *Value*,[19] a problem sometimes called "gold plating."

The Solution milestone

The Solution phase's goal is to define and deliver a validated, effective, coherent solution into the marketplace. The solution must solve the customer's problem (or "do the job to be done") and meet all of the opportunity's requirements.

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[18] This assessment is possible because the *Business*, *Usage*, and *Technology* regions are all tangent in the diagram, representing cross-disciplinary communication.

[19] In some cases, *Ingredients* with superfluous *Capability* might make sense overall, such as limiting the number of different versions of an *Ingredient* to save design and manufacturing costs.

The solution is the result a synthesis and refinement of all the previous information, including the connections, dependencies, and relationships among the various data elements. In particular, there must be demonstrated coherence and traceability among the following sets of elements:

- *Business*, *Usage*, *Technology* (circles)
- *Value*, *Capability*, *Ingredient* (overlaps)
- *Market*, *Design*, *Production* (cycles)

The Obsolescence milestone

The Obsolescence milestone represents the formal end of support for a solution and its dissolution into ingredients that could feed into other current and future solutions. Obsolescence is the final state for a solution. Obsolescence can be thought of as the Opportunity milestone's inverse: in Obsolescence, unfavorable circumstances exist in *Business*, *Usage*, or *Technology*.[20] Obsolescence is a final opportunity to reuse various solution elements, but reuse can begin well before Obsolescence. For example, in a product line, various solution features or ingredients could be "flowed" from flagship offerings into mass-market offerings.

An activity-agnostic framework

Many life cycles suffer from a significant flaw: the life cycle phases are named according to sequential activities. For example, a phase-gate approach might include phases named exploration, design, development, and maintenance. Given the increasingly complex, unpredictable nature of solutions and solution development today and the rise of Agile and Lean product development over the last two decades, it should be obvious that a life cycle composed of a sequence of activities is incompatible with the needs and practices of today's engineering environment. A strict sequence of activities is completely antithetical to Agile development and complex adaptive systems engineering.

In contrast, **the DSLC is activity-agnostic.** Because DSLC milestones represent measurable changes in what is known and demonstrable about the solution itself rather than the type and amount of effort expended, **a team can use an Agile, Lean, traditional sequential, or hybrid approach to create their solution within the model**.

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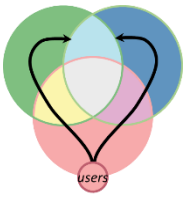
[20] Notice that while all three circles must be present to declare an Opportunity, only one circle need fall below a threshold for Obsolescence before that state exists.

Applications

This section contains a few examples of Three-Circle Model use:

- Application to an emerging healthcare usage
- Funding strategy
- Diagnosis and treatment of various organizational issues

Patient discharge tablet



Elderly patients with more than one chronic medical condition (such as diabetes and chronic obstructive pulmonary disease) are at elevated risk for hospital readmission within a few months of discharge, often due to their inability to correctly complete post-discharge instructions and home therapies. These readmissions are costly in both economic and human terms. In some cases, government agencies can issue a fine to a hospital if a patient is readmitted for the same chronic conditions within a certain period after discharge. In addition, each hospital admission incurs some risk to these frail patients, including infection and falls.

Could technology in a tablet sent home with such a patient at discharge reduce readmission rates and improve patient outcomes? High-resolution imaging (both 2D and 3D), data encryption, wireless and wired sensors, and many other technologies could be useful.

Potentially valuable capabilities include Remote Patient Monitoring,[21] reminders for medications, activities, and measurements, remote check-ins with clinicians (to prevent time-consuming, difficult, or costly travel to a hospital), access to educational materials, or even gamification applied to treatment regimens.

What business models might support such a tablet? At a low enough price point, they could be given away to each patient at discharge. Alternatively, they could be retrieved, sanitized, and refurbished, possibly permitting use of a more expensive device due to amortized cost across several cycles of use.

Private insurers might pay for the devices to reduce costs associated with readmission (given good evidence for device efficacy). Government agencies might pay for or defray the cost of devices, also for cost-saving reasons. Hospitals might support the device's costs for both economic and patient care quality reasons. Of course, various partnerships are also possible.

[21] Collecting vital signs and other measurements without requiring a trip to a hospital or other clinical setting outside the patient's home or residence.

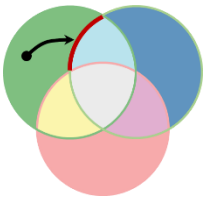
Usage challenges abound. Given the elderly user population, age-related hearing and vision loss will be common. Common hearing aid use negates ear buds or headphones for audio.

Can a tablet have the necessary screen size, resolution, contrast ratio, audio fidelity, and range of adjustments needed while still meeting the price target? If so, is it an existing, mass-produced model, or will it require custom design? If an off-the-shelf tablet at the right price point is not available with the necessary capabilities, the cost for a custom design might be infeasible given the potential market size and price constraints.

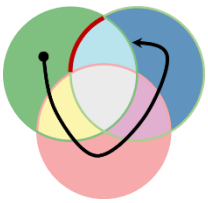
A full analysis and write-up for this example is well beyond the scope of this white paper. That said, it should be clear how systematic Three-Circle Model application permits robust, comprehensive, and coherent reasoning about both the problem and its potential solutions.

Regardless of a solution's impetus or the entry point into the model, the goal remains the same: create a balanced, coherent, validated, traceable description across the entire model.

Fixing a "stuck" mobile payment app



Suppose a start-up is having trouble getting investors to fund a new mobile payment app based on the information in their business model. This seems like it should be simple to do, because the app is an ingredient to an overall mobile payment solution and the *Ingredient* region is right next to the *Business* circle. But asking investors to fund development of another mobile payment app in a complex and already crowded marketplace has only led to frustration.



Rather than asking investors for money to build the app on business data alone, the start-up must make its case by showing it satisfies the entire model. With the proper data, the team can show that their investment in the app creates distinct new *Value* within a *Usage* through a unique *Capability* afforded by new and current *Technology*. After traveling this path, the app development is much more likely to be considered by investors because the team is able to speak in a compelling, balanced way to all of the model's regions.

The Three-Circle Model can be used in many other situations similar to these examples to analyze the situation and overcome incoherent or weak areas of understanding in order to make better decisions during solution development.

Diagnosing organizational issues

Beyond improving solution definition and decision making, the Three-Circle Model can serve as a diagnostic tool for organizations that are struggling to produce compelling solutions or that need to improve their solution development methods, practices, and processes.

Organizations and teams often inadvertently overweight or underweight some Three-Circle Model areas. For example, the organization's current development methods and practices might cause attention to be paid to just some model regions, or perhaps an important specialty is not involved in solution development until too late in the process.

You can use the Three-Circle Model to determine possible areas for organizational improvement by following this general process:

1. Draw the Three-Circle Model in outline form on a whiteboard.
2. Have individuals write down the names of all methods and practices currently used to create solutions on individual sticky notes. (For example, an organization might do user surveys, business canvass creation, Scrum, manufacturing QA, etc.)
3. Have the individuals place these sticky notes on the model in the area they each address. (For example, most user interviews belong in the *Usage* circle.)
4. Examine the overall pattern. Typically, some areas within the model end up well-populated, and others are sparse or even empty. An example is shown in Figure 10.
5. Repeat this exercise for:
    a. skills and specialties
    b. roles and responsibilities
    c. assumptions and risks
    d. captured data, models, and specifications

The diagrams that result from this exercise can give the organization a good picture of how well it is covering the model for methods, skills, roles, etc. Based on the results, the organization can take action where needed to either eliminate wasteful redundancy or close gaps. One common gap is around establishing roles and responsibilities for interdisciplinary collaboration. Many organizations have specialists within the various model regions but no one with the skills or responsibilities to bridge those regions in a holistic, interdisciplinary way.

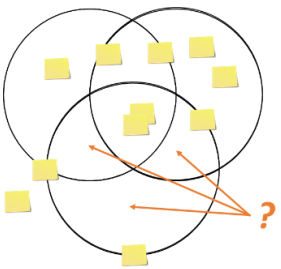


Figure 10

Model history and related work

Model history

Work on the Three-Circle Model began in about 2001 at Intel Corporation and continued intensely for several years. The model's major tenets were established and stable by December, 2003. The period from 2003–2007 was spent on the detailed taxonomy, typology, development ontology, and life cycle description, along with many applications to projects. The model attained the general form and detail level contained in this white paper in 2007. Minor revisions and additions have continued over the years to adapt and improve the model based on lessons learned from application and the changing engineering landscape.

The original Three-Circle Model authors were Erik Simmons and Brian Bramlett. Over the years, significant contributions have also been made by Sarah Gregory and Daniel Walsh.

Related work

The Three-Circle Model has similarities to and, in some cases, was influenced by several other models that were published in various books, articles, websites, and presentations. Some of these early models are reproduced here for reference and to give credit to the individuals who created them. This section is not an exhaustive or comprehensive literature survey. There might be other early models with similar traits to the Three-Circle Model, and many new variants have appeared in the past decade, but none were influences on the Three-Circle Model's development.

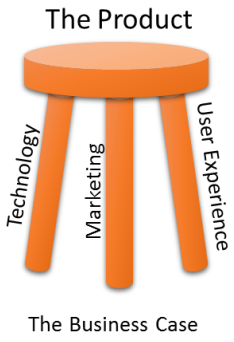


Figure 11

In 1998, Don Norman published a model[22] based on a three-legged stool metaphor (Figure 11). According to Norman, "A successful product must be balanced: marketing, technology, and user experience all play critical roles, but one cannot dominate the others."

Obvious differences between this model and the Three-Circle Model include the use of Marketing and User Experience as main model elements rather than their placement in the Three-Circle Model as an interdisciplinary cycle and the flow within *Usage*, respectively.

[22] See *The Invisible Computer: Why Good Products Can Fail, the Personal Computer Is So Complex, and Information Appliances Are the Solution,* The MIT Press, 1998

Alan Cooper is credited with a model from 2001 based on Business, People, and Technology[23] as reproduced in Figure 12. The model's overlapping regions are named as Politics, Engineering, and Art, with Architectural Design at the center.

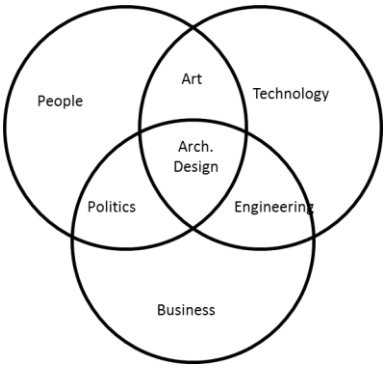


Figure 12

Cooper's model and the Three-Circle Model both use Business and Technology as names for main circles. But Cooper's model uses People for the third circle, where the Three-Circle Model prefers *Usage*. The term People is most similar to Users in the Three-Circle Model; that term serves as the flow of experience's focus within the *Usage* circle. The terms Art, Politics, and Architectural Design do not appear in the Three-Circle Model, though Design is used as the interdisciplinary cycle between *Usage* and *Technology*. The Three-Circle Model uses *Engineering* as the discipline at the center of workload flow within the *Technology* circle, rather than the overlap between Business and Technology. The Three-Circle Model names that region *Ingredient* instead.

A 2004 presentation by Dirk Knemeyer, founder of Boston design firm Involution Studios, contains a model also based on Business, People, and Technology. A secondary internal structure contains three overlapping circles for Form, Function, and Vision. The overlaps in that model are not named. Knemeyer's model is reproduced in Figure 13.

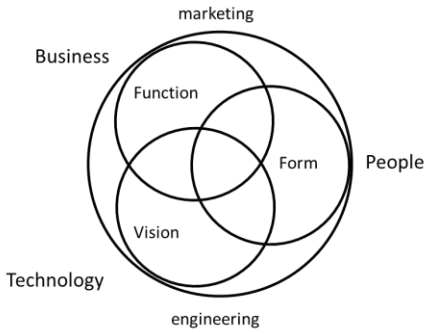


Figure 13

The Three-Circle Model lacks the terms Form and Function, though Functional is an attribute associated with the Technology perspective. Both Form and Function would be considered within the Three-Circle Model's Design cycle. Vision is included in the Three-Circle Model, but it is the used as the force that pulls a team forward while creating a solution within the DSLC. Marketing appears in the Three-Circle Model as *Market*, the interdisciplinary cycle between *Business* and *Usage* (approximating the term's position in Knemeyer's model, given a swap of People for Usage). Engineering appears in yet another location in this model, approximately where the *Design* cycle appears in the Three-Circle Model.

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[23] See *Gain AIGA Journal of Design for the Network Economy*, Volume 1, Number 2, 2001.

In 2005, design firm IDEO showed a model during a sales presentation that appears to have its roots in the same model by Keeley shown previously, based on capability, viability, and desirability. This model explicitly shows a loop for insights and opportunities that lead to implementation, as reproduced in Figure 14. As in the previous model, the overlaps are not named. This diagram and a large number of minor variants, can be found in many places on the Internet today.

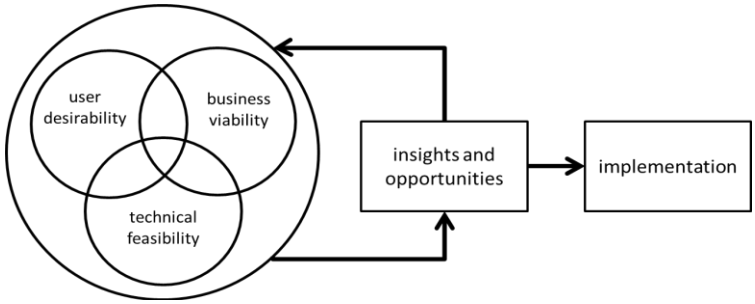

Figure 14

The most interesting addition of this model is the connection between the Venn diagram and an implementation life cycle. The Three-Circle Model contains a much more developed life cycle representation, but the fundamental spirit is the same in both models.

Learn more about solutions thinking and the Three-Circle Model

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